

PRESCHOOLER ILLNESS KNOWLEDGE QUESTIONNAIRE: A FORCED-CHOICE
MEASURE OF PRESCHOOLERS' ILLNESS KNOWLEDGE

By

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To my family and friends

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CHAPTER I

INTRODUCTION

Children's early conceptualization of illness is an important research area for pediatric health care providers. Over the past 30 years, researchers have investigated children's cognitive developmental process of acquiring illness knowledge with the ultimate purpose of providing a developmental framework to craft health promotion/disease prevention interventions and educational programs for children (Myant & Williams, 2005). Pediatric nurse researchers and practitioners have long understood that health promotion and disease prevention interventions and educational programs for children must be sensitive to their cognitive ability (Holiday, LaMontagne, & Marciel, 1994; Whitener, Cox, & Maglich, 1998).

Preschool children (4 to 5-years old) are a particularly important age group in which it is critical to understand early development of illness knowledge (Eiser, 1989). Better insight into their early conceptualizations of illness may yield the identification of malleable points thus, providing direction for future interventions and educational strategies for young children (Au, Romo, & DeWitt, 1999; Inagaki, 1992; Sigelman et al., 2000). However, many gaps in the current body of knowledge prevent a full understanding this phenomenon.

Problem Statement

The illness knowledge of children has been investigated over two decades; yet, several aspects of this phenomenon remain poorly understood. The concept of illness knowledge has been poorly defined, the most developmentally appropriate means of testing preschoolers has not been used, and a valid and reliable measure of preschoolers' illness knowledge has not been available. Conceptual and methodological differences in prior research likely contributed to incomplete, inconclusive and varied findings across studies of children's illness knowledge (Burbach & Peterson, 1986; Eiser & Kopel, 1997).

The concept of illness knowledge has not been well defined in prior research (Paterson, Moss-Morris, & Butler, 1999). The majority of previous investigations (e.g., Au, Slides, & Rollins, 1993; Kalish, 1996a, 1996b; Kister & Patterson, 1980; Rozin, Fallon, & Augustoni-Ziskind, 1985; Siegal, 1988; Siegel & Share, 1990; Solomon & Cassimatis, 1999; Springer & Belk, 1994; Springer & Ruckel, 1992) of children's illness knowledge have focused primarily on causes of illness such as contamination and contagion. A more comprehensive conceptualization of illness has been introduced but less studied. In addition to cause of illness, the conceptualization includes three additional components: identification, consequences, and cure of the illness (Leventhal, Diefenbach, & Leventhal, 1992; Leventhal, Meyer, & Nerenz, 1980).

Measures used in prior research have not been well suited for preschoolers' developmental needs. Semi-structured interviews, comprised of open-ended questions, were used in many of the illness knowledge studies

(Bibace & Walsh, 1981; Hagger & Orbell, 2003; Goldman, Whitney-Saltiel, Granger, & Rodin, 1991; Paterson et al., 1999; Perrin & Gerrity, 1981). Data collection strategies such as semi-structured interviews and open-ended questions have been criticized by several investigators (Siegal, 1988; Siegal, Patty, & Eiser, 1990). Specifically, semi-structured interviews are seen as misleading or repetitive for young children and open-ended questions belied preschoolers' cognitive ability because this age group does not have the vocabulary to adequately express their thoughts and ideas (Siegal). Using these types of questionnaires likely do not elicit preschoolers' maximal illness knowledge. Forced choice questionnaires were suggested as a better means to evaluate preschoolers' knowledge (Siegal).

Using testing formats that include a brief illness or health story followed by questions (i.e., story/questions) have shown promise in some studies that include preschoolers (e.g., Au et al., 1993; Hergenrather & Rabinowitz, 1991; Kalish 1996a, 1997, 1998; Kister & Patterson, 1980; Rozin et al., 1985; Siegel, 1988; Siegal & Share, 1990; Sigelman et al., 2000; Solomon & Cassimatis, 1999). For example, in a study (Siegal & Share) of children's contamination knowledge, participants were shown a glass of juice contaminated by a cockroach (i.e., the story) and then were asked to judge whether it was okay to drink (i.e., questions). Children responded to questions using yes or no and provided a justifications for their responses. Using the story/questions format, preschoolers' responses were more sophisticated and their immature lexicon did not limit their expression of illness knowledge as it did when using open-ended

questions. Unfortunately, researchers (i.e., Eiser & Kopel, 1997; Sigelman et al., 2000) have found that research studies using forced-choice measures to evaluate preschoolers' illness knowledge have not reported reliability and validity data for the instruments (e.g., Au et al.; Goldman et al.; Hergenrather & Rabinowitz; Kalish 1996a, 1997, 1998; Kister & Patterson; Rozin et al.; Siegel; Siegal & Share; Sigelman et al.; Solomon & Cassimatis).

A critical review of the literature indicated that a reliable and valid measure to evaluate a comprehensive conceptualization of illness knowledge for young children was not available. Therefore, this author designed a tool, the Illness Knowledge Questionnaire (IKQ), to fill this gap. The IKQ was designed to detect different levels of illness knowledge across four-illness dimensions (i.e., identification, cause, consequences, and cure) for various common illnesses (i.e., cold, asthma, skinned knee, and stomach virus).

Purpose and Research Questions

The overall purpose of this study was to psychometrically test a questionnaire of preschoolers' illness knowledge. The study had three specific aims and corresponding study phases: 1) to develop and establish the content validity of the IKQ; 2) to pilot test the IKQ with a cross-sectional sample of children (4- 5 year olds, 8-9 year olds, and 11-12 year olds); 3) to determine the scale structure, the reliability and the construct validity of the IKQ.

Significance

Society

Health promotion and disease prevention programs for children are a national priority (CDC, 2002, Introduction section, para. 1). In fiscal year 2003, the Centers for Disease Control (CDC) allotted over 23 million dollars for improving health, education, and well being of children and adolescents. Monies were designated for interventions by school health programs to address Healthy People 2010 objectives (U.S. Department of Health and Human Services, 2000), such as decreasing inadequate dietary patterns and increasing physical activity. Developmentally appropriate educational strategies have an integral role in achieving these and other objectives. Considering the substantial investment of federal monies to children's health, programs must be commensurate with children's cognitive ability.

Nursing

Developmental theory serves as a major underpinning of pediatric nursing practice. Specifically, cognitive developmental theory is fundamental to educating and intervening with children (Holiday et al., 1994; Natapoff, 1982; Rushforth, 1999; Whitener et al., 1998). Many nurses, however, do not consider new developments in cognitive developmental theory. In nursing reviews of children's cognitive development and understanding of health (Rushforth; Whitener et al.), cognitive developmental theories were either not included or minimal information

was provided. Nursing interventions and educational programs for children will not reflect recent cognitive theories until nurses become familiar with this literature, examine its utility to nursing practice, and integrate useful findings into practice.

Health education and interventions for children frequently are not guided by any cognitive developmental theory. In three large cohort studies designed to improve cardiovascular health or prevent obesity in children, developmental theory was not explicitly mentioned as guiding the development, implementation or evaluation of interventions (Edmundson et al., 1996; Harrell et al., 1996; Taylor et al., 2007). These studies were among several health-promotion intervention studies not explicitly addressing the integration of cognitive developmental theory. In an integrated review of 22 cardiovascular health-promotion intervention studies for children, cognitive developmental theory was not listed among the theoretical frameworks that were used by study investigators (Nicholson, 2000). More recently in an integrative review of seven intervention studies to prevent or treat obesity in preschoolers, cognitive developmental models were identified as the theoretical frameworks used in these studies. The authors, however, did not explicitly state how the models were used to deliver developmentally appropriate interventions (Bluford, Sherry, & Scanlon, 2007). This exclusion or omission of developmental theory undermines the salient importance of creating developmentally appropriate interventions and educational materials for children.

The lack of developmental consideration is surprising considering that

nurse researchers and practitioners repeatedly note the importance of children's cognitive ability when considering health/illness education (Gochman, 1992; O'Brien & Bush, 1997; Sigelman et al., 2000; Susman, Dorn, Feagans, & Ray, 1992). According to Healthy People 2010, an essential component of improving children's health/illness education is achieving health literacy, that is, the degree to which individuals process and understand basic health information to make appropriate health decisions (U.S. Department of Health and Human Services, 2000, p. 7-28). Nurses, other healthcare professionals, and government agencies identify cognition as integral to health education, disease prevention, and health-promotion programs for children. This underscores the need to explicitly address how cognitive development is considered and what strategies are implemented to ensure developmental appropriateness. Appreciating the strengths and limitations of theoretical and methodological issues related to children's knowledge development is critical to future pediatric health care practice and research.

Children's Health

Unhealthy behaviors such as physical inactivity, unhealthy diets and substance use are rampant among American children resulting in a generation of children whose health status during childhood is poorer than when their parents were children (O'Brien & Bush, 1997; Tinsley, Holtgrave, Reise, Erdley, & Cupp, 1995). The prevalence of obesity among adolescents has almost tripled in the past 20 years, and 13% of children (6 to 11) are overweight (Surgeon General,

n.d., First section, para, 1). Childhood obesity and physical inactivity are implicated as contributing factors in the emergence of typical adult onset diseases such as hypercholesterolemia, hypertension, and type 2 diabetes mellitus during childhood (Surgeon General, n.d., First section, para, 1). Investigating strategies to improve health promotion and disease prevention interventions likely includes incorporating data regarding children's knowledge development of health and illness phenomena. This information is critical to the development of appropriate health promotion and disease prevention interventions.

In summary, society's investment in children's health, nurses' utilization of developmental theory, and children's health status are significant areas that may be affected by better understanding children's early conceptualizations of illness. The potential effects of health promotion and disease prevention interventions that are grounded in cognitive developmental theory remain unrealized.

This study made significant contributions to this area as it addressed some of the noted limitations of prior research. Specifically, the target population of study was preschoolers and the measure developed as part of this study to assess illness knowledge used a forced-choice approach.

CHAPTER II

CONCEPTUAL FRAMEWORK AND REVIEW OF LITERATURE

In this section of the paper, the conceptual framework is described and relevant literature is reviewed. The conceptual framework for this study uses aspects of three theoretical orientations: the common sense representations of illness, stage-based health and illness developmental theory, and intuitive theory. First, the concept of illness is defined based on common sense representations of illness. Next, theoretical frameworks of cognitive development, stage-based theories and intuitive theory are summarized. Supportive literature for each framework is compared and contrasted including literature on preschoolers' knowledge of illness phenomena. Then, the utility of theoretical perspectives to explain illness knowledge development is examined.

Illness Knowledge

The concept of illness knowledge has not been well defined in prior research (Paterson et al., 1999). Most studies (e.g., Bibace & Walsh, 1980; Kister & Patterson, 1985; Perrin & Gerrity, 1980; Rozin et al., 1985; Siegal, 1988; Siegal & Share, 1990; Springer & Ruckel, 1992) of illness knowledge are limited to examining children's knowledge of the causes of illness such as contagion (i.e., the spread of illness by contact) or contamination (i.e., invisible particles on vectors) (Goldman et al., 1991; Paterson et al.). In the past eight years, a few

studies (e.g., Myant & Williams, 2005; Schmidt & Frohling, 2000; Williams & Binnie, 2002) have begun to investigate children's knowledge of other elements of illness such as treatment, time course and prevention but have not always provided a rationale or a theoretical basis for selecting these elements. The common sense theories of illness (e.g., Goldman et al.; Lau & Hartman, 1983; Leventhal et al., 1980; Paterson et al.) provides a more comprehensive conceptualization of illness knowledge.

According to common sense theories of illness, illness is a concept that encompasses five dimensions. The dimensions include identification (i.e., what it is), cause (i.e., factors that led to illness), consequences (i.e., effects/symptoms), cure (i.e., how to recover from illness), and time line (i.e., duration, treatment and reoccurrence) (Goldman et al., 1991; Lau & Hartman, 1983; Leventhal et al., 1992; Leventhal et al., 1980; Paterson et al., 1999). Leventhal et al. (1980) identified the dimensions of illness within the context of adults' representations of illness. A few researchers (i.e., Myant & Williams, 2005; Williams & Binnie, 2002) have assessed preschoolers' knowledge of illness timeline; however, their findings did not support that preschoolers have a well developed knowledge about the incubation period or recovery time of illness. The concept of time is complex and abstract making it difficult for children (Friedman, 1990). Researchers (e.g., Espinosa-Fernandez, de la Torre Vacas, Garcia-Viedma, Garcia-Gutierrez, & Torres Colmenero, 2004) who investigate children's knowledge of time report that most children do not learn conventional units of time until after age seven and do not have accurate estimates of time intervals

until eight years of age. Conceptualizing time as it relates to illness (i.e., duration of illness) is even more complex than conceptualizing time alone.

Cognitive development and illness knowledge

Preschoolers' knowledge of illness phenomena is a topic that has generated disagreement among investigators (e.g., Kister & Patterson, 1985; Rozin et al., 1985; Siegal, 1988; Siegal & Share, 1990; Springer & Ruckel, 1992). The debate centers on researchers' assertions about preschoolers' illness knowledge capabilities. Specifically, are preschoolers inherently limited in their illness knowledge or are preschoolers able to master facts about illness? At the heart of this conflict are the underlying theoretical perspectives, stage-based theory and intuitive theory. On one hand, investigators (e.g., Bibace & Walsh, 1980; Kister & Patterson; Perrin & Gerrity, 1980; Rozin et al.) from a stage-based perspective maintain that preschoolers have minimal illness knowledge. On the other hand, investigators (e.g., Siegal; Siegal & Share; Springer & Ruckel; Wellman & Gelman, 1998) from an intuitive theory perspective suggest that preschoolers' knowledge of illness is similar to older children's knowledge. The stage-based perspective and the intuitive theory perspective have different assumptions about cognitive development and therefore different expectations of preschoolers' knowledge ability.

Cognitive development is described in a stage-based perspective and intuitive theory perspective using mental structures. Mental structures are defined as mental representations of reality. The mental structures identified in stage-

based perspectives (i.e., stages) and intuitive theory perspective (i.e., theories), however, are dissimilar. The form and nature of mental structures impact how data are found, interpreted, and assimilated (Gelman & Williams, 1998). Thus, descriptions of cognitive development are profoundly influenced by the characteristics of mental structures assumed to exist (see Table 1).

Table 1. Comparison of Stage-Based and Intuitive Perspectives

	STAGE-BASED	INTUITIVE
Central Construct	Understanding	Knowledge
Mental Structures	Developmental stages	Foundational theories
Definition of Mental Structures	Developmental stages limit or constrain the causal complexity of children's reasoning across all content areas (i.e., domain general structures)	Foundational theories are coherent systems of knowledge that define the ontology and causal mechanisms of specific content areas called domains.
Domain Knowledge	Domain general structures	Domain specific knowledge
Domain Knowledge Impact on Cognitive Development	Does not influence development	Shapes and constrains conceptual understanding Knowledge systems from which predictions and explanations are formulated. Psychology, physics, and biology are examples of domains.
Developmental Stages Impact on Cognitive Development	Sensorimotor – (~ birth to 24 months) interaction with the environment through reflexes and physical actions Preoperational - (~ 2 to 7 years old) emergence of language and pretend play, absence of ability to reverse operation and conserve, Concrete operations - (~ 7 to 11 years old) begin logical operations, unable to form operations into structured wholes, and Formal operations - (~ 11 to 15 years old) logical structures are coordinated into wholes that are used to form hypotheses and construct propositions	Does not influence development

Developmental stages. From a stage-based perspective, mental structures are conceptualized as single content independent structures that characterize children's knowledge and understanding (Gelman & Baillargeon, 1983; Gelman & Williams, 1998; Miller, 1993). Developmental stages represent these single mental structures. Piaget (1967) described four sequential stages, sensorimotor, preoperational, concrete operations, and formal operations. Preschoolers, typically, are associated with the preoperational stage and their thinking is characterized as unsystematic and illogical (Miller). Similarly, preschoolers' illness knowledge is characterized as illogical and magical among investigators (e.g., Bibace & Walsh, 1980; Perrin & Gerrity, 1980) who draw from a Piagetian perspective. From this perspective, four to six year old children have limited knowledge because they are constrained by a single mental structure (i.e., developmental stage).

Theories. In contrast, mental structures described from an intuitive theory perspective are assumed to be multiple, domain-specific theories that are organized into coherent framework theories (Wellman & Gelman, 1992, 1998). Framework theories provide humans with foundational knowledge about phenomena (i.e., psychology, physics and biology) that at an evolutionary level serve to enhance basic survival (e.g., the knowledge early human species needed about plants and animals to choose nutritious foods or identify predators) (Cosmides & Tooby, 1994; Wellman & Gelman, 1992, 1998). According to the tenets of intuitive theory, preschoolers have framework theories; therefore, even preschoolers are knowledgeable about basic psychology, physics and biology

phenomena. Relevant to preschoolers' illness knowledge is the framework theory of biology. Natural processes such as maturation (i.e., growth), inheritance (i.e., transmission of physical features from generation to generation), contagion (i.e., transmission of germs from person to person) and contamination (i.e., infiltration of germs on objects) are considered foundational biological knowledge (Carey, 1985; Hatano & Inagaki, 1994; Siegal & Peterson, 1999; Wellman & Gelman, 1992, 1998; Wellman, Hickling, & Schult, 1997). Thus, from an intuitive theory perspective preschoolers are thought to have foundational knowledge about illness phenomena.

Stage-based perspective and intuitive theory perspective's expectations of preschoolers' illness knowledge differ. A review of studies that examine preschoolers' illness knowledge capabilities is provided to compare and contrast perspectives.

Preschoolers' illness knowledge capability

In general, preschoolers demonstrate rudimentary knowledge of illness phenomena, specifically knowledge of contamination and contagion. They appear to have knowledge of illness identification, consequences, and cure, as well. Preschoolers' knowledge of illness has been underestimated by prior research (Siegel, 1988). However, their illness knowledge is incomplete. In addition, preschoolers' knowledge of illness is not adequate to support that they have a framework theory of biology. Support for each of these findings is provided below.

Contagion. Contagion has been examined by several researchers (Kalish, 1996a; Kister & Patterson, 1980; Siegal, 1988; Solomon & Cassimatis, 1999) as a component of children's knowledge development over the last two decades. In general, contagion is conceptualized as the transmission of illness via person-to-person contact. Preschoolers have rudimentary knowledge about contagion especially with familiar illnesses such as colds, although their knowledge is incomplete. Preschool children can correctly judge that being in proximity to someone who has a cold or is "sick" can lead to illness (Kalish; Kister & Patterson; Siegal). Similarly, preschool children are more likely to judge symptoms typical of colds (i.e., cough, runny nose) versus other illness symptoms (i.e., stomachache, rash) as contagious (Solomon & Cassimatis, 1999). Thus, preschoolers appear to be knowledgeable that colds are contagious.

Although young children are knowledgeable about contagion in familiar illnesses, they frequently overextend contagion to noncontagious illnesses (Kister & Patterson, 1980; Siegal, 1988; Solomon & Cassimatis, 1999). Research suggests that one third or more of four to seven-year old children predict that illness caused by accidents (i.e. scraped knee), noncontagious illness (i.e., toothache, exposure to poisons), or both are contagious (Kister & Patterson; Siegal). In a study (i.e., Solomon & Cassimatis) examining children's contagion knowledge, four to seven year old children were told that a story character developed an illness symptom (e.g., coughing) caused by poison. Despite knowing that a poison caused the symptom, most four to seven year old children

thought that the illness symptom was contagious (Solomon & Cassimatis).

Preschool children appear to indiscriminately apply contagion in some situations.

Preschoolers often overextend contagion; however, they do not think that all illnesses are contagious (Kalish, 1996a). For example, preschoolers predict contagion preferentially for illnesses caused by “playing with a sick friend” over illnesses caused by various events such as being hit in the stomach with a baseball, being stung by a bee; falling off a swing, and breathing in pollution (Kalish). Preschoolers identify illnesses as contagious only when they are told that an individual is exposed to an ill person (Kalish). By eight years of age children do not overextend contagion to noncontagious illnesses and by age 10 children correctly distinguished between symptoms caused by poison and by contagion. These findings support that preschoolers’ knowledge of contagion is incomplete when compared to contagion-knowledge of older children.

Contamination. Contamination like contagion is identified as an important component of children’s illness knowledge development (Au et al., 1993; Kalish, 1996b; Rozin et al., 1985; Siegal, 1988; Siegal & Share, 1990; Springer & Belk, 1994; Springer & Ruckel, 1992). Children’s knowledge of contamination is the awareness of unseen or invisible particles on objects or vectors. Preschoolers are knowledgeable about contamination (Au et al.; Kalish; Siegal; Siegal & Share; Springer & Belk; Springer & Ruckel). Preschoolers reject contaminated edible items under conditions that vary on type of item (e.g., milk, juice, cookies) and contaminant (i.e., insect, comb, garbage) (Siegal; Siegal & Share). Furthermore, preschool children’s responses to contaminated drinks are not

significantly different from children in the first and third-grade (Siegal). Contrary to the notion that preschoolers' contamination-knowledge is perceptually bound, preschoolers reject contaminated beverages whether contaminants are visible in liquids or not (Siegal; Siegal & Share). These findings support that preschoolers are knowledgeable about contamination.

Children's knowledge of contamination is frequently examined in concert with children's knowledge of invisible causal mechanisms or germs (Au et al., 1993; Kalish, 1996b; Springer & Belk, 1994). Preschoolers are familiar with the concept of germs and associate it with illness in contamination stories (Kalish). Prior research indicates that preschoolers preferentially predict illness in contamination situations where germs are explicitly mentioned versus conditions where germs are not mentioned (Kalish). Although preschoolers have rudimentary knowledge of germs, the depth of their germ-knowledge is limited.

Preschoolers' germ-knowledge is limited when the term *germs* is not explicitly stated (Au et al., 1993; Springer & Belk, 1994). Five-year old children appreciate that invisible particles (i.e., germs) cause contamination but three and four-year old children must be prompted before they refer to invisible particles (Au et al.). Most three to eight year old children may know that material contact is necessary for contamination; however, in a study of children's contamination sensitivity, only 30% of three to four year olds and 50% of seven to eight year old children could spontaneously identify germs as the causal agent (Springer & Belk). Consistent with prior research that suggests preschoolers' limited

vocabulary belies their cognitive ability (e.g., Siegal, 1988), their knowledge of germs appears to be contingent upon verbal prompts.

Immanent justice. The concept of immanent justice (i.e., misdeeds cause illness) is not a causal explanation for illness that preschoolers consistently use. In two early studies (i.e., Kister & Patterson, 1980; Rozin et al., 1985) of children's contamination and contagion knowledge, findings support that preschoolers use immanent justice causal explanations. For example, when asked whether familiar conditions (i.e., tooth ache, scraped knee) are contagious, preschool children accept more immanent justice explanations than school age children accept (Kister & Patterson). Although findings support immanent justice as a causal explanation of illness used by preschoolers, study methodologies are criticized by several investigators (Siegal, 1988; Siegal & Share, 1990; Springer & Ruckel, 1992).

When research methodologies are altered, preschool children do not use immanent justice as a causal explanation (Eiser, 1989; Siegal, 1988; Siegal & Share, 1990; Springer & Ruckel, 1992). For example, the use of forced-choice questions and visual prompts such as videos create favorable experimental methods for preschool children (Siegal). Preschoolers reject immanent justice and demonstrate knowledge of contagion when these methods are implemented. Some investigators (i.e., Siegal; Siegal & Share) criticize the procedures by Rozin et al. (1985) because children were subjected to social pressures. Rozin et al. investigators consume contaminated food then asked children if they would consume the food. Preschoolers capitulate to the social pressure of the

investigators (i.e., Rozin et al.); thereby, falsely elevating the percentage of preschooler who accepted contaminated food. When testing procedures are free of social pressures, preschoolers are more likely to know that ingestion of contaminated foods causes illness, and they are more likely to reject misdeeds as a cause of illness (Siegal & Share; Springer & Ruckel). Even when stories of misdeeds are judged by young children to cause illness, many preschoolers explain that contamination results from misdeed, which then lead to illness (Springer & Ruckel). Studies about immanent justice provide important information about preschoolers' illness knowledge. Specifically, testing procedures need to be sensitive to the developmental needs of young children.

Dimensions of illness. In addition to having knowledge of causes of illness such as contagion and contamination, investigators have found that preschoolers are knowledgeable about the identification, consequences, and cure of illness (Goldman et al., 1991; Hergenrath & Rabinowitz, 1991; Kalish, 1997; Myant & Williams, 2005; Schmidt & Frohling, 2000; Sigelman et al., 2000; Williams & Binnie, 2002). Illness is identified by preschoolers as a set of symptoms. For example, a cold is an illness that consists of a runny nose, sneezing and coughing; whereas, a fever consists of a hot forehead and a high temperature (Goldman et al.). Preschool children are knowledgeable of illness consequences (Goldman et al.; Sigelman et al.). Preschoolers recognize that changes in bodily processes not mental processes underlie illness (Kalish, 1997). For example, most young children describe consequences of illness using somatic descriptors such as feeling hot, having a cough, or feeling yucky that appeal to physical

aspects and to a lesser extent psychological aspects of illness (Goldman et al.). Yet, unobservable biologic consequences such as an elevation of white blood cells are not identified. Similarly, most children do not know the biologic effects of alcohol on the brain and circulation. However, when five to seven year old children were asked whether alcohol makes the brain work slower or makes the brain work faster, young children knew that alcohol was a depressant (Sigelman et al.). Preschoolers are able to provide simplistic explanations of illness consequences.

Preschoolers describe cure within the context of personal and social activities such as resting and going to a health care provider (Goldman et al., 1991; Schmidt & Frohling, 2000). However, preschoolers are capable of correctly identifying cures to illnesses with modified testing procedures. When preschoolers were provided forced-choice responses to explain recovery from common illnesses (i.e., cold, scraped knee, and broken arm) almost half of preschoolers selected responses depicting external physical processes (i.e., applying topical medications) or internal bodily processes such as “healthy cells” overcoming “unhealthy/bad cells” (Williams & Binnie, 2002). Preschoolers’ knowledge of illness identification, consequences and cure is not as well supported as preschoolers’ knowledge of illness causes; however, preschoolers appear to appreciate multiple dimensions of illness.

Utility of stage-based and intuitive theory perspectives

Preschoolers' illness knowledge capabilities seem more advanced than predicted by stage-based frameworks. Prior findings (Au et al., 1993; Eiser, 1989; Kalish, 1996b; Siegel, 1988; Siegel & Share, 1990; Springer & Belk, 1994; Springer & Ruckel, 1992) suggest they are knowledgeable about contagion and contamination and appear to reject immanent justice as a causal explanation of illness. Although the intuitive theory perspective accurately predicted preschooler's knowledge capabilities in the aforementioned studies, this perspective does not adequately address illness concepts because most humans consider illness a biological and psychosocial process (Kalish, 1996a; Parmelee, 1992).

A framework theory of biology is a mental structure that defines the ontology and basic causal devices within the biological domain according to intuitive theory perspective (Wellman et al., 1997). Ontological categories within the domain of biology include humans, other animal species and plants, and causal processes. The expectation is that illness phenomena will be described and understood by the underlying biological causal process; however, illness is a complex concept, and people do not exclusively use causes to understand illness. For example, if preschoolers and adults characterize illness using a biological framework theory then they will use underlying illness causes to make this determination. However, adults and children characterize illness as a prototype representation meaning they use a set of illness symptoms and causes to define a "best instance" of illness (Kalish, 1996a, p.1648). In other words,

neither adults nor preschoolers appear to conceptualize illness from a strictly biological framework because they use observable symptoms and biological causes to understand illness. Thus, illness may be too complex of a concept to be explained exclusively within a biological framework.

In addition, young children do not appear to have a coherent framework theory of biology. As a coherent system of knowledge, a framework theory should provide a mental structure that is used to make inferences. The notion that preschoolers' knowledge of germs is based on a coherent intuitive theory of biology is not well supported (i.e., Kalish, 1996b; Solomon & Cassimatis, 1999; Springer & Belk, 1994). If preschoolers are knowledgeable about illness within a biological framework, then they should appreciate that germs are ontological members of living things; however, they do not appreciate germs as living things (Solomon & Cassimatis). Few preschoolers characterize germs into the same ontological category as plants and animals. This knowledge gap limits their ability to make inferences about germs, such as germs multiply to survive or use humans as hosts for nutrients. However, older children are able to correctly characterize germs (Solomon & Cassimatis). Preschool children's knowledge of germs is inadequate to support that their theory of biology is a coherent system of knowledge. Older children's knowledge of germs is consistent with a coherent system; however, their system of knowledge may be due to formal education about germs and not a framework theory of biology. Thus, a coherent framework theory of biology does not appear to be an adequate model to explain children's illness knowledge development.

The intuitive theory and stage-based theory are the theoretical perspectives used most often in studies of children's illness conceptualizations (Sigelman et al., 2000); however, neither perspective provides a completely accurate account of children's illness cognitions. On one hand, the stage-based perspective underestimates preschoolers' illness knowledge by characterizing it as magical or temporally based. On the other hand the intuitive theory perspective has not supported that illness is exclusively a biological phenomena or that preschoolers have a coherent framework theory of biology. Despite these limitations both perspectives provide important insights into preschoolers' illness knowledge development. The intuitive theory perspective is recognized as an important catalyst that prompted many researchers to reevaluate preschoolers' cognitive capabilities and discover that preschoolers have rudimentary knowledge about illness. The stage-based perspective illustrates the differences in children's illness knowledge across age groups. In other words, the intuitive theory suggests that children have boundless cognitive abilities while the stage-based perspective gives their cognitive ability structure. Given the limitations and strengths of both perspectives, the best theoretical perspective is likely a combination of the two. In this study, the stage-based and intuitive theory based perspectives were combined into a framework where children's illness knowledge is expected to increase with age and preschoolers' are expected to have rudimentary illness knowledge that is not limited to magical or temporal thinking.

Measurement issues related to illness knowledge

A major limitation in examining preschoolers' knowledge of illness is identifying an instrument that is psychometrically tested and developmentally appropriate for preschool children. Existing instruments of illness dimensions are inappropriate for children because they were designed for chronically ill adults (Moss-Morris, Weinman, Petrie, Cameron, & Buick, 2002; Weinman, Petrie, Moss-Morris, & Horne, 1996), use open-ended questions (Goldman et al., 1991; Myant & Williams, 2005; Paterson et al., 1999), or forced-choice questions without psychometric assessment (Williams & Binnie, 2002).

The Illness Perception Questionnaire (IPQ) and the Revised Illness Perception Questionnaire (IPQ-R) are two quantitative measures of the five dimensions of illness (i.e., identify, cause, consequence, cure, and timeline). The IPQ is a 38 item questionnaire with five subscales that assess the five dimensions of illness using either a four point (identify scale) or five point (cause, consequence, cure, and timeline scale) Likert type response scale (Weinman et al., 1996). The IPQ-R is an 80 item questionnaire that was developed to improve the original IPQ by refining two of the existing subscales (i.e., cure and timeline) and adding three subscales (i.e., timeline cyclic, coherence, and emotional dimensions) (Moss-Morris et al., 2002). Psychometric assessments have been reported for both indicating that the internal consistency for the IPQ subscales (.73 - .82) and the IPQ-R subscales (.79 - .89) were good and that the validity of both measures were supported (Moss-Morris et al.; Weinman et al.). These instruments are commonly used in studies that examine individuals' illness

representations (Hagger & Orbell, 2003). These measures, however, were not appropriate for this study because test items were not designed for healthy populations. The IPQ and IPQ-R examine respondents' perceptions about their chronic illness (e.g., consequences item: my illness is a serious condition). Therefore, items are not pertinent to respondents who are not ill. Furthermore, the reliability and validity of the IPQ and IPQ-R were established with adult populations (Hagger & Orbell).

In summary, illness is a construct that healthy preschoolers can conceptualize. Preschoolers' illness experiences likely contribute to their ability to formulate ideas and reason about illness. The IPQ and IPQ-R provide excellent examples of the feasibility of developing a reliable forced-choice questionnaire to assess the dimensions of illness knowledge.

Given this potential, the overall purpose of this study was to psychometrically test a questionnaire of preschoolers' illness knowledge. The three specific aims of the study included: 1) to develop and establish the content validity of the IKQ; 2) to pilot test the IKQ with a cross-sectional sample of children (4- 5 year olds, 8-9 year olds, and 11-12 year olds); 3) to determine the scale structure, the reliability and the construct validity of the IKQ.

CHAPTER III

METHODS

This chapter describes the three-phase methodology related to the development and preliminary psychometric evaluation of the Illness Knowledge Questionnaire (IKQ). Phase I included the initial development and evaluation of the content validity of the IKQ and Phase II included the pilot test of the IKQ and health history questionnaire (HHQ). A complete description of each of these phases follows below. The main purpose of the last phase of this project, Phase III, was to determine the scale structures, reliability and construct validity.

Phase I

Purpose

The purposes of Phase I were to create a developmentally appropriate questionnaire (i.e., the Illness Knowledge Questionnaire) to assess preschoolers' illness knowledge, establish the content validity of the tool, and create a health history questionnaire. This phase involved four steps: the development of the initial draft of the IKQ, the assessment of its content validity, the revision of the IKQ based on feedback from identified research and clinical experts, and the confirmation of questionnaire revisions by the identified research and clinical experts. A description of each of these steps follows.

Step 1: Development of the illness knowledge questionnaire

The development of the IKQ began with extensive review of the literature as summarized in Chapter II. Synthesis of the literature facilitated the initial delineation of the content domain of illness knowledge for item development. Common sense theories of illness provided a framework to define the concept of illness. Leventhal et al. (1984) identified five dimensions (i.e., identify, cause, consequence, cure, and timeline) of illness. The questionnaire was formatted based on measures in prior literature that used stories or vignettes followed by multiple-choice questions with three or more choices (e.g., Hergenrather & Rabinowitz, 1991; Inagaki & Hatano, 1993; Raman & Winer, 2002; Williams & Binnie, 2002), and that changed the gender of story characters to match the gender of the participant (e.g., Inagaki & Hatano).

Initial drafts of the questionnaire (see appendices A & B) were submitted to the author's dissertation committee, consisting of two advanced practice pediatric nurses, a statistician, and a developmental psychologist, for evaluation of the content and format. The initial review did not include the visual cues (i.e., line drawings) that would be included on the questionnaire, as they were not yet developed. Committee members made several suggestions related to clarifying the element tested (i.e., knowledge versus representation or understanding), simplifying the use of gender in items (i.e., use either a boy character or a girl character in each vignette rather than both genders), limiting choices to two, and refining the method of calculating scores. Their suggestions were used to modify and guide the final format of the instrument.

Instrument format. Choice of content, item format, item presentation and visual cues were formatting considerations for the IKQ. A short vignette followed by forced-choice questions with visual cues of choices was considered the most developmentally appropriate testing format. The vignette format provided a means of presenting questionnaire items in an entertaining manner for preschoolers. Vignettes were presented to child participants as stories about children who were sick. Vignettes and questions were read by the researcher while child participants looked at visual cues.

Development of the choices for questions was guided by prior research findings (e.g., Bibace & Walsh, 1980; Perrin & Gerrity, 1981) related to developmental levels of children's illness knowledge. Choices were kept uncomplicated for preschoolers by using two choices for each question, one correct and one incorrect choice. Correct choices were designed to be simple, accurate accounts of illnesses or diseases. On the other hand, incorrect choices were designed to be unequivocally wrong. For example, many incorrect choices were designed to be consistent with preschoolers' magical-thinking and temporal/spatial orientation of illnesses and diseases while other incorrect choices did not use physiologic and anatomic terms correctly.

To distinguish preschoolers who were knowledgeable about illnesses from preschoolers who were not as knowledgeable, a relatively easy and a relatively difficult item were paired together (e.g., easy cold identify item with a difficult cold identify item; easy skinned knee cause item with a difficult skinned knee cause item, etc.). With this format, the author anticipated that preschoolers

who were more knowledgeable about illness would correctly answer both items while children who were less knowledgeable would either correctly answer one question or no questions. Table 2 depicts the format for correct and incorrect choices of easy and difficult items.

Table 2. Format for Easy and Difficult Items

ITEM TYPE	CHOICE TYPE
Easy Item	Correct Choice: Well known fact True general information
	Incorrect Choice: Inconsistent information Implausible information
Difficult Item	Correct Choice: Well known fact plus the use of illness or physiologic terms True specific information
	Incorrect Choice: Similar wording to correct choice Incorrect use of illness/physiologic terms

Criteria for visual cues were adapted from criteria used to develop pictures for the Peabody Picture Vocabulary Test, 3rd edition (Williams & Wang, 1997). Drafts of the author's conceptions of drawings were submitted to a professional artist. Visual cues of choices were developed by a professional artist as simple line representations that depicted an equal number of main characters from both genders and a variety of racial/ethnic characters (i.e., African-American, Caucasian, Hispanic, and Asian). In addition, drawings of vignette characters included clothing and environments that were familiar to participants.

The Illness Knowledge Questionnaire. A final draft of the questionnaire with drawings was submitted to the dissertation committee. Overall, the draft was well received; however, the committee members recommended eliminating the timeline items. Thus, the timeline dimension was not used in this study because

the concept of time was complex and abstract making it difficult for young children to comprehend (Friedman, 1990). The final draft of the IKQ was modified by removing all timeline items and the Illness Knowledge Questionnaire was produced (see Appendix C).

The initial IKQ was a 32-item questionnaire that included four brief vignettes. Each vignette described a child who had an illness (i.e., a cold, skinned knee, an upset stomach, and asthma). The vignette also established the context for the questionnaire (i.e., vignette character has “friends who ask questions about the character’s illness or disease”). Vignettes were accompanied by a simple line drawing of the child featured in the vignette. Following each vignette were four sets of items representing each illness dimension (i.e., identify, cause, consequence, and cure) and two items related to each of the four illness dimensions. Items for each illness dimension (called illness dimension items in this paper) had similar stems (e.g., “What is *X illness*?”; “How did *the character* get *X illness*”; “What happens to *the character* when he has *X illness*”; “How will *the character* get better from *X illness*?”). Within the context of the vignette, the illness dimension items were presented as the questions that “two friends ask” (e.g., two friends ask “What is *X illness*”). All illness dimension items had a pair of choices (i.e., one correct and one incorrect) with accompanying simple line drawings that illustrated the condition. Each pair of choices had one of two introductory stems. The choice presented first began with “One friend says,” and the choice presented second began with “The other friend says.” The introductory stems provided a referent for the person who answered the “two

friends” question. One of the choices was selected by child respondents in response to the question posed to them, “Which kid has the best answer?” here after referred to as the “best” question.

Scores for each dimension within a vignette ranged from 0 – 2, with 0 = least knowledge and 2 = most knowledge. Total dimension scores (i.e., sum of like dimensions across four illnesses) were computed and ranged from 0 - 8. Scores closest to eight indicated high knowledge level and scores less than four indicated low knowledge levels. A total score (0 - 32) for all dimensions was calculated for a total IKQ score. The IKQ was estimated to take 20 - 30 min. to administer.

Results: Step 1. The initial IKQ, as described above, was approved by the dissertation committee. This initial version of the IKQ was the product of revising several drafts (i.e., clarifying the IKQ as a test of knowledge, simplifying the presentation of vignette characters, refining the scoring and eliminating timeline items) based on committee recommendations. The IKQ from step 1 of Phase I included four vignettes, 32 dimension items, 64 item choices. There was one image for each item choice and four vignette images for a total of 68 images. Two scores are calculated from the IKQ; the total dimension score and the total IKQ score. With the questionnaire designed and formatted, the next step in the development of the IKQ was an initial assessment of content validity by a panel of pediatric professionals with clinical and research expertise.

Step 2: Assessment of content validity

Methods: Identification & contact of experts. Researchers with expertise related to content and instrument development were identified by three means. Word-of-mouth was used to identify experts within the Vanderbilt community; national nursing organizations (e.g., National Association of Pediatric Nurse Practitioners; Sigma Theta Tau International, Southern Nurses Research Society) in which the author has membership were used to identify nurse researcher experts; and experts in children's illness knowledge development were identified in the literature. The Vanderbilt Directory was used to obtain e-mail contact information for experts within the Vanderbilt community. E-mail lists for special interest groups were obtained via nursing organizations and the Internet was used to identify e-mail addresses of nationally known experts.

After receipt of institutional review board (IRB) approval, 19 identified experts (10 nationally known experts; five pediatric nurse researchers, one practicing pediatrician, one practicing nurse practitioner, one developmental pediatrician, and one social psychologist) were contacted via e-mail with an invitation to participate in the study. The e-mail included an overview of the purpose and significance of the study and assured their confidentiality if they participated in the research study (see Appendix D). A link to an on-line instrument evaluation form was included in the e-mail. The on-line evaluation form included instructions to complete the form, definitions of major constructs, IKQ items and associated images, an item evaluation scale, space for comments, and demographic questions (see Appendix E for excerpt). Two

experts were unable to use the on-line survey because of technical difficulties. One expert lacked on-line experience; thus the author conducted a phone interview with this expert by reading items to her. The other expert did not have broadband internet services and was unable to open the survey. This expert completed a paper-pencil version of the survey. Experts were given four weeks to respond to the survey; a reminder e-mail was sent during week three.

Sample. Seven of the content experts (i.e., three pediatric nurse researchers, one practicing pediatrician, one practicing nurse practitioner, one developmental pediatrician, and one social psychologist) completed the survey. Six of the identified experts did not provide any response and an additional six experts responded via e-mail stating that they were not able to complete the survey because of prior commitments. Several of the nationally known experts stated that they were inundated with requests to act as an expert; therefore, they must decline most of these requests.

On-line survey. Content experts who completed the on-line survey evaluated the IKQ (see Appendix C) sequentially beginning with the first vignette (i.e., cold vignette). Six components of the IKQ were evaluated: the vignette stems, vignette images, the illness dimension items, choices, images of choices, and the question posed to child respondents. Content experts responded to 298 dichotomous (yes/no) questions about the relevance, clarity, and/or appropriateness of the IKQ components. All vignettes and accompanying images were evaluated for appropriateness (i.e., developmentally appropriate) for preschool age children (4-5 years old) and clarity (i.e., clear wording or clear

illustration). Only illness dimension items (e.g., “What is *X illness*?”; “How did *the character* get *X illness*”; “What happens to *the character* when he has *X illness*”; “How will *the character* get better from *X illness*?”) in the cold vignette were evaluated for appropriateness, clarity, and content validity (i.e., content relevance) because illness dimension items were the same in all vignettes. To minimize the redundancy of content on the on-line survey, content experts were not asked to evaluate the illness dimension items in the other vignettes (i.e., asthma, skinned knee, and upset tummy). All choices and choice images were evaluated for appropriateness and clarity. The “best” question was evaluated for appropriateness and clarity only once by content experts to minimize survey redundancy. Finally, content experts provided narrative data (i.e., comments, suggestions, or both) for any element of the IKQ that was judged as inappropriate, unclear, and/or not relevant. Table 3 summarizes IKQ components and type of data collected.





Table 3. Expert Ratings Type of Data Collected

DICHOTOMOUS YES/NO	COMPONENT			COMMENTS
	Clarity	Appropriateness	Relevance	
Vignettes (4)	X	X		X
Vignette images (4)	X	X		X
Illness dimension items (8)	X	X	X	X
Choices (64)	X	X		X
Choice images (64)	X	X		X
Final question (1)	X	X		X
Number of possible expert evaluations	145	145	8	145

Data analysis consisted of examining the percentage of yes responses to clarity, appropriateness, and, when applicable, relevance of questions for the IKQ components. The rating of a component was determined as satisfactory when at least six of the seven experts (86%) selected “yes” in response to each question about the component. An analysis of narrative data (202 comments) was conducted by collating the experts’ comments about each component and using the comments directly to revise components. The final evaluation of IKQ components was made based on quantitative and qualitative data.

Results: Step 2. Of the four vignettes, the Asthma and Stomach ache vignettes received satisfactory ratings for the vignette and image. Table 4 details the ratings of vignettes. The narrative data revealed that several experts found the wording for the Cold and Skinned knee vignettes confusing. For example, one (E-3) of the seven experts stated “‘This is Billy. He has a cold. His friends ask questions about his cold.’ From there this gets confusing—are his friends asking the questions or giving the answers?” Several experts also suggested that the skinned knee of the character in the skinned knee vignette needed to be visible.

Table 4. Vignettes and Images

VIGNETTE & IMAGE		CLARITY (%)	APPROPRIATE (%)	RATING
#1 COLD 	Vignette	86	71	Unsatisfactory
	Image	86	100	Satisfactory
#2 ASTHMA 	Vignette	86	86	Satisfactory
	Image	86	100	Satisfactory
#3 SKINNED KNEE 	Vignette	71	86	Unsatisfactory
	Image	57	71	Unsatisfactory
#4 UPSET TUMMY 	Vignette	86	86	Satisfactory
	Image	100	100	Satisfactory

All of the illness dimension items received satisfactory ratings except for one of the cure items (see Table 5). This cure item (i.e., #7 How will he get better?) was rated as relevant and clear by all experts; however, only five experts found the item appropriate and two experts did not provide any rating for the appropriate question. No comments or suggestions were provided about item # 7; therefore, the narrative data did not provide any explanation about why the two experts did not rate the appropriateness of item # 7. Several comments and suggestions were offered about the other illness dimension items. One expert (E-3) questioned why the introduction was presented twice, and stated “This might be confusing to the child.” No other expert commented on the repetition of the illness dimension items. Other comments were made about the wording of the illness dimension items. For example, one expert (E-2) suggested revising the “cause” item. “You might want to change this to ‘How did Billy get the cold?’ or, ‘How did Billy get his cold?’” While another expert (E-5) suggested that the

“consequence” item needed to be altered to better reflect the lexicon of a preschooler: “4 and 5 years usually do not say what ‘happens’ they might [say] how come.”

Table 5. Illness Dimension Items – Cold vignette

DIMENSION	ITEM #	RELEVANT (%)	CLARITY (%)	APPROPRIATE (%)
IDENTIFY	# 1	100	100	100
	# 2	86	100	86
CAUSE	# 3	100	100	100
	# 4	86	100	86
CONSEQUENCE	# 5	100	100	100
	# 6	100	100	86
CURE	# 7	100	100	71*
	# 8	100	100	100

* Only five of the seven experts responded to the “appropriate” question

Of the 64 choices and accompanying images, 78% ($n = 50$) of the choice/image pairs (C/I pairs) received satisfactory ratings for either both or one component of the C/I pair. Forty percent ($n = 26$) of the C/I pairs received satisfactory ratings for both the choice and image meaning the choice and the image were clear and appropriate (see Table 6). The majority (85%) of C/I pairs that were mutually satisfactory were “correct” choice/images.

Table 6. Mutually Satisfactory – Choice and Image



























CHOICE	IMAGE	CO/ IN	ChCI (%)	ChAp (%)	ICI(%)	IAp(%)
3-B. He got a cold playing with a friend who has a cold.		CO	100	100	86	100
4-B. He got a cold because he ate ice cream.		IN	100	86	100	100
5-A. He will feel happy and want to play.		IN	100	86	100	100
5-B. He will feel yucky and not want to play.		CO	100	100	86	100
7-A. He needs medicine.		CO	86	100	100	100
7-B. He needs a toy.		IN	86	100	100	100
10-A. It can make you cough a lot and makes it hard to breath.		CO	100	86	86	100
11-A. She got it playing with a friend who has asthma.		IN	100	86	100	100
11-B. She just has it.		CO	100	100	86	86
12-B. The tubes that bring air to her lungs are too tight.		CO	86	100	86	86
13-A. She will need to stay at home and rest.		CO	100	100	86	100
14-A. She will have a hard time breathing and not want to play.		CO	100	100	86	100
15-B. She needs medicine.		CO	86	100	100	86
16-B. She needs to take special medicine that she breathes into her lungs.		CO	100	100	86	100
17-A. It is a booboo.		CO	86	86	100	100
18-A. It is a sore that is red and bleeds.		CO	100	100	100	100
19-A. He hurt his knee.		CO	100	86	100	100
21-A. He needs to be careful to not hit his knee again.		CO	86	86	100	100
22-B. It might leave a scar.		CO	86	86	86	86
23-A. Put a band aid on his skinned knee to keep it protected.		CO	86	100	100	100


















Table 6 cont'd

CHOICE	IMAGE	CO/ IN	ChCl (%)	ChAp (%)	ICl(%)	IAp(%)
24-A. Clean it with soap and water to kill the germs.		CO	100	100	100	100
25-A. It makes you feel sick.		CO	100	100	86	86
26-A. It makes your tummy hurt.		CO	100	100	86	100
29-A. She must stay at home.		CO	100	86	86	86
30-A. She will feel yucky and not want to eat.		CO	100	100	86	100
31-B. She should eat only little bits of food.		CO	100	100	86	100

CO/IN = Correct/Incorrect ChCl = choice clarity ChAp = choice appropriate
 ICl = image clarity IAp = image appropriate

Thirty-eight percent ($n = 24$) of the C/I pairs received a satisfactory rating for either the choice or the image but not for both components. The majority (71%, $n = 17$) of the 24 C/I pairs had satisfactory images but the choices were inappropriate or not clear (see Table 7). Most of the unsatisfactory choices were “incorrect” choices. The narrative data clarified why the choices were not satisfactory. For example, two experts (i.e., E-1, E-2) recommended that the wording of an asthma consequence response (i.e., 13-B, She will need to stay at a playground and play) be changed to reflect effect “She will still be able to play at the playground” (E-1).

Table 7. Unsatisfactory Choice – Satisfactory Image








CHOICE	IMAGE	CO/IN	ChCl(%)	ChAp(%)	ICI (%)	IAp (%)
1-A. A cold makes you have a sore toe.		IN	100	57	86	100
3-A. He got a cold by playing with his toys.		IN	71	71	86	86
8-A. He needs to rest, drink lots of juice, and take medicine.		CO	100	71	100	100
9-B. It makes you hiccup.		IN	86	57	86	100
10-B. It makes you smile a lot and makes it easy to giggle.		IN	86	57	100	100
13-B. She will need to stay at a playground and play.		IN	86	57	86	100
16-A. She needs special soap that she rubs into her skin.		IN	57	71	100	100
17-B. It is a place on you leg.		IN	43	29	100	100
19-A. He hurt his arm.		IN	86	71	86	86
20-B. He spilled juice on his leg and it gave him a booboo.		IN	71	43	86	86
23-B. Put peanut butter on his skinned knee to keep it protected.		IN	57	43	86	86
24-B. Rub it with salt and pepper to kill the germs.		IN	86	71	100	86
25-B. It makes you scratch your bellybutton.		IN	100	71	86	100
29-B. She must stay in school.		IN	86	43	100	100
30-B. She will feel happy and not want to frown.		IN	86	57	86	86
31-A. She should eat lots and lots of food.		IN	100	71	86	100
32-B. She needs to play, drink milkshakes and eat French fries.		IN	100	71	100	100

CO/IN= Correct/ Incorrect ChCl = choice clarity ChAp = choice appropriate
 ICI = image clarity IAp = image appropriate

Seven C/I pairs (29%) had satisfactory choices but unsatisfactory images

and all of these C/I pairs were “correct” choices. Table 8 lists the C/I pairs with an unsatisfactory image but satisfactory choice. Recommendations for image revisions focused on providing whole pictures. For example, the image for 3-A depicted only hands and a toy and one expert (E-3) recommended a “...whole picture of child sitting with toys.”

Table 8. Satisfactory Choice -Unsatisfactory Image















CHOICE	IMAGE	CO/IN	ChCl (%)	ChAp(%)	ICl (%)	IAp (%)
1-B. A cold makes you have a runny nose.		CO	100	100	71	100
2-A. A cold makes you cough.		CO	100	100	71	86
4-A. He got a cold because cold-germs got inside his body.		CO	100	100	71	71
6-B. He will stay at home and rest.		CO	100	100	71	100
20-A. He fell down and the skin on his knee was torn.		CO	100	100	71	71
27-A. She ate food that was in the garbage.		CO	100	86	43	71
28-B. She ate some food with germs on it.		CO	86	86	100	71

CO/IN = Correct/Incorrect ChCl = choice clarity ChAp = choice appropriate
ICl = image clarity IAp = image appropriate

Fourteen (22%) of the C/I pairs had choices and images that were mutually unsatisfactory (see Table 9). The majority ($n = 12$) of these pairs were incorrect choices/images. The experts' suggested that the unsatisfactory C/I pairs were not developmentally appropriate for preschoolers because the C/I pair was too sophisticated (e.g., asthma cause 12-A “The pumping muscles that move blood from her heart are too tight.”), too easy (e.g., skinned knee cause 19-

B “He hurt his arm.”) or poorly worded and portrayed (e.g., upset tummy identify 26-B “It makes your tummy strong.”).

Table 9. Mutually Unsatisfactory Choice and Image

CHOICE	IMAGE	CO/IN	ChCl (%)	ChAp (%)	ICI (%)	IAp(%)
2-B. A cold makes you hiccup.		IN	86	57	100	71
6-A. He will stay at a playground and play.		IN	100	71	71	71
8-B. He needs to jump, run, and play.		IN	100	71	71	71
9-A. It makes you sick.		CO	71	86	71	86
12-A. The pumping muscles that move blood from her heart are too tight.		IN	57	71	71	71
14-B. She will have an easy time singing and want to play.		IN	86	71	71	86
15-A. She needs a toy.		IN	86	71	71	57
18-B. It is a bump that is clear and leaks.		IN	86	71	57	71
21-B. He needs to be careful to not wash his knee again.		IN	43	14	57	57
22-A. It might leave a tattoo.		IN	71	57	71	71
26-B. It makes your tummy strong.		IN	86	57	43	43
27-B. She saw food that was in the garbage.		IN	71	57	71	71
28-A. She saw some food with germs on it.		IN	71	57	43	86
32-A. She needs to rest, drink Gatorade, and eat crackers		IN	86	71	43	86

CO/IN = Correct/Incorrect ChCl = choice clarity ChAp = choice appropriate
 ICI = image clarity IAp = image appropriate

An additional comment was made regarding the formatting of the choices.

Expert E-2 suggested that choices be counterbalanced to minimize primacy/recency effects, that is, “have the wrong response first out of the 4 vignettes and the correct response appear first in the other two vignettes (in a balanced fashion).”

The final question (i.e., Which friend has the best answer?) received adequate endorsement (i.e., Clarity 86%; Appropriate 86%). Several of the experts (e.g., E-1, E-5, and E-7) suggested that the “best” scale be eliminated and replaced with a scale using right or wrong: “...who is right? Or which friend is right?” (E-1).

Summary of step 2. Seven content experts completed an on-line survey to evaluate the IKQ. Experts rated six components (i.e., vignettes, vignette images, illness dimension items, choices, images of choices, and the “best” question) and provided recommendations and suggestions for revision. Based upon results from Step 2 Phase I, revisions were indicated to improve the IKQ.

Step 3: Revisions to the Illness Knowledge Questionnaire

Experts’ recommendations were used to modify the IKQ vignettes, illness dimension items, choices, images of choices, and the question posed to child respondents. The number of items, testing format, and test scoring were not revised.

Revision procedures. The dissertation committee approved revisions before implementing any changes. The author worked closely with the professional artist to develop images congruent with suggestions. A draft of

revision plans (see Appendix F) was submitted to the author's dissertation committee for feedback. Upon receipt of the author's dissertation committee's feedback, the IKQ was revised (see Appendix G).

Revision of vignettes. The wording of the vignettes was changed to clarify who in the vignette was asking questions and who was providing answers. The vignettes were reworded to delineate that a teacher was asking the questions and the kids in the class were answering the questions (i.e., "This is *the ill character*. He/she has a *name of illness*. His/her teacher asks the kids in his/her class questions about the illness. You tell me which kid has the right answer."). Experts suggested that the knee of the character with a skinned knee be visible; however, this suggestion was not adopted because all of the vignette images were busts of the character and uniformity among vignette images was important to preserve.

Revision of illness dimension items. One change was made to an illness dimension item. The wording of the "cause" dimension item was changed from "How did *character* get an *illness*?" to "How did *character* get his/her *illness*?" to clarify that the character was the referent to the illness. Although one expert suggested that the "consequence" introduction be altered from what "happens" to "how come" to better reflect preschoolers' lexicon, this change was not made because the phrases were not interchangeable. The phrase "how come" connoted the word "why" not the phrase "what happens."

Revision of choices and images of choices. Three changes were made to all choices. First, the introductory stems were revised to match the revised

vignettes (i.e., “One kid says” or “Another kid says”). Second, pronouns were replaced with proper nouns (e.g., use the name of the illness or disease instead of “it,” use the name of the character instead of “he” or “she”). Third, the order of correct and incorrect choices was changed in response to the recommendation that choices be counterbalanced to minimize primacy/recency effects. The correct choice was positioned first in the cold and the skinned knee vignettes while the incorrect choice was made first in the asthma and the upset tummy vignettes.

Forty-five (70%) of the 64 C/I pairs underwent some level of revision. Twenty C/I pairs were partially revised, meaning only one component of the pair needed revision (i.e., choice-only or image-only). Forty two percent ($n = 19$) of the 45 revised C/I pairs needed the choice reworded and the accompanying image revised to match the reworded choice, called choice/image revisions in this paper. Six C/I pairs required complete revision meaning the revised choice and image had no similarity in wording, sentence structure, content or image with the Phase I C/I pair.

The majority ($n = 14$) of partial revisions were image-only revisions (see Table 10). Experts had rated seven C/I pairs as satisfactory choices/unsatisfactory images; however, only five of these C/I pairs (i.e., 1-B, 2-A, 6-B, 27-A, 28-B) had image-only revisions. Narrative data were the primary sources from which mutually satisfactory (i.e., 3-A, 11-A, 15-B, 31-B), unsatisfactory choice/satisfactory images (i.e., 25-B, 31-A), and mutually unsatisfactory (2-B, 26-B, 27-B) pairs were selected for image-only revisions.

Experts' recommendations suggested that the image was the primary problem despite satisfactory or unsatisfactory ratings given to the choice or image. Specific recommendations included to broaden the view of the characters, emphasize the characters' actions, or simplify the images. The order of the correct and incorrect choices was changed for five of the image-only C/I pairs (3-A, 6-B, 28-B, 31-A, 31-B) to minimize primacy/recency effects.

Table 10. Revision of Image-only

































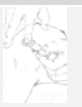







PHASE I IMAGE & CHOICE		REVISION	REVISED IMAGE & CHOICE	
	1- B. Another friend says, "A cold makes you have a runny nose."	Broadened view		1- B. Another kid says, "A cold makes you have a runny nose."
	2- A. One friend says "A cold makes you cough."	Emphasized coughing		2- A. One kid says "A cold makes you cough."
	2- B. Another friend says, "A cold makes you hiccup."	Broadened view		2- B. Another kid says, "A cold makes you hiccup."
	3- A. The other friend says, "He got his cold by playing with his toys."	Broadened view		3- B. Another kid says, "Billy got his cold by playing with his toys."
	6-B. The other friend says, "He will stay at home and sleep".	Eliminated plant		6-A. One kid says, Billy will stay at home and sleep."
	11-A. One friend says, "She got it playing with a friend who has asthma."	Emphasized smiling		11-A. One kid says, "Annie got asthma playing with a friend who has asthma."
	15- B. The other friend says, "She needs medicine."	Added inhaler		15- B. Another kid says, "Annie needs to take medicine."
	25- B. The other friend says, "It makes you scratch your bellybutton."	Broadened view		25- B. Another kid says, "An upset tummy makes you scratch your bellybutton."
	26-B. The other friend says, "It makes your tummy strong."	Broadened view		26- B. Another kid says, "An upset tummy makes your tummy strong."
	27-A. One friend says, "She ate food that was in the garbage."	Broadened view		27- A. One kid says, "Tina ate food that was in the garbage"

Table 10. cont'd

PHASE I IMAGE & CHOICE		REVISION	REVISED IMAGE & CHOICE	
	27-B. The other friend says, "She saw food with germs on it."	Broadened view		27- B. Another kid says, "Tina saw food that was in the garbage."
	28-B. The other friend says, "She ate some food with germs on it."	Changed food		28-A. One kid says, "Tina ate food with germs on it."
	31-A. One friend says, "She should eat lots and lots of food."	Broadened view		31-B. Another kid says, "Tina should eat lots and lots of food."
	31-B. The other friend says, "She should eat only little bits of food."	Broadened view		31-A. One kid says, "Tina should eat only little bits of food."















Six C/I pairs were choice-only revisions. Four choices (i.e., 8-A, 19-B, 29-B, and 30-B) were revised based on experts' rating that the wording was inappropriate or unclear but the image was satisfactory. Choices 23-B and 29-A were rated as mutually satisfactory C/I pairs; however, experts recommended single word changes to improve the clarity of the choices. The order of the correct and incorrect choices was changed for one of the choice-only C/I pairs (19-B) to minimize primacy/recency effects. Tables 11 depict choice-only revisions.

Table 11 Revisions to Choice-only

PHASE I IMAGE & CHOICE		REVISION	REVISED IMAGE & CHOICE	
	8-A. One friend says, "He needs to rest, drink lots of juice and take medicine."	Simplified wording		8-A. One kid says, "He needs to sleep."
	19-B. The other friend says, "He hurt his knee."	Made more difficult		19-A. One kid says, "Corey fell down."
	23-A. One friend says, "Put a band aid on his skinned knee to keep it protected."	Improved wording		23-A. One kid says, Put a band aid on Cory's skinned knee to keep it clean."
	29-A. One friend says, "She must stay home."	Softened wording		29-A. One kid says, "Tina will stay at home."
	29-B. The other friend says, "She must stay in school."	Softened wording		29-B. Another kid says, "Tina will stay in school."
	30-B. The other friend says, "She will feel happy and not want to frown."	Improved wording		30-B. Another kid says, Tina will feel happy and want to eat all of her food."

Choice/image revisions were overall consistent with experts' ratings of C/I pairs. Seven choice/image revisions were C/I pairs that had been rated by the experts as mutually unsatisfactory. Table 12 depicts the choice/image revisions that had been rated as mutually unsatisfactory. Experts' suggestions were used to make revisions of mutually unsatisfactory pairs. For example, the choice and image for 28-A were changed because experts wanted a more realist description (i.e., "might have germs on it") and image (i.e., no magnifying glass or visible germs) of food with germs on it. The order of the correct and incorrect choices was changed for three of the mutually unsatisfactory C/I pairs (6-A, 14-B & 32-A) to minimize primacy/recency effects.

Table 12. Choice/Image Revision – Rated Mutually Unsatisfactory

PHASE I IMAGE & CHOICE		REVISION	REVISED IMAGE & CHOICE	
	6-A. One friend says, "He will stay at a playground and play."	Improved wording Broadened image view		6-B. Another kid says, "Billy will stay at home and play".
	8- B. The other friend says, "He needs to jump, run and play."	Improved wording Broadened image view		8- B. Another kid says, "Billy needs to play and drink lots of water."
	14-B. The other friend says, "She will have an easy time singing and want to play	Improved wording Broadened image view		14- A. One kid says, "Annie will have a hard time moving and not want to play."
	15-A. One friend says, "She needs a toy."	Improved wording Matched Image		15- A. One kid says, "Annie needs to eat candy."
	18-B. The other friend says, "It is a bump that is clear and leaks."	Improved wording Clarified Image		18-B. Another kid says, "A skinned knee is rash that is bumpy and leaks."
	28-A. One friend says, "She saw some food with germs on it."	Improved wording Simplified Image		28- A. One kid says, "Tina saw some old food with that might have germs on it."
	32-A. One friend says, "She needs to rest, drink Gatorade and eat crackers."	Improved wording Simplified Image		32- B. Another kid says, "Tina needs to rest and eat crackers"

Nine of the choice/image revisions had been C/I pairs rated by experts as unsatisfactory choice/satisfactory image (see Table 13). To improve the unsatisfactory choices, the wording of choices were either simplified or made more closely related to the vignette illness or disease. For example, "a sore toe" was replaced on 1-A by "nose grow longer" because one expert recommended that the choice should be related to a body part that was affected by a cold. The order of the correct and incorrect choices was changed for three of the

unsatisfactory choice/satisfactory image pairs (9-B, 10-B & 32-B) to minimize primacy/recency effects.

Table 13. Choice/Image Revision – Rated Unsatisfactory Choice/Satisfactory Image

PHASE I IMAGE & CHOICE		REVISION	REVISED IMAGE & CHOICE	
	1- A. One friend says, “A cold makes you have a sore toe.”	Improved wording Matched Image		1- A. One kid says, “A cold makes your nose grow longer.”
	9- B. The other friend says, “It makes you hiccup.”	Improved wording Matched Image		9- A. One kid says, “Asthma makes you burp.”
	10-B. The other friend says, “It makes you smile a lot and makes it easy to breathe.”	Improved wording Matched Image		10-A. One kid says, “Asthma can make you burp a lot and makes it hard to breathe.”
	13-B. The other friend says, “She will need to stay at a playground and play.”	Improved wording Broadened image view		13-B. Another says, “Annie needs to stay at home and play.”
	16- A. One friend says, “She needs to use special soap that she rubs into her skin.”	Improved wording & Image to match		16- A. One kid says, “Annie needs special medicine that she rubs on her nose.”
	17-B. The other friend says, “It is a place on your leg.”	Improved wording Simplified Image		17-B. Another kid says, “A skinned knee is a bumpy rash that itches
	23-B. The other friend says, “Put peanut butter on his skinned knee to keep it protected	Improved wording Matched Image		23- B. Another kid says, “Put a cast on Cory’s skinned knee to keep it clean.”
	24-B. The other friend says, “Rub it with salt and pepper to kill the germs.”	Improved wording Matched Image		24-B. Another kid says, “Rub Cory’s knee with hand lotion and baby powder to kill the germs.”
	32-B. The other friend says, “She needs to play, drink milkshakes and eat French fries.”	Improved wording Simplified Image		32- A. One kid says, “Tina needs to play and eat French fries“

Two choice/image revisions were C/I pairs that were rated as satisfactory choice/unsatisfactory image (see Table 14) and one C/I pair rated as mutually satisfactory (see Table 15). Minimal rewording was needed to revise these three choices and only the image for 20-A was completely changed.

Table 14. Choice/Image Revision – Rated Satisfactory Choice/Unsatisfactory Image







PHASE I IMAGE & CHOICE		REVISION	REVISED IMAGE & CHOICE	
	4-A. One friend says, "He got a cold because cold-germs got inside his body."	Eliminated "germs"		4-A. One kid says, "Billy got a cold because cold germs he could not see got inside his body."
	20-A. One friend says, "He fell down and the skin on his knee was torn."	Improved wording Broadened image view		20-A. One kid says, "Corey fell down and the skin on his knee was broke open."

Table 15. Choice/Image Revision – Rated Mutually Satisfactory













PHASE I IMAGE & CHOICE		REVISION	REVISED IMAGE & CHOICE	
	17-A. One friend says, "It's a booboo."	Improved wording Simplified Image		17- A. One kid says, "A skinned knee is a booboo that hurts."

The complete revisions included C/I pairs that had been rated as unsatisfactory choice/satisfactory image (i.e., 19-A, 20-B), mutually unsatisfactory (i.e., 21-B, 22-A), and mutually satisfactory (i.e., 21-A, 22-B).

Table 16 displays C/I pairs that were completely revised. Choice/image pairs 21-A and 22-B were the "correct" choice counterparts to "incorrect" choices 21-B and 22-A, respectively. Although 21-A and 22-B were rated as mutually




















satisfactory, these C/I pairs were not salvageable because the author was unable to develop credible “incorrect” C/I pairs to replace 21-B and 22-A. Therefore, the correct and incorrect C/I pairs for dimension items 21 and 22 were completely revised. The order of the correct and incorrect choices was changed for three of the completely revised C/I pairs (19-A, 22-A & 22-B) to minimize primacy/recency effects.

Table 16. Complete Revision

PHASE I IMAGE & CHOICE		REVISION	REVISED IMAGE & CHOICE	
	19-A. One friend says, “He hurt his arm.”	Complete revision		19-B. Another kid says, “Cory sat down.”
	20-B. The other friend says, “He spilled juice on his leg and it gave him a booboo.”	Complete revision		20-B. Another kid says, Corey played with a friend with a skinned knee.”
	21-A. One friend says, “He needs to be careful to not his knee.”	Complete revision		21-A. One kid says, “Corey will cry.”
	21-B. The other friend says, “He needs to be careful to not wash his knee again.”	Complete revision		21-B. Another kid says, “Corey will laugh.”
	22-A. One friend says, “It will leave a tattoo.”	Complete revision		22-B. Another kid says, “Cory’s knee will itch when he walks.”
	22-B. The other friend says, “It might leave a scar.”	Complete revision		22-A. One kid says, “Cory’s knee will hurt when he walks.”

One third ($n = 19$) of the 64 C/I pairs were not revised beyond the three aforementioned revisions applied to all C/I pairs. The majority (89%) of C/I pairs that were not revised were rated by experts as mutually satisfactory; however, two C/I pairs that were not revised (i.e., 9-A & 12-A) had received mutually unsatisfactory expert ratings. Table 17 depicts C/I items that were not revised.

Table 17. No Revision*

CHOICE	IMAGE	RATING OF CHOICE	RATING OF IMAGE
3-A. Billy got a cold playing with a friend who has a cold.		Satisfactory	Satisfactory
4-B. Billy got a cold because he ate ice cream.		Satisfactory	Satisfactory
5-A. Billy will feel yucky and not want to play.		Satisfactory	Satisfactory
5-B. Billy will feel happy and want to play.		Satisfactory	Satisfactory
7-A. Billy needs medicine.		Satisfactory	Satisfactory
7-B. Billy needs a toy.		Satisfactory	Satisfactory
9-A. Asthma makes you sick.		Unsatisfactory	Unsatisfactory
10-B. Asthma can make you cough a lot and makes it hard to breathe.		Satisfactory	Satisfactory
11-B. Annie just has it.		Satisfactory	Satisfactory
12- A. The pumping muscles that move blood from her heart are too tight.		Unsatisfactory	Unsatisfactory
12-B. The tubes that bring air to Annie's lungs are too tight.		Satisfactory	Satisfactory
13-A. Annie will need to stay at home and rest.		Satisfactory	Satisfactory
14-B. Annie will have a hard time breathing and not want to play.		Satisfactory	Satisfactory
16-B. Annie needs to take special medicine that she breathes into her lungs.		Satisfactory	Satisfactory
18-A. A skinned knee is a sore that is red and bleeds.		Satisfactory	Satisfactory
24-A. Clean a skinned knee with soap and water to kill the germs.		Satisfactory	Satisfactory
25-B. An upset tummy makes you feel sick.		Satisfactory	Satisfactory
26-B. An upset tummy makes your tummy hurt.		Satisfactory	Satisfactory
30-B. Tina will feel yucky and not want to eat.		Satisfactory	Satisfactory

* No revisions except to introductory stems, pronouns and order of correct/incorrect choices

Choice/image items 9-A and 12-A were rated as unsatisfactory because the difficulty level of the items was inappropriate for preschoolers. Experts commented that the choice for 9-A was too easy and that the image of the asthma character, specifically her eyes, did not “look like” the other images of this character. This C/I pair was not revised because it was designed to be the correct choice of an “easy” illness dimension item. Likewise, the image was intentionally drawn to appear noticeably different especially about the eyes. Experts suggested that 12-A was too difficult for preschoolers. During informal piloting of the IKQ, however, preschoolers accepted and appeared to understand both the choice and image. One expert recommended changing the image (i.e., child with “X-ray view of heart) so that only the heart was shown. This suggestion was considered but ultimately rejected because similar images have been used in children’s books and health/illness educational materials designed for children of all ages.

Revision of the “best” question. The overwhelming consensus of the experts was that the “best” scale be eliminated and replaced with a scale using right or wrong; therefore, this suggestion was adopted. The question posed to child respondents was revised to “Which kid is right?”

Summary of step 3. Overall the experts found the clarity, appropriateness, and relevance of IKQ components satisfactory and when components were not satisfactory, experts provided suggestions for revision. The IKQ was revised using experts’ ratings and narrative data in conjunction with input from the author’s dissertation committee. Once the revised version of the IKQ was

approved by the author's dissertation committee, the instrument was ready for the final step of Phase I, the confirmatory process of the revisions by a sample of experts.

Step 4: Confirmatory process

The revised IKQ was sent to five of the experts for their feedback related to the changes made to the IKQ. Two of the original seven experts who responded were not available to respond; therefore, they were not included.

The revised IKQ was sent to five experts via an e-mail message (see Appendix H) requesting that they evaluate the revised IKQ after reviewing the two documents attached to the e-mail, the revised IKQ, and an executive summary (see Appendix I). The experts were asked three opened ended questions: 1) Did revisions reflect their recommendations?, 2) What were the strengths of the revised IKQ?, and 3) What areas still need revision? The experts were also asked to rate the overall quality of the revised IKQ on a 4-point scale (1 = poor, 2 = fair, 3 = good, 4 = excellent). Experts were instructed to send their responses to the author by e-mail.

Results. Experts responded favorably to the revisions. All content experts stated that the revisions reflected their recommendations. Three of the content experts identified specific strengths of the revised IKQ (i.e., the revised tool was more valid than the original tool and the tool was developmentally appropriate). Four of the content experts offered suggestions about additional revisions most of which were editorial comments about typographical errors. The revised IKQ

was rated overall as either good or excellent by the content experts.

Development of the health history questionnaire

The purpose of the health history questionnaire (HHQ) was to obtain demographic information and evaluate child participants' health status (i.e., ethnicity, birth history, child's health history, family history, family income, and parent/guardian education). This questionnaire was developed during Phase I and was used in Phases II and III.

Instrument format. Following the format of a standard pediatric health history, the author developed the HHQ using primarily forced-choice questions to facilitate parent/guardians' self-administration of the questionnaire. The race and ethnicity categories on the HHQ were the categories identified by the National Institute of Health (NIH) (2001). The first drafts of the HHQ were made into two separate questionnaires: one included standard pediatric health history questions (see Appendix J) and the other included the standard questions plus an asthma section (see Appendix K). The former questionnaire was designed for any children who did not have asthma and the latter questionnaire was for children with asthma. The asthma section was included in the HHQ as a means of exploring the impact of a chronic illness on a child's illness knowledge. The asthma section was designed to obtain a detailed health history of any child participants who had asthma and the questions for this section were developed to examine the child's level of asthma severity based on the National Asthma Education and Prevention Program (NAEPP) Expert Panel Report II: Guidelines

for the diagnosis and management of asthma (1997).

Health history questionnaire. Initial drafts of the HHQ were submitted to the author's dissertation committee for evaluation of the content and formatting. Committee members made suggestions primarily about simplifying the questionnaire: use a single HHQ (i.e., general pediatric health history questions) with a separate asthma section that was skipped if child participants did not have asthma and eliminate medical jargon. The draft of the HHQ was revised per committee members' recommendations, producing a 45-item health history questionnaire (see Appendix L).

Phase I summary

The initial development of the IKQ, the assessment of the content validity of the IKQ, and the development of the HHQ was completed in Phase I. With the content validity of the IKQ supported from the feedback of the experts, the revised IKQ was ready for pilot testing, the focus of Phase II of this study.

Phase II

Purpose

The purpose of Phase II was to pilot test the Illness Knowledge Questionnaire (IKQ), health history questionnaire (HHQ), and consent and data collection processes with a sample of preschool and school age children. Piloting the IKQ with preschoolers facilitated feedback about the clarity and

appropriateness of the IKQ from the population for whom the instrument was designed (Berk, 1993). School age children were included to 1) aid feedback related to clarity, 2) articulate problems with items that preschoolers may not be able to articulate, and 3) assess any developmental differences and discrimination of the IKQ. The HHQ was also pilot tested with a sample of parents.

Design

A cross-sectional descriptive design was used to pilot test the IKQ.

Sample and sampling plan

Four childcare centers for children up to 12 years of age were used to recruit participants. These centers provided a familiar setting for potential participants. Entering the familiar world of children has the potential benefit of lessening stress of participants during study interviews than if they were interviewed in an unfamiliar setting (Greig & Taylor, 1999). Table 18 depicts the characteristics of the childcare centers.

Table 18. Childcare Center Characteristics

SITE #	PROGRAM TYPE	TARGET POPULATION	CAPACITY	AGE RANGE
1	Summer Childcare	Low-income families	99	6wk – 12yrs
2	Summer Childcare	Middle-income families	150	6wk – 12yrs
3	After School	Low-income families	160	12mos – 12yrs
4	After School at a private school	Private school attendees	250	5yrs – 15yrs

The inclusion criteria were the following: all participants (children and child’s parent/guardian) must be fluent in English, and children must meet the age requirements (i.e., 4 – 5 years, 8 – 9 years, and 11 – 12 years) at the time of data collection. Exclusion criteria were the following: an illness at the time of recruitment or interview, and children with special learning needs or visual impairment per parent guardian history.

The sample consisted of 49 children from three different age groups.

Table 19 depicts the sample by age group and recruitment site.

Table 19. Sample by Age Group and Site

	AGE GROUP			
	4-5	8-9	11-12	Total
Site 1	8	6	5	19 (39%)
Site 2	2	4	1	7 (14%)
Site 3	7	6	4	17 (35%)
Site 4	0	5	1	6 (12%)
	17 (35%)	21 (43%)	11 (22%)	49 (100%)

Sixty-seven percent of the sample were girls and 33 % were boys. The majority of participants were African American (74%, $n = 36$); 10% were Caucasian, and 16% were from other ethnic minorities. Of the participants who provided income and educational levels ($n = 41$), 64% ($n = 26$) of household incomes were equal to or less than \$30,000. The highest educational level for the majority of parents/guardians (55%) was a high school diploma or high school equivalent; 28% had 13-16 years of education and 15% had greater than 16 years of education.

Recruitment procedures

Recruitment procedures began after IRB approval was obtained. Two hundred and fourteen child care centers (13 or more children) that serve 4 -12 year old children were identified using the childcare locator on the official web site of the state of Tennessee (www.state.tn.us/humanserv/childcare/providers-map.htm). Each childcare center was assigned an identification (ID) number and a computer-generated list of 10 randomly selected ID numbers was obtained. Initially, the administrators of the first four child care centers on the list were contacted either in person or by phone to introduce the purpose, procedures, and timeline of the study. Contact was made with three of the four administrators and two administrators agreed to participate. The third administrator was willing to participate; however, the program provided only after school child care and the school year ended soon after contact with the administrator was made. Two additional sites were later contacted because an adequate sample size was not obtained from the first two sites. Site three was randomly selected; however, site four was purposefully selected because it had over 200 children at the site and it was ethnically/racially diverse. The characteristics of site four were desirable to meet an adequate sample size as well as ensure a more ethnically/racially diverse sample. Childcare center administrators were given an informational packet that included an introductory letter for the administrator (see Appendix M), an introductory letter for childcare teachers (see Appendix N), and copies of all questionnaires and forms used with children and their parents/guardians.

Recruitment procedures of children included an initial letter (see Appendix

O) sent to all parents/guardians of children who attended the child care centers. The letter provided the author's phone number and dates when the author would be at the child care facility to answer questions. Recruitment visits occurred during child pick-up times at the facility. The visit by the author also served as a time to obtain informed consent from parents/guardians and assent from children.

Measures

Illness Knowledge Questionnaire. The revised Illness Knowledge Questionnaire (see Appendix G) was used. Given the information regarding IKQ administration, structure and procedures, the IKQ format that controlled for recency/primacy effect was used when testing the first two sites; however, the format was changed for the last two sites because a participant from site one recognized the correct-answer pattern. For sites three and four, the responses to items were placed in alphabetical order.

Administration observation notes. Administration observation notes (see Appendix P) were completed by the author during/after the interview process to document participants' reactions (verbal and nonverbal) to the IKQ. The author's observations and/or participant's comments about vignette stems, vignette images, illness dimension items, choices, images of choices, and the question posed to child respondents were documented on the administration observation notes.

IKQ post-administration checklist. A 10-item post-administration checklist (see Appendix Q) was used with preschool and school age children. The post-administration checklist used in this study was adapted from the checklist of post-administration questions created by Berk (1993). Questions (e.g., Did any of the questions seem confusing?) on the checklist were dichotomous (i.e., yes/no). If the participant's response indicated a problem, then additional probing questions (e.g., if a question was confusing which question was confusing?) were asked.

Health history questionnaire. The 45-item health history questionnaire (see Appendix L) was piloted in Phase II. The asthma section, however, was removed from the HHQ before data collection because the child care administrator from Site # 1 predicted that the parents/guardians would find the asthma section confusing. Respecting the expertise of the Site # 1 administrator, the asthma section was removed from the HHQ. The HHQ administered at the three other study sites did not include the asthma section to maintain consistency with site # 1 and to prevent increasing administration time of the questionnaire.

HHQ post-administration checklist. A 9-item self-report health history post-administration checklist (see Appendix R) was used to obtain parents'/guardians' evaluation of the clarity of the HHQ. The health history post administration checklist was adapted from the checklist of post-administration questions created by Berk (1993). Questions on the checklist were close-ended (e.g., Did any of the questions seem confusing?) with yes/no responses. If the participant's response indicated a problem, then an additional probing question (i.e., if YES, which question was confusing?) was asked.

Procedures

Parents/Guardians. The majority of parents/guardians ($n = 43$, 86%) completed the HHQ and the HHQ post-administration checklist. Six parents/guardians (12%) did not complete either the HHQ or the health history post-administration, and five parents/guardians (10%) did not complete the health history post administration questionnaire. Most parents/guardians completed the HHQ and health history post-administration checklist ($n = 27$, 63%) after signing consent forms. Thirty-seven percent ($n = 16$) of parents/guardians completed questionnaires at home and mailed completed forms to the author.

Children. All children signed assent forms before testing. Two developmentally appropriate assent forms were used (i.e., an assent for 4-5 year old children and an assent for 8 – 12 year old children). The assent for young children was read to young participants by the author or a trained research assistant (RA) and the children either signed their name or made a mark. Older children were given an assent to read and the assent was verbally explained by the author or RA before their signing the assent. Individualized interviews were conducted with all child participants in a semi-private area that was free of excessive noise and other distracters. The questionnaire was read to each child by the author or an RA. The IKQ was formatted on a 10 in. X 15 in. spiral flip chart that displayed the correct and incorrect images on the same page. The examiner read each item to the child volunteer and the child was instructed to point to the picture that was “right.”

During the interview, children's responses to the IKQ were recorded by the investigator using HandBase software on a personal digital assistant (PDA). Immediately after child participants responded to IKQ items, the RA read items from the post-administration checklist to them. Initially, the post IKQ checklist was used after completing all IKQ items; however, children who identified problems with the IKQ could not remember the specific problematic item. Thus after the first four interviews, the author posed post IKQ checklist questions after each vignette. Investigator observations were recorded immediately after the interview. Upon completion of the interview, each child was given a \$10.00 gift card for participating in the study.

The training of research assistants included an orientation to all questionnaires used in the study, practice administering the IKQ to the author, observation of the author administering the IKQ to children and administering the IKQ to children with the supervision of the author.

As Phase II was an initial pilot phase, testing procedures were made more flexible than procedures used when evaluating the IKQ internal structure, validity, and reliability. The interview was discontinued or shortened (i.e., vignettes were eliminated) for four children (24% of 4 - 5 year olds) who demonstrated signs of fatigue such as disinterest or poor attention. Table 20 depicts participants and contextual issues related to discontinued or shortened interviews.

Table 20. Discontinued or Shortened Interviews

ID #	AGE	GENDER	SITE #	CONTEXTUAL ISSUE DURING INTERVIEW	VIGNETTES COMPLETED
02	4	Male	1	Became distraught and disengaged mid-interview because he saw his class moving to a different area in the childcare center	Cold & Asthma
07	5	Male	1	Distracted at beginning of interview; therefore, the PI eliminated the Asthma section	Cold, Skinned knee, Upset tummy
32	4	Male	3	Distracted at beginning of interview; therefore, the PI eliminated the Asthma section	Cold, Skinned knee, Upset tummy
50	4	Female	3	Had difficulty following basic instructions (i.e., point to the picture that is right)	Cold & Skinned knee

The asthma vignette was the vignette most frequently eliminated by the author to keep participants engaged. Asthma was not a familiar condition to many participants and the asthma vignette, more specifically the asthma items, were more difficult for participants to understand than the other vignettes regardless of participants' age. Questionnaires designed for children that are perceived by child participants as too difficult may lead to the participants feeling unsuccessful and eventually disengaging from the interview (Greig & Taylor, 1999). Given the difficulty level of the asthma vignette, it was eliminated when child participants were distracted to prevent them from completely disengaging from the interview.

A second interview was not conducted with the four child participants who did not complete the entire IKQ. In part this was due to the inability to provide a second incentive (\$10.00 Wal-mart gift card) to participants at the end of a second interview. The primary deterrent, however, was inadequate time because the author had negotiated a specific timeline to complete recruitment and testing

and a second interview would have exceeded the timeline.

Results

Data analysis consisted of examining responses to the illness knowledge questionnaire post-administration checklist, examining reliability and inter-correlation of IKQ items, and evaluating responses to the health history questionnaire post-administration checklist. The percentages of favorable guardian responses were calculated for each of the HHQ post-administration checklist items and the percentages of favorable child responses were calculated for each of the IKQ checklist items. Coefficient alphas for each of the four scales (i.e., Identify, Cause, Consequence, and Cure) were computed using Statistical Package for the Social Sciences (SPSS) 15.0 to examine the reliability of the IKQ scales. In addition, inter-item correlation matrix and item-total statistics were generated via SPSS 15.0 for a preliminary evaluation of the internal consistency among IKQ items.

Illness Knowledge Questionnaire post-administration checklist. Before analyzing IKQ post –administration checklist items and child respondents' comments, an one-way analysis of variance (ANOVA) of mean IKQ scores and subscale scores between the sites using the recency format and the sites using the alphabetical format was evaluated, which revealed that there were no significant differences between the groups. Given these results, data from all sites were evaluated together. Table 21 depicts ANOVA results.

Table 21. Analysis of Variance – IKQ scores by Testing Format

DEPENDENT VARIABLE	F (df)	p
TOTAL	.05 (1, 47)	.82
IDENTIFY	.14 (1, 47)	.71
CAUSE	.16 (1,47)	.69
CONSEQUENCE	.25 (1, 47)	.62
CURE	.24 (1, 47)	.62

All but one participant responded to the IKQ post-administration checklist. This 5-year old child was not questioned because he was extremely distracted and concerned because his class was moving to a different room and he was not with them. Of the 48 participants who did respond to the IKQ post-administration checklist, 80% or more responded favorably to eight of the 10 checklist items (see Table 22).

Table 22. IKQ Post-Administration Checklist

CHECKLIST ITEM	RESPONSE (%)
1. Confusing	No – 69
2. No right answer	No – 78
3. More than one right answer	No – 80
4. Words hard to understand	No – 94
5. Questions that you did not want to answer	No – 96
6. Questions make you feel bad	No – 94
7. Right order	Yes – 98
8. Any additional questions that needed to be included	No – 88
9. Directions made sense	Yes – 98
10. Pictures match words	Yes - 94

Almost half of child participants (47%, $n = 23$) made comments to clarify their responses to the IKQ post-administrations checklist. A total of 23 items from the IKQ were commented upon and six comments were made without a referent item. Four of the non-referenced comments were made by participants who were asked IKQ post-administration items only once at the end of IKQ testing.

Seventeen items received either one or two comments (See Table 23 & Table 24), and five IKQ items received multiple comments (see Table 25).

Table 23. Items Receiving One Comment

Item	Child ID # Age	Comment
2. What is a cold?" 2- A. One kid says "A cold makes you cough." 2- B. Another kid says, "A cold makes you hiccup."	(#14) 8yrs	Confusing because the identity response is not really what a cold is.
8. "How will Billy get better from his cold?" 8- A. One kid says, "He needs to sleep and drink lots of water." 8- B. Another kid says, "He needs to play and drink lots of water."	(#03) 9yrs	Confusing – no further explanation
11. "How did Annie get asthma?" 11- A. One kid says, "Annie got asthma playing with a friend who has asthma." 11- B. Another kid says, "Annie just has it."	(#39) 9yrs	Words hard to understand
13. "What happens to Annie when she has an asthma attack?" 13- A. One kid says, "Annie needs to stay at home and play." 13- B. Another kid says, "Annie needs to stay at home and sleep."	(#13) 9yrs	Seems to have more than one right answer.
17. "What is a skinned knee?" 17- A. One kid says, "A skinned knee is a booboo that hurts." 17- B. Another kid says, "A skinned knee is a bumpy rash that itches."	(#25) 8yrs	More than one right answer – no further explanation
20. "How did Cory get a skinned knee?" 20- A. One kid says, "Cory fell down and the skin on his knee was broke open" 20- B. Another kid says, "Cory played with a friend with a skinned knee."	(#51) 11yrs	Confusing – no further explanation
22. "What happens to Cory when he has a skinned knee?" 22- A. One kid says, "Cory's knee will hurt when he walks." 22- B. Another kid says, "Cory's knee will itch when he walks."	(#38) 8yrs	More than one right answer
23. "How will Cory's skinned knee get better?" 23- A. One kid says, "Put a band aid on Cory's skinned knee to keep it clean." 23- B. Another kid says, "Put a cast on Cory's skinned knee to keep it clean."	(#08) 9yrs	Hard question

Table 23. cont'd

Item	Child ID # Age	Comment
30. "What happens to Tina when she has an upset tummy?" 30- A. One kid says, "Tina will feel happy and want to eat all of her food." 30- B. The other kid says, "Tina will feel yucky and not want to eat any food."	(#08) 9yrs	Confusing – no further comment
31. "How will Tina get better from her upset tummy?" 31- A. One kid says, "Tina should eat lots and lots of food." 31- B. Another kid says, "Tina should eat only little bits of food."	(#22) 8yrs	Should include medicine as a possible cure for upset tummy

Table 24. Items Receiving Two Comments

Item	Child ID # Age	Comment
1. "What is a cold?" 1- A. One kid says, "A cold makes you have a runny nose." 1-B. Another kid says, "A cold makes your nose grow longer."	(#14) 8yrs	Confusing because identity response not really what a cold is.
	(#22) 8 yrs	Did not seem to have a right answer
12. "How did Annie get asthma?" 12- A. One kid says, "The pumping muscles that move blood from her heart are too tight." 12- B. Another kid says, "The breathing tubes that bring air to her lungs are too tight."	(#20) 8yrs	Confusing question
	(#39) 9yrs	Used words that were hard to understand
16. "How will Annie get better from her asthma attack?" 16- A. One kid says, "Annie needs to use special lotion that she rubs on her nose." 16- B. Another kid says, "Annie needs to take special medicine that she breathes into her lungs."	(#03) 9yrs	No comment
	(#20) 8yrs	Lotion on top of nose was confusing
21. "What happens to Cory when he has a skinned knee" 21- A. One kid says, "Cory will cry." 21- B. Another kid says, "Cory will laugh."	(#24) 11yrs	Sometimes kid with a skinned knee do not cry so did not seem to have a right answer
	(#64) 9yrs	Had more than one right answer because some people do not cry when they skin their knee but no one will laugh
24. "How will Cory's skinned knee get better?" 24- A. One kid says, "Clean Cory's skinned knee with soap and water to kill the germs." 24- B. Another kid says, "Rub Cory's skinned knee with hand lotion and baby powder to kill the germs."	(#19) 8yrs	Confusing question
	(#25) 8yrs	Had more than one right answer

Table 24. cont'd

Item	Child ID # Age	Comment
25. "What is an upset tummy?" 25- A. One kid says, "An upset tummy makes you feel sick." 25- B. Another kid says, "An upset tummy makes you scratch your bellybutton."	(#26) 11yrs	Picture did not match words because her hair needs to be drawn on her shoulders
	(#61) 9yrs	Confusing question because sometimes scratch your bellybutton with an upset tummy
28. "How did Tina get an upset tummy?" (28- A. One kid says, "Tina saw some old food with that might have germs on it." 28- B. Another kid says, "Tina ate some food with germs on it."	(#24) 11yrs	confusing
	(#39) 9yrs	confusing
32. "How will Tina get better from her upset tummy?" 32- A. One kid says, "Tina needs to play and eat French fries." 32- B. Another friend says, "Tina needs to rest, and eat crackers."	(#22) 8yrs	Should have included taking medicine as a cure for an upset tummy
	(#38) 8yrs	More than one right answer because French fries or crackers are an okay cure for an upset tummy

Table 25. Items Receiving Four or More Comments

Item	Child ID # Age	Comment
4. "How did Billy get a cold?" 4- A. One friend says, "Billy got a cold because cold-germs he could not see got inside his body." 4- B. Another kid says, "Billy got a cold because he ate ice cream."	(#20) 8yrs	Did not have a right answer
	(#20) 8yrs	Had more than one right answer
	(#22) 8yrs	Ice cream question was confusing
	(#63) 8yrs	Did not have a right answer because cannot really see little germs
9. "What is asthma?" 9- A. One kid says, "Asthma makes you burp." 9-B. Another kid says, "Asthma makes you sick."	(#20) 8yrs	Burp might be part of asthma so confusing
	(#38) 8yrs	Question was too hard – confusing
	(#38) 8yrs	Asthma does not make you sick; therefore, the question did not have a right answer
	(#60) 11yrs	Had more than one right answer
	(#63) 8yrs	Confusing because you should go to the hospital with asthma.
10. "What is asthma?" 10-A. One kid says, "Asthma can make you burp a lot and makes it hard to breathe." 10- B. Another kid says, "Asthma can make you cough a lot and makes it hard to breathe."	(#08) 9yrs	Made participant feel bad
	(#18) 9yrs	Pictures were confusing
	(#24) 11yrs	More than one right answer
	(#38) 8yrs	Question was too hard – confusing
	(#48) 9yrs	Did not seem to have a right answer
	(#63) 8yrs	Confusing because you should go to the hospital with asthma
27. "How did Tina get an upset tummy?" 27- A. One kid says, "Tina saw food that was in the garbage." 27- B. Another kid says, "Tina ate food that was in the garbage."	(#17) 11yrs	Had more than one right answer
	(#24) 11yrs	Confusing
	(#39) 9yrs	Did not want to answer
	(#39) 9yrs	Confusing

Preliminary reliability. The coefficient alphas for each scale were the following: Identify .75, Cause .74, Consequence .81, and Cure .72. Inter-item correlation matrices revealed items with unsatisfactory correlations in the Identify (see Table 26), Cause (see Table 27), and Cure scales (see Table 28), but no problems with items in the Consequence scales (see Table 29). Items # 2

(identify-cold), # 27 (cause-upset tummy), and # 23 (Cure-skinned knee) had negative correlations and the inter-item correlation between item # 15 (cure-asthma) and # 16 (cure-asthma) was one.

Table 26. Identify Scale – Phase II

	C1	C2	A9	A10	SK17	SK18	UT25	UT26
Cold 1^E	1.00							
Cold 2^H	.48**	1.00						
Asthma 9^E	.44**	-.07	1.00					
Asthma 10^H	.47**	-.06	.79**	1.00				
Skinned knee 17^E	.18	.25	.10	.01	1.00			
Skinned knee 18^H	.09	-.06	.41**	.29*	.45**	1.00		
Upset tummy 25^E	.34*	-.05	.47**	.17	.37**	.03	1.00	
Upset tummy 26^H	.34*	.05	.47**	.34*	.37**	.20	.43**	1.00

^E = Easy item

^H = Hard item

** Correlation significant at the 0.01 level

* Correlation significant at the 0.05 level

Table 27. Cause Scale – Phase II

	C3	C4	A11	A12	SK19	SK20	UT27	UT29
Cold 3^E	1.00							
Cold 4^H	.70**	1.00						
Asthma 11^E	.10	.22	1.00					
Asthma 12^H	.14	.26	.39**	1.00				
Skinned knee 19^E	.45**	.29*	.15	.07	1.00			
Skinned knee 20^H	.45**	.58**	.24	.20	.52**	1.00		
Upset tummy 27^E	.05	.16	-.11	.04	.21	.23	1.00	
Upset tummy 28^H	.49**	.49**	.19	.34*	.28**	.23	.37**	1.00

^E = Easy item

^H = Hard item

** Correlation significant at the 0.01 level

* Correlation significant at the 0.05 level

Table 28. Cure Scale – Phase II

	C7	C8	A15	A16	SK23	SK24	UT31	UT32
Cold 7^E	1.00							
Cold 8^H	.27	1.00						
Asthma 15^E	.55**	.49**	1.00					
Asthma 16^H	.55**	.49**	1.00	1.00				
Skinned knee 23^E	-.15	.18	-.01	-.01	1.00			
Skinned knee 24^H	.38**	.63**	.40**	.40**	.02	1.00		
Upset tummy 31^H	.19	.22	.17	.17	.03	.03	1.00	
Upset tummy 32^E	.51**	.44**	.20	.20	-.05	.48**	.45**	1.00

^E = Easy item

^H = Hard item

** Correlation significant at the 0.01 level

* Correlation significant at the 0.05 level

Table 29. Consequence Scale – Phase II

	C5	C6	A13	A14	SK21	SK22	UT29	UT30
Cold 5^H	1.00							
Cold 6^E	.68**	1.00						
Asthma 13^E	.55**	.51**	1.00					
Asthma 14^H	.22	.31*	.65**	1.00				
Skinned knee 21^E	.58**	.16	.35*	.10	1.00			
Skinned knee 22^H	.26	.37**	.26	.34*	.05	1.00		
Upset tummy 29^E	.14	.20	.29*	.26	.14	.45**	1.00	
Upset tummy 30^H	.17	.43**	.51**	.47**	.16	.51**	.56**	1.00

^E = Easy item

^H = Hard item

** Correlation significant at the 0.01 level

* Correlation significant at the 0.05 level

Revision of the Illness Knowledge Questionnaire. The evaluation and subsequent revisions of the IKQ were developed by considering three perspectives of the IKQ: 1) child participants' comments; 2) reliability and inter-correlations of IKQ items, and 3) illness type and illness dimension. Child participants' comments and reliability/correlation data were used to identify items that may need revision. Illness type and illness dimension were used to evaluate

the theoretical issues that may underlie items requiring revision.

Revisions for IKQ items were considered when participants suggested that the item was problematic or when correlation data were poor (i.e., negative correlation or correlation equal to one). A total of 14 items met the criteria. Most of these items were identified because of child participants' comments ($n = 9$), three were identified because of poor correlations, and two items were identified by both comments and poor correlations. Table 30 depicts items that were identified by participants' comments and/or poor correlations.

Table 30. Items Identified by Participants' Comments and/or Poor Correlations

ITEM	COM	COR
1. "What is a cold?" 1- A. One kid says, "A cold makes you have a runny nose." 1-B. Another kid says, "A cold makes your nose grow longer."	X	
2. What is a cold?" 2- A. One kid says "A cold makes you cough." 2- B. Another kid says, "A cold makes you hiccup."		X
4. "How did Billy get a cold?" 4- A. One friend says, "Billy got a cold because cold-germs he could not see got inside his body." 4- B. Another kid says, "Billy got a cold because he ate ice cream."	X	
9. "What is asthma?" 9- A. One kid says, "Asthma makes you burp." 9-B. Another kid says, "Asthma makes you sick."	X	
10. "What is asthma?" 10-A. One kid says, "Asthma can make you burp a lot and makes it hard to breathe." 10- B. Another kid says, "Asthma can make you cough a lot and makes it hard to breathe."	X	
12. "How did Annie get asthma?" 12- A. One kid says, "The pumping muscles that move blood from her heart are too tight." 12- B. Another kid says, "The breathing tubes that bring air to her lungs are too tight."	X	
15. "How will Annie get better from her asthma attack?" 15- A. One kid says, "Annie needs to eat candy." 15- B. Another kid says, "Annie needs to take medicine."		X
16. "How will Annie get better from her asthma attack?" 16- A. One kid says, "Annie needs to use special lotion that she rubs on her nose." 16- B. Another kid says, "Annie needs to take special medicine that she breathes into her lungs."	X	X
21. "What happens to Cory when he has a skinned knee?" 21- A. One kid says, "Cory will cry." 21- B. Another kid says, "Cory will laugh."	X	
23. "How will Cory's skinned knee get better?" 23- A. One kid says, "Put a band aid on Cory's skinned knee to keep it clean." 23- B. Another kid says, "Put a cast on Cory's skinned knee to keep it clean."		X

Table 30, cont'd

ITEM	COM	COR
24. "How will Cory's skinned knee get better?" 24- A. One kid says, "Clean Cory's skinned knee with soap and water to kill the germs." 24- B. Another kid says, "Rub Cory's skinned knee with hand lotion and baby powder to kill the germs."	X	
25. "What is an upset tummy?" 25- A. One kid says, "An upset tummy makes you feel sick." 25- B. Another kid says, "An upset tummy makes you scratch your bellybutton."	X	
27. "How did Tina get an upset tummy?" 27- A. One kid says, "Tina saw food that was in the garbage." 27- B. Another kid says, "Tina ate food that was in the garbage."	X	X
28. "How did Tina get an upset tummy?" 28- A. One kid says, "Tina saw some old food with that might have germs on it." 28- B. Another kid says, "Tina ate some food with germs on it."	X	
32. "How will Tina get better from her upset tummy?" 32- A. One kid says, "Tina needs to play and eat French fries." 32- B. Another friend says, "Tina needs to rest, and eat crackers."	X	

COM = Comment by child participant COR = Correlation that was poor

Each type of illness and illness dimension was represented and almost an equal number of easy and hard items were among the items that may need revision. Table 31 depicts items by type of illness and illness dimension.

Table 31. Illness & Illness Dimension

TYPE OF ILLNESS	ILLNESS DIMENSION			
	Identify	Cause	Consequence	Cure
Cold	Item # 1 ^H Item # 2 ^E	Item # 4 ^H		
Asthma	Item # 9 ^E Item # 10 ^H	Item # 12 ^H		Item # 15 ^E Item # 16 ^H
Skinned Knee			Item # 21 ^E	Item # 23 ^E Item # 24 ^H
Upset Tummy	Item # 25 ^E	Item # 27 ^E Item # 28 ^H		Item # 32 ^E

^E = Easy item

^H = Hard item

Type of illness. Among the illnesses, asthma and upset tummy items were identified most frequently as difficult or confusing. As previously mentioned, the

asthma vignette was difficult for many participants probably because they either have not been exposed to persons with asthma, or if they have been exposed to family or friends with asthma, the participants' exposures were highly variable because of varying degrees of asthma severity. For example, one child was likely to know an individual with mild asthma because she thought that asthma was not a type of sickness because people with asthma go to school and go about other daily activities. In contrast, another child likely knew someone with a more severe form of asthma because he thought that a person with asthma should go to the hospital. Although the inherent variability of asthma cannot be completely resolved, the asthma items needed to be more precise.

Having an upset tummy has been identified by other researchers as a common illness for which children should be familiar; however, four of the upset tummy items were difficult or confusing to the participants. One of the identify-upset tummy items was commented on by two participants (i.e., 25. What is an upset tummy? One kid says, "An upset tummy makes you feel sick." Another kid says, "An upset tummy makes you scratch your bellybutton."). This item does not appear to be problematic because the comments were unrelated. For example, one of the comments was not specific to an upset tummy and was simply a recommendation about the vignette character's hair. The participants' comments about the cause-upset tummy items were vague but consistently identified as confusing. During the interviews, a few of the participants stated that looking at garbage would make them feel sick to their stomach; therefore, to these participants this item had more than one correct answer (i.e., 27. "How did Tina

get an upset tummy?” One kid says, “Tina saw food that was in the garbage.” 27-B. Another kid says, “Tina ate food that was in the garbage.”). Both of the cause-upset tummy items focused on contamination as the primary cause of an upset stomach; however, contagion was not used. This exclusion of contagion as a cause of an upset tummy may have been confusing to many of the participants who attributed the development of an upset stomach to exposure to an ill person but did not recognize contaminated food as a cause. Furthermore, the upset tummy vignette was the only vignette that did not have a contagion cause item. Thus, one of the cause-upset tummy items (#27) was revised to a contagious cause of an upset tummy, making it consistent with the cause items among the three other illness types.

Overall cold and skinned knee items were not identified as confusing or difficult to participants perhaps because these illnesses were more familiar to the children. One of the consequence-skinned knee items received two comments (#21. “What happens to Cory when he has a skinned knee? One kid says, “Cory will cry.” Another kid says, “Cory will laugh.”); however, the item was not revised because the comments were not relevant to the target population for the IKQ. The two child participants who commented on this item were both males and school-age children (9 years and 11 years old) and they both stated that crying was not always a consequence of a skinned knee. The age and gender of these respondents likely influenced their perspective of what was or was not a consequence of a skinned knee (i.e., school-age children and boys in particular do not or avoid crying about a skinned knee). Because the majority of

preschoolers typically do cry after skinning their knee, this item accurately depicted a consequence of a skinned thus was not revised.

Illness dimension. Five identify items, four cause items, and five cure items were identified as problematic. One consequence item (#21) was identified; however, as discussed above, the underlying problem appeared to be related to the type of illness rather than the illness dimension.

The identify items represented three illness types (i.e., cold, asthma, and upset tummy). These items likely were confusing because as articulated by an eight year old participant the choices are not really “what” the illness is. In retrospect, a more accurate description of the choices provided was “an illness symptom.” Symptoms were used to identify illness based on findings by Goldman et al. (1991) that suggested that preschoolers identified illnesses by illness symptoms. The identify items needed a more accurate noun to identify what the illness is. For example, a cold is an illness that makes your nose run or asthma is a disease that makes you cough. Although other children did not articulate this problem, the participants may have sensed a problem but were not able to hone into the problematic issue. Thus, all of the identify items were revised to include an identifying noun (e.g., an illness, a disease)

The four cause items that were identified as problematic included three types of illnesses (i.e., cold, asthma, and upset tummy). Of the four illness dimensions, the cause of an illness was probably the most difficult illness dimension for child participants to understand because the typical causes of illness/disease, such as germs and underlying pathology, are non-observable.

Likewise, developing correct choices that were accurate and clear and incorrect choices that were feasible but incorrect was challenging. Given the difficulties associated with the cause items, the reliability data were used to further assess whether any of the items should be revised. Only item # 27 (cause-upset tummy) had a significantly bad intra-item correlation (i.e., it was negatively correlated with another item). As previously discussed, item # 27 was revised to depict a contagion mechanism. The inter-item correlations of the remaining cause items (# 4. "Billy got a cold because cold-germs he could not see got inside his body." "Billy got a cold because he ate ice cream.", # 12. "The pumping muscles that move blood from her heart are too tight." "The breathing tubes that bring air to her lungs are too tight.", # 28. "How did Tina get an upset tummy?", "Tina saw some old food with that might have germs on it.", "Tina ate some food with germs on it.") were adequate: # 4 (.14 - .58); # 12 (.04 - .39), and # 28 (.19 - .49); therefore, these items were not revised

Five cure items were identified as problematic. Medication was the type of cure used in both of the cure-asthma items, and this similarity between the items likely explained their inter-item correlation of one. One of these items needed to be completely revised, and item # 16 ("Annie needs to use special lotion that she rubs on her nose." "Annie needs to take special medicine that she breathes into her lungs.") was chosen for complete revision because it had been identified by two participants as confusing. No revisions were made to item # 15 ("Annie needs to eat candy." "Annie needs to take medicine.").

The underlying problem with item # 23 ("Put a band aid on Cory's skinned

knee to keep it clean.”, “Put a cast on Cory’s skinned knee to keep it clean.”) may have been related to the accompanying image for the incorrect choice. The image, depicting a cast, was possibly confusing because the cast looks more like a gauze bandage than a cast. During the interviews several participants appeared to use the image to answer the question. Thus, the choices for item # 23 were not revised but the accompanying image to the incorrect choice was revised to look like a more conventional cast (i.e., covers the foot, lower leg, and the knee).

Two of the items may have been difficult for participants because the participants had different cures for these conditions than the cures used on the IKQ. For example, one child told the author that a skinned knee should not be washed with soap because it will make the sore burn. Another child stated that French fries were the food that helped her recover from an upset stomach. Item # 24 (“Clean Cory’s skinned knee with soap and water to kill the germs.” “Rub Cory’s skinned knee with hand lotion and baby powder to kill the germs.”) was not revised because the participant who commented on this item appeared to simply not know the answer. Item # 32 (“Tina needs to play and eat French fries.” “Tina needs to rest, and eat crackers.”) was revised because it was too similar to item # 31. The inter-item correlation between # 31 and # 32 was okay ($r = .45$) and no child participant specifically stated that the items were too similar; however, one child suggested that medicine should have been used as a cure for an upset tummy. This comment made the author think that item # 32 should be revised to depict a cure for an upset stomach that was different from a change in

food choices. Medication was not used as a cure because pharmacologic therapy is typically not used to treat children's upset stomachs (Sondheimer, 2007). Rest was chosen as the cure for item # 32.

Draft of revised IKQ. Based on participants' feedback, reliability results, and inter-item correlations, 22 of the IKQ response/image pairs underwent some level of revision. Responses from nine items were reworded to improve clarity, images from three items were changed to improve image clarity, six items required both rewording of responses and revising of accompanying images, and four items were completely revised. The number of items (i.e., 32 items), testing format (i.e., brief vignettes with forced-choice responses to questions), and test scoring (i.e., 0-32 where 32 indicates greatest illness knowledge) were not changed during revision. A draft of the revised IKQ was submitted to the author's dissertation committee. Table 32 depicts the original items in Phase II and how the IKQ was revised.

Table 32. Items Revised Based on Participant Comments & Inter-item Correlations

PHASE II ITEM		REVISED	PHASE III ITEM	
	1- A. One kid says, "A cold makes your nose grow longer."	Reworded response		1- A. One kid says, "A cold is an illness that makes your nose grow longer."
	1- B. Another kid says, "A cold makes you have a runny nose."	Reworded response		1- B. Another kid says, "A cold is an illness that makes you have a runny nose."
	2- A. One kid says "A cold makes you cough."	Reworded response		2- A. One kid says "A cold is an illness that makes you cough."
	2- B. Another kid says, "A cold t makes you hiccup."	Reworded response		2- B. Another kid says, "A cold is an illness that makes you itch."
	3- B. Another kid says, "Billy got his cold by playing with his toys."	Reworded response		3- B. Another kid says, "Billy got his cold by playing with his own toys."
	9- A. One kid says, "Asthma makes you sick."	Reworded response & Image change		9- A. One kid says, "Asthma is a disease that makes you cough."
	9-B. Another kid says, "Asthma makes you burp."	Reworded response & Image change		9-B. Another kid says, "Asthma is a disease that makes you burp."
	10- A. Another kid says, "Asthma makes you cough a lot and makes it hard to breathe."	Reworded response & Image change		10-A. One kid says, "Asthma is a disease that makes it hard to breathe."
	10-B. One kid says, "Asthma can make you burp a lot and makes it hard to breathe."	Reworded response & Image change		10- B. Another kid says, "Asthma is a disease that makes it hard to swallow."
	15- B. Another kid says, "Annie needs to take medicine."	Image change		15- B. Another kid says, "Annie needs to take medicine."
	16- A. One kid says, "Annie needs special medicine that she rubs on her nose."	Complete revision		16- A. One kid says, "Annie needs to go to her doctor."
	16- B. Another kid says, "Annie needs special medicine that she breathes into her lungs."	Complete revision		16- B. Another kid says, "Annie needs to go to her teacher."
	25- A. One kid says, "An upset tummy makes you feel sick."	Reworded response		25- A. One kid says, "An upset tummy is an illness that makes you feel sick."









Table 32. cont'd

PHASE II ITEM		REVISED	PHASE III ITEM	
	25- B. Another kid says, "An upset tummy makes you scratch your bellybutton."	Reworded response		25- B. Another kid says, "An upset tummy is an illness that makes you scratch your bellybutton."
	26- A. One kid says, "An upset tummy makes your tummy hurt."	Reworded response		26- A. One kid says, "An upset tummy is an illness that makes your tummy hurt."
	26- B. Another kid says, "An upset tummy makes your tummy strong."	Reworded response		26- B. Another kid says, "An upset tummy is an illness that makes your tummy strong."
	27- A. One kid says, "Tina ate food that was in the garbage"	Complete revision		27- A. One kid says, "Tina played with a friend who had an upset tummy."
	27- B. Another kid says, "Tina saw food that was in the garbage."	Complete revision		27- B. Another kid says, "Tina played a game lying on her tummy."
	28- A. One kid says, "Tina saw some old food with that might have germs on it."	Image change		28- A. One kid says, "Tina saw some old food with that might have germs on it."
	28- B. Another kid says, "Tina ate some food with germs on it."	Image change		28- B. Another kid says, "Tina ate some food with germs on it."
	32- A. One kid says, "Tina needs to play and eat french fries"	Reworded response & Image change		32- A. One kid says, "Tina needs to play "
	32- B. Another friend says, "Tina needs to rest and eat crackers"	Reworded response & Image change		32- B. Another friend says, "Tina needs to rest"

Revised IKQ. The members of the author's dissertation committee approved the revisions made to the 22 response/image pairs and also recommended that two additional items be simplified (see Table 33). With revisions made to items # 8 and # 14 per committee members'

recommendations, the final version of the illness knowledge questionnaire was completed (see Appendix S).

Table 33. Items Revised Based on Dissertation Committee Member’s Comments

PHASE II ITEM		REVISED	PHASE III ITEM	
	8- A. One kid says, “Billy needs to sleep and drink lots of water.”	Reworded response		8- A. One kid says, “Billy needs to sleep.”
	8- B. Another kid says, “Billy needs to play and drink lots of water.”	Reworded response		8- B. Another kid says, “Billy needs to play.”
	14- A. One kid says, “Annie will have a hard time moving and not want to play.”	Reworded response		14- A. One kid says, “Annie will have a hard time moving.”
	14- B. Another kid says, “Annie will have a hard time breathing and not want to play.”	Reworded response		14- B. Another kid says, “Annie will have a hard time breathing.”

Participant feedback Six (i.e., three 5 – 6 years old and three 8 – 13 years old) of the 17 children from recruitment site # 3 were invited to participate in a group discussion about the revisions made to the IKQ. The age ranges were increased by one year to account for participants who had birthdays since the original interview. Eleven of the original 17 participants were not available because they no longer attended the child care center. The younger age group was comprised of two girls and one boy and the older age group included one girl and two boys.

Two presentations were made to provide information in a developmentally appropriate manner; one for young children (5 - 6 years) and another for older children (8 - 13 years). During the presentation, each age group was presented a

10 x 15 spiral flip chart of the original IKQ and a 10 x 15 spiral flip chart of the revised IKQ. All IKQ items were reviewed and changes to the questionnaire were identified. After reading both items, I asked participants “What do you think about this change?” or “What do you think about the questions that were not changed?” I also used probing comments/questions (e.g., tell me more, what do you mean when you say...) to help participants express their meaning fully. This procedure was completed in 30 minutes and participants were given a \$5.00 gift card after the interview was completed.

Participant feedback results. The children responded favorably to the revisions. Overall, the children in the older age group approved the changes to the items. They did not like the revisions made to the upset tummy cause items. Item # 27 (i.e., “Tina played with a friend who had an upset tummy.” “Tina played a game lying on her tummy.”) was confusing despite the revision and the images for item # 28 (i.e., “Tina saw some old food with that might have germs on it.”, “Tina ate some food with germs on it.”) should not have been changed to the images with the character looking at and eating from the garbage.

The children in the older age group had comments about three items that were not changed. They were surprised that item # 12. (i.e., “How did Annie get asthma?” “The pumping muscles that move blood from her heart are too tight.”, “The breathing tubes that bring air to her lungs are too tight”) was not eliminated because it appeared too difficult for preschoolers. They also stated that the image for item choice # 19 - A (i.e., “Cory fell down.”) needed to depict the character down on his knee and that choice 25 – A (i.e., “An upset tummy makes

you feel sick.”) needed to be more specific to an upset stomach such as an upset tummy makes your stomach rumble.

The children in the younger age group provided positive feedback; however, this feedback session was not as informative as the session with the older children. The younger children appeared confused by the open-ended questions and were unable to formulate responses; therefore, I asked them close-ended questions (i.e., “Does this change look okay?”). They also became distracted after 15 minutes and began evaluating how many more items they had to look at before the session was over.

The feedback session took place after the completion of Phase III due to scheduling issues with the child care site; therefore, participants’ comments were not integrated into Phase II revisions of the IKQ.

Health history questionnaire post-administration checklist. Of the 38 guardians who completed the checklist, 80% or more participants responded favorably to eight of the nine checklist items (see Table 34). The checklist item # 7 (i.e., were HHQ items in the right order?) received a score less than 80%; however, none of the participants provided comments or suggestions about this item. A few guardians ($n = 6$) provided comments. Most of the comments were about HHQ items (i.e., race, children’s environmental cigarette exposure, parent/guardian income and education, and gestational age) that parents/guardians considered problematic; however, one comment was a suggestion about adding an item to evaluate whether parents/guardians discuss health issues with their children. Table 35 depicts parent/guardian comments

about the HHQ.

Table 34. HHQ Post-Administration Checklist

CHECKLIST ITEM	RESPONSE (%)
1. Confusing	No – 97
2. No right answer	No – 92
3. More than one right answer	No – 92
4. Words hard to understand	No – 92
5. Questions that you did not want to answer	No – 97
6. Questions make you feel bad	No – 97
7. Right order	Yes – 74
8. Any additional questions that needed to be included	No – 95
9. Directions made sense	Yes – 82

Table 35. Parent/Guardian Comments about the HHQ

HHQ ITEM	PARENT/GUARDIAN COMMENT
Child's race	Had more than one right answer Made one parent/guardian feel bad because the race choices were not sensitive to interracial individuals
Birth history: gestational age	Did not understand term "gestational age"
Is your child routinely exposed to cigarette smoke daily?	Did not have a right answer for children who were not exposed to cigarette smoke in their primary home but were routinely exposed to cigarette smoke in relatives homes
Family income and Parental educational level	Did not want to answer
	Needed to include an additional item "Do you discuss health problems with your child?"

Revision of the health history questionnaire. The health history questionnaire (HHQ) was modified slightly based on guardian feedback and the author's field experience with the questionnaire. Questions about gestational age (i.e., under Birth History: Gestational age and "was your child born: on time, early, late, unsure") were removed and replaced with a two-tiered question that used layman's terms. Added to the child's health history section was a question

that examined whether the parent/guardian discusses health problems or health issues with her child. This question also included a narrative section for parents/guardians to document specific health problems/issues that have been discussed with their children. An observation made by the author during Phase II was that few guardians provided the birth date of their child. Every question on the HHQ was aligned to the left except for the birth date question that was situated on the right side of the HHQ. The birth date question was moved to the left and prompts for month, date and year were included in the revised HHQ.

The order of the HHQ, the race/ethnicity choices, and the income/educational level questions had received either a poor rating or negative comments from parent/guardian respondents; however, no revisions were made to these items. The order of the HHQ was not changed because the poor rating (74%) of post-administration checklist item # 7 (i.e., was the HHQ in the right order?) may be related to response bias rather than any specific problem with the order of the questionnaire. Item # 7 and item # 9 (i.e., did the directions make sense?) were the only checklist items that needed a “Yes” response to indicate a favorable rating from parents/guardians. The remaining HHQ post-administration checklist items received a favorable response if the parent/guardian marked “No.” Parents/guardians may have inadvertently selecting the “No” response for item # 7 because of the response pattern of the other seven items. As previously mentioned, no comments were made by parents/guardians about how or why the order of the HHQ was problematic; therefore, response bias appeared to be the most likely explanation for the low rating of checklist item #7.

The race/ethnicity choices and income questions on the HHQ were not changed because parents'/guardians' comments appeared to be consistent with prior research findings that individuals who complete demographic questionnaires often find race and ethnicity choices inadequate or incomplete (Smedley, Stith, & Nelson, 2003) and that they do not want to respond to income questions as evidence by high none response rates (Fukuola, Rankin, & Carroll, 2007). Given the inherent problems with these demographic questions, the items on the HHQ appeared adequate to the author of this paper. The revised HHQ (see Appendix T) was submitted to and approved by the author's dissertation committee.

Parent/guardian feedback Parents/guardians of the children who participated in the feedback sessions provided feedback about the revised HHQ using a 4-item survey (see Appendix U); however, this feedback procedure had poor parent/guardian participation. Only two parents/guardians provided feedback. This low response was related to five of the participants belonging to one of two families so only two parent/guardian responses were generated and the parent/guardian of the singleton participant did not complete the feedback questionnaire. The feedback from the two parents/guardians was favorable.

Phase II summary

Pilot testing of the IKQ with a sample of children and the HHQ with a sample of parents/guardian was completed in Phase II. Child participants and their parents/guardians evaluated the respective instruments and provided

excellent feedback that was used to refine and clarify the IKQ and the HHQ. Initial reliability and inter-item correlations of the IKQ were also examined and provided an additional means to evaluate the quality of the IKQ items. The IKQ and the HHQ were revised based on participants' comments. The author's dissertation committee approved revisions of the IKQ and the HHQ and provided suggestions to further refine the IKQ. Phase II also enabled the author to refine the instructions for and administration of the IKQ. The next step of the study (i.e., Phase III) was to evaluate the psychometric properties of the IKQ in a sample of young children. An overview of the methods used in Phase III is described below.

Phase III: Methods

Purpose

The purpose of Phase III was to examine the psychometric properties of the illness knowledge questionnaire (IKQ) including the scale's structure, reliability, and construct validity. Preschoolers are the target population for the IKQ; however, school age children were included in Phase III to assess the construct validity of the IKQ.

Design

A cross-sectional descriptive design was used to establish scale structure, reliability, and construct validity of the IKQ.

Sample and sampling design

A convenience sample of 230 participants was recruited from three private catholic schools (kindergarten to eighth grade) and one pediatric clinic at a teaching children’s hospital in Davidson County Tennessee (see Table 36). These sites were chosen because of their large number of potential participants. Recruitment procedures for the sites were slightly different because prospective participants at the schools were available at the respective site for several weeks while prospective participants at the clinic were available only on the day of their clinic visit.

Table 36. Recruitment Site Characteristics – Phase III

SITE	ENROLLMENT	AGE RANGE
School # 1	400 students/year	4 yrs – 14 yrs
School # 2	200 students/year	4 yrs – 14 yrs
School # 3	180 students/year	4 yrs – 14 yrs
Clinic	80 – 120 clients/day	Newborn – 16 yrs

Inclusion criteria were the following: all participants (children and their parents/guardians) must be fluent in English and children must meet the age requirement (i.e., 4-6 year olds; 7-9 year olds; and 10-12 year olds) at the time of data collection. Exclusion criteria were the following: an illness at the time of recruitment or interview and children with special learning needs or visual impairment per parent/guardian history. Inclusion and exclusion criteria for Phase III were the same as the criteria used in Phase II. Recruitment procedures are outlined below.

A total of 230 children were recruited from three different age groups (i.e., 4-6 year olds, $n = 79$; 7-9 year olds, $n = 93$; and 10-12 year olds, $n = 58$). Table 37 depicts the sample by age group and site. Sixty percent of the sample came from the schools and 40% from the clinic.

Table 37. Sample by Age Group and Site – Phase III

SITE	AGE GROUP			
	4-6	7-9	10-12	
School 1	25	24	20	69 (30%)
School 2	6	11	9	26 (11%)
School 3	13	20	12	45 (19%)
Clinic	35	38	17	90 (40%)
TOTAL	79 (34%)	93 (41%)	58 (25%)	230 (100%)

School recruitment procedures

Recruitment procedures for child participants from schools and their guardians began after IRB approval was obtained. The author and an official at each school identified a routine school process for distribution of study information (i.e., weekly newsletter packets or distribution by classroom teachers). A letter (see Appendix V) introducing the study purpose and procedures was sent to all parents/guardians of children enrolled in the school. About one week after introduction letters were sent to parent/guardians, the author or trained research assistant (RA) visited the school campus during child drop-off and pick-up times to recruit participants.

The author positioned herself outside the school's main entrance and used one of the school's 3ft. X 8 ft. tables draped in a table cloth with the author's nursing school name and emblem as an information desk. Several

parents/guardians approached the table to enroll in the study; however, most potential participants were approached by the author. During drop-off times the author approached potential participants as they walked past the information desk, and during pick-up times the author would also approach parents/guardians who waited in their cars or congregated in the school parking lot. The author attempted to gain the parents'/guardians' attention and asked if their children were within the study age range. If the parent/guardian acknowledged the author and stopped to converse, the author briefly described the study and then asked if the parents'/guardians' child or children might like to participate in the study. The consent and assent were reviewed with all interested potential participants. Parents/guardians were given the option to either read and sign the consent form at the school or sign the consent and complete the health history questionnaire at home. A stamped envelope addressed to the author was given to all parents/guardians who opted to complete the forms at home. This process was repeated at each school on four to five days (including both pick-up and drop-off times) to approach as many parents/guardians as possible.

Clinic recruitment procedures

Recruitment procedures for participants from the clinic and their guardians began after receiving IRB approval. The author was available in the clinic waiting area and examination rooms to review study procedures and to obtain informed consent and child assent with interested children and their parents/guardians. The author used two methods to approach potential participants. In the clinic

waiting area, the author approached any parent/guardian who accompanied a child or children who appeared to be 4 years to 12 years old. This method was used because the author did not have access to names and ages of children who were in the waiting area. Once a child was taken to an examination room, the author used the clinic computer system that identified children's ages and names. The author introduced herself and briefly described the purpose of the study, the inclusion/exclusion criteria, and the study procedures. The author asked if the parents'/guardians' child or children might like to participate in the study. The consent and assent were reviewed by the author with all interested potential participants and the consent/assent was signed by all who agreed to participate.

Measures

Illness Knowledge Questionnaire: Phase III. The IKQ used in Phase III (see Appendix S) was the revised version of the Phase II IKQ.

Health history questionnaire. The health history questionnaire (HHQ) used in Phase III (see Appendix T) was the revised HHQ used in Phase II. A minor modification was made to the HHQ after starting Phase III. This modification was the addition of a birth history question about whether the child had been adopted and inserting "birth mother" next to "your" when referring to the pregnancy.

Procedures

Parents/Guardians. The majority of parents/guardians from the schools

completed the HHQ at home and returned it via United States Postal services ($n = 109$) using a stamped envelope addressed with the author's address. The remaining 31 parent/guardians hand delivered the completed form to the author at the school. All adult participants from the clinic site ($n = 90$) completed the HHQ before leaving the clinic.

Children. The IKQ was administered to children by the author or trained RA during individualized interviews. School teachers were informed about study procedures via an informational letter (see Appendix W) and approved interview times. The IKQ was formatted on a 10 in. X 15 in. spiral flip chart that displayed the correct and incorrect images on the same page. The examiner read each item to the child volunteer and the child was instructed to point to the picture that was "right." The IKQ required 10-20 min. to administer depending upon the child's age (i.e., testing younger children took more time). Parents/guardians indicated on the consent if they desired to accompany their children during the interview. Seven children from the school sites were interviewed with an accompanying parent/guardian. All parents/guardians from the clinic sites were present with their children during the interview. During the interview, children's responses to the IKQ were recorded by the investigator using a PDA. Upon completion of the interview, each child was given a \$10.00 gift card for participating in the study.

Data analysis

Evaluation of the items. Correlation of items, item difficulty, and item

discrimination index were used to evaluate the performance of the individual items. Examining the inter-correlations of the items via the correlation matrix was an important first step in evaluating the individual items because it is an indirect means to assess whether the items are highly correlated with the true score of the underlying construct (i.e., illness knowledge) (DeVellis, 1991). In other words, the IKQ items were developed to measure the latent variable, illness knowledge; therefore, well performing items should correlate with each other. Specifically, inter-item, corrected item-subscale, and corrected item-total score correlations were examined. Acceptable correlations were as follows: inter-item ($r = 0.3-0.7$), item-subscale and item-scale at $r = 0.6$ (Knapp & Brown, 1995; Lynn, 1995).

Two additional item analysis techniques (i.e., difficulty level and discrimination index) were used because these techniques evaluate measures of cognitive abilities, such as knowledge (Polit & Beck, 2007). The IKQ was developed to measure preschoolers' illness knowledge; therefore, evaluating it as a measure of cognitive ability was an important assessment of item quality. Only preschoolers' (i.e., four and five year old children) responses to items were used to calculate item difficulty level and discrimination index to insure that IKQ items are appropriately difficult for preschool children. Items' difficulty levels were assessed by examining the percentage of participants who answered each item correctly (e.g., < 30 percent = most difficult, 50 – 75 percent = ideal difficulty, 76 – 85 percent = moderately easy, > 90 percentage very easy) (Davis, 1993). Item discrimination was evaluated by computing the discrimination ratio. Specifically, the 10 highest and 10 lowest scoring preschoolers were identified; the number of

preschoolers from each group that answered individual items correctly was counted; then the number of low scorers who answered the item correctly was subtracted from the number of high scorers who answered the item correctly and that value was divided by 10. The possible range of discrimination ratio was from – 1.0 to + 1.0 and the criterion for an acceptable discrimination ratio was + 0.3 or higher (Davis). IKQ items were deemed appropriate if the difficulty level was between 30 to 95 percent and the item discrimination was at least + .3. The evaluation of IKQ items was used to ensure that the appropriate items were retained in the scale and suboptimal items were removed from the scale. Only retained IKQ items were used for testing the scale reliability, construct validity and factor analysis.

Assessment of reliability. After removing inappropriate items, the reliability of the IKQ scale and subscales (i.e., identify, cause, consequence, cure) was evaluated, thereby assessing the variance of the scale that is attributable to the true score of the latent variables (i.e., illness knowledge and the four dimensions of illness) (DeVellis, 1991). The reliability of the IKQ was addressed by conducting SPSS RELIABILITY procedures. Kuder-Richardson formula 20 (KR-20) was used to estimate internal consistency because individual items are dichotomous (right or wrong). The desired alpha coefficient was equal to or greater than 0.70 for total of all items.

Descriptive statistics. The mean and standard deviation (SD) for total and subscale scores across the three age groups was assessed to summarize the distribution of scores for each age group (Polit & Beck, 2008).

Assessment of construct validity. To begin supporting the IKQ as a measure of illness knowledge, the construct validity of the IKQ was evaluated using hypothesis testing. Three hypotheses were tested to support the construct validity of the IKQ. First, it was predicted that older children were more knowledgeable about illness than younger children. Regression analysis was used to examine the correlation of the scale scores with age as a continuous variable and analysis of variance was used to assess the mean differences of IKQ scores among the three age groups (i.e., 4 to 6 years; 7 to 9 years, 10 to 12 years). Second, preschool children whose parents/guardians discussed health issues were predicted to score higher on the IKQ than preschoolers whose parents/guardians did not discuss health issues and analysis of variance (ANOVA) was used to compare mean scores. Third, it was predicted that preschool children with asthma or a family history of asthma would score higher on the asthma items than preschoolers who did not have or are not exposed to persons with asthma. This relationship was examined using ANOVA.

Assessment of factor structure. The IKQ was designed to include four subscales; however, empirically testing the internal structure of the IKQ was needed to fully appreciate the properties of the scale (DeVellis, 1991). Exploratory factor analysis was performed to empirically determine the number of underlying constructs. Principal components factoring, unrotated was used for the initial factor extraction to maximize the variance explained by factors (Nunnally & Bernstein, 1994). Eigenvalues for each factor were evaluated with a criterion value of equal to or greater than one (Munro, 1997). A Scree plot of the

unrotated extraction was used as an additional factor extraction criterion. Factors that are positioned below the “elbow” of the plot line were not retained because these factors explain little of the variance (DeVellis, 1991, p. 98). The criterion selected for an adequate item loading was ≥ 0.40 . Factors that met factor-loading criteria were considered the factor structure.

CHAPTER IV

RESULTS

This chapter summarizes the results for Phase III of the study. The purpose of Phase III was to examine the psychometric properties of the illness knowledge questionnaire (IKQ), including the scale's reliability, construct validity, and structure in a sample of 230 children between the ages of 4 to 12 years. Initial correlation of items, item difficulty, and item discrimination index were conducted to evaluate the performance of individual items and poorly performing items were eliminated prior to assessing the IKQ psychometric properties.

Sample

Fifty-two percent of the sample were girls and 48% were boys. The majority of the sample identified themselves as "not Hispanic/Latino" (94%) and White (64%). Of the participants who provided income and education levels, 53% of household incomes were greater than \$50,000 per year and 70% had 13 or more years of education. Table 38 provides demographic characteristics of the sample.

Table 38. Demographic Characteristics of the Sample for Phase III

CHARACTERISTICS	NUMBER OF RESPONDENTS PERCENTAGE	
Gender	<i>n</i> = 230	
• Girls		52%
• Boys		48%
Ethnicity	<i>n</i> = 173	
• Hispanic or Latino		6%
• Not Hispanic/Latino		94%
Race	<i>n</i> = 226	
• African American		29%
• White		64%
• Other		7%
Family Yearly Income	<i>n</i> = 220	
• < 10,000		15 %
• 10,001 – 20,000		7 %
• 20,001 – 30,000		9 %
• 30,001 – 40,000		9 %
• 40,001 – 50,000		7 %
• > 50,000		53%
Parent/Guardian Education	<i>n</i> = 224	
• < 12 years		6 %
• 12 years or GED		24 %
• 13 to 16 years		39 %
• > 16 years		31%

Children’s health histories were obtained from their parents/guardians to examine participants’ overall health and their experiences with illnesses. Table 39 summarizes the birth histories of the sample. The parents/guardians who completed the health history reported that the birth mother had received prenatal care (94%) and that the birth mother had no history of substance use or complications with the pregnancy (74%). The mean birth weight was 3333 gm (range = 992 - 5358 gm, *SD* 629 gm). Table 40 depicts a summary of the medical histories of the children participants. Over half of the children (59%) were reported to have one to three of the 20 medical conditions and almost a third of the children had no history of medical problems.

Table 39. Birth History of Sample for Phase III

HEALTH HISTORY – Birth	NUMBER OF RESPONDENTS PERCENTAGE	
Maternal Prenatal History		
• Received prenatal care	<i>n</i> = 221	98%
• Used illegal/illicit substances		
Alcohol	<i>n</i> = 225	3%
Cigarette	<i>n</i> = 224	7%
Marijuana	<i>n</i> = 224	1%
Cocaine	<i>n</i> = 224	0.4%
Prescription drugs	<i>n</i> = 221	1%
• Experienced pregnancy complications		
Urinary tract infection	<i>n</i> = 221	6%
Vaginal infection	<i>n</i> = 216	5%
Hypertension	<i>n</i> = 222	10%
Gestational diabetes	<i>n</i> = 216	5%
• Combinations of substance use & complications	<i>n</i> = 205	
No substance use/No complications		
Substance use/No complications		
Complications/No substance use		
Complications/Substance use		
Child Participant Birth History		
• Birth weight	<i>n</i> = 217	
≥ 2500 grams		
1501 gram – 2499 grams		
1001 grams – 1500 grams		
< 1500 grams		
• Uncomplicated nursery course	<i>n</i> = 227	
		80%

Table 40. Child's Medical History

HEALTH HISTORY – Medical History	NUMBER OF RESPONDENTS PERCENTAGE	
Child Participants Medical History	N = 228	
Seizures		1%
Headaches		13%
Allergies		23%
Vision problems		16%
Hearing problems		5%
Chronic ear infections		18%
Speech problems		11%
Dental caries		25%
Heart disease		0.4%
Pneumonia		5%
Asthma		13%
Inflammatory bowel disease		2%
Chronic diarrhea		0.4%
Chronic constipation		1%
Urinary tract infection		5%
Musculoskeletal disease		3%
Eczema		14%
Sickle cell disease		0.4%
Immunization up to date	n = 221	98%
Takes Daily Medication(s)	n = 229	19%
Exposure to second hand cigarette smoke	n = 228	14%
Has a parent/guardian who discusses health issues with child	n = 226	71%
Has positive family history of Asthma	n = 228	42%
Lives with someone with a chronic condition	n = 225	34%

Item Analysis

Correlations

Correlations among IKQ dimension subscales (i.e., eight identify items, eight cause items, eight consequence items, and eight cure items) were evaluated using KR-20. Most correlations for the identify scale were statistically

significant ranging from .15 -.60, and the four non-significant correlations were related to the two identify-asthma items (see Table 41). The correlations for the cause, consequence, and cure scales revealed several non-significant correlations and negative correlations. Specific items associated with non-significant and negative correlations included both asthma items and one of the upset tummy items from the cause scale (see Table 42), items both skinned knee and one of the upset tummy items from the consequence scale (see Table 43), and a cold and an upset tummy items on the cure scale (see Table 44). Corrected item-subscale correlations and corrected item-scale correlations revealed six items with subscale correlations below .30, and four items with subscale and scale correlations less than .30 (see Table 45).

Table 41. Identify Scale – Phase III

	C1	C2	A9	A10	SK17	SK18	UT25	UT26
Cold 1^E	1.00							
Cold 2^H	.45**	1.00						
Asthma 9^E	.16*	.15*	1.00					
Asthma 10^H	.18**	.16*	.03	1.00				
Skinned knee 17^E	.17**	.22**	.18**	.12	1.00			
Skinned knee 18^H	.34**	.16*	.11	.10	.27**	1.00		
Upset tummy25^E	.27**	.33**	.26**	.23**	.34**	.29**	1.00	
Upset tummy 26^H	.26**	.31*	.11	.25**	.37**	.28**	.60**	1.00

^E = Easy item

^H = Hard item

** Correlation significant at the 0.01 level

* Correlation significant at the 0.05 level

Table 42. Cause Scale – Phase III

	C3	C4	A11	A12	SK19	SK20	UT27	UT29
Cold 3^E	1.00							
Cold 4^H	.63**	1.00						
Asthma 11^E	-.01	.04	1.00					
Asthma 12^H	.30**	.31**	.12	1.00				
Skinned knee 19^E	.41**	.38**	-.04	.05	1.00			
Skinned knee 20^H	.41**	.39**	.13	.14*	.28**	1.00		
Upset tummy 27^E	.12	.11	-.12	-.03	.18**	-.01	1.00	
Upset tummy 28^H	.23**	.32**	.11	.18**	.29**	.22*	.09	1.00

^E = Easy item

^H = Hard item

** Correlation significant at the 0.01 level

* Correlation significant at the 0.05 level

Table 43. Consequence Scale – Phase III

	C5	C6	A13	A14	SK21	SK22	UT29	UT30
Cold 5^H	1.00							
Cold 6^E	.54**	1.00						
Asthma 13^E	.40**	.59**	1.00					
Asthma 14^H	.29**	.26**	.16*	1.00				
Skinned knee 21^E	.25**	.06	.33**	.10	1.00			
Skinned knee 22^H	.04	.03	.09	.22**	.54**	1.00		
Upset tummy 29^E	-.05	-.03	-.04	.02	.09	.05	1.00	
Upset tummy 30^H	.42**	.42**	.37**	.23**	.20**	.13	.07	1.00

^E = Easy item

^H = Hard item

** Correlation significant at the 0.01 level

* Correlation significant at the 0.05 level

Table 44. Cure Scale – Phase III

	C7	C8	A15	A16	SK23	SK24	UT31	UT32
Cold 7^E	1.00							
Cold 8^H	.25**	1.00						
Asthma 15^E	.21**	-.02	1.00					
Asthma 16^H	.30**	.40**	.34**	1.00				
Skinned knee 23^E	.13*	-.04	.16*	.37**	1.00			
Skinned knee 24^H	.22**	.32**	.26**	.37**	.29**	1.00		
Upset tummy 31^H	.04	.19**	.15*	.22**	.15*	.28**	1.00	
Upset tummy 32^E	.18**	.77**	-.02	.30**	-.05	.22**	.13	1.00

^E = Easy item

^H = Hard item

** Correlation significant at the 0.01 level

* Correlation significant at the 0.05 level

Table 45. Corrected Item-Subscale and Item-Scale Correlations

ITEMS	Item-subscale				Item-scale
	ID	CA	CO	CU	
1. "What is a cold?" 1- A. "A cold is an illness that makes your nose grow longer." 1- B. "A cold is an illness that makes you have a runny nose."	.52**				.37**
2. "What is a cold?" 2- A. "A cold is an illness that makes you cough." 2- B. "A cold is an illness that makes you itch."	.52**				.40**
3. "How did Billy get a cold?" 3- A. "Billy got a cold by playing with a friend who has a cold." 3- B. "Billy got his cold by playing with his own toys."		.52**			.64**
4. "How did Billy get a cold?" 4- A. "Billy got a cold because cold-germs he could not see got inside his body." 4- B. "Billy got a cold because he ate ice cream."		.55**			.66**
5. "What happens to Billy when he has a cold?" 5- A. "Billy will feel yucky and not want to play." 5- B. "Billy will feel happy and want to play."			.49**		.45**
6. "What happens to Billy when he has a cold?" 6- A. "Billy will stay at home and sleep." 6- B. "Billy will stay at home and play outside."			.49**		.39**
7. "How will Billy get better from his cold?" 7- A. "Billy needs medicine." 7- B. "Billy needs a toy."				.29	.41**
8. "How will Billy get better from his cold?" 8- A. "Billy needs to sleep." 8- B. Another kid says, "Billy needs to play."				.40**	.38**
9. "What is asthma?" 9- A. "Asthma is a disease that makes you burp." 9- B. "Asthma is a disease that makes you cough."	.22				.17
10. "What is asthma?" 10- A. "Asthma is a disease that makes it hard to swallow." 10- B. "Asthma is a disease that makes it hard to breathe."	.26				.43**
11. "How did Annie get asthma?" 11- A. "Annie got asthma playing with a friend who has asthma." 11- B. "Annie just has it."		.06			.13
12. "How did Annie get asthma?" 12- A. "The pumping muscles that move blood from her heart are too tight." 12- B. "The breathing tubes that bring air to her lungs are too tight."		.27			.30**
13. "What happens to Annie when she has an asthma attack?" 13- A. "Annie needs to stay at home and play." 13- B. "Annie needs to stay at home and sleep."			.47**		.43**
14. "What happens to Annie when she has an asthma attack?" 14- A. "Annie will have a hard time moving." 14- B. "Annie will have a hard time breathing."			.31**		.48**
15. "How will Annie get better from her asthma attack?" 15- A. "Annie needs to eat candy." 15- B. "Annie needs to take medicine."				.30**	.32**
16. "How will Annie get better from her asthma attack?" 16- A. "Annie needs to go to her doctor." 16- B. "Annie needs to go to her teacher."				.57**	.52**

Table 45, cont'd

ITEMS	Item-subscale				Item-scale
	ID	CA	CO	CU	
17. "What is a skinned knee?" 17- A. "A skinned knee is a boobo that hurts."17- B. "A skinned knee is a bumpy rash that itches."	.39**				.44**
18. "What is a skinned knee?" 18- A. "A skinned knee is a sore that is red and bleeds."18- B. "A skinned knee is a rash that is bumpy and leaks."	.32**				.33**
19. The teacher asks the kids, "How did Cory get a skinned knee?" 19- A. "Cory fell down."19- B. "Cory sat down."		.37**			.46**
20. "How did Cory get a skinned knee?" 20- A. "Cory fell down and the skin on his knee was broke open" 20- B. "Cory played with a friend with a skinned knee."		.38**			.54**
21. "What happens to Cory when he has a skinned knee?" 21- A. "Cory will cry." 21- B. "Cory will laugh."			.40**		.55**
22. "What happens to Cory when he has a skinned knee?" 22- A. "Cory's knee will hurt when he walks." 22- B. "Cory's knee will itch when he walks."			.28		.44**
23. "How will Cory's skinned knee get better?" 23- A. "Put a band aid on Cory's skinned knee to keep it clean." 23- B. "Put a cast on Cory's skinned knee to keep it clean."				.29	.40**
24. "How will Cory's skinned knee get better?" 24- A. "Clean Cory's skinned knee with soap and water to kill the germs." 24- B. "Rub Cory's skinned knee with hand lotion and baby powder to kill the germs."				.50**	.52**
25. "What is an upset tummy?" 25- A. "An upset tummy is an illness that makes you feel sick."25- B. "An upset tummy is an illness that makes you scratch your bellybutton."	.57**				.63**
26. "What is an upset tummy?" 26- A. "An upset tummy is an illness that makes your tummy hurt." 26- B. "An upset tummy is an illness that makes your tummy strong."	.56**				.69**
27. "How did Tina get an upset tummy?" 27- A. "Tina played with a friend who had an upset tummy." 27- B. "Tina played a game lying on her tummy."		.04			.12
28. "How did Tina get an upset tummy?" 28- A. "Tina ate some food with germs on it." 28- B. "Tina saw some old food with that might have germs on it."		.38**			.39**
29. "What happens to Tina when she has an upset tummy?" 29- A. "Tina will stay home." 29- B. "Tina will stay in school."			.03		.13
30. "What happens to Tina when she has an upset tummy?" 30- A. "Tina will feel yucky and not want to eat any food."30- B. "Tina will feel happy and want to eat all of her food."			.47**		.47**
31. "How will Tina get better from her upset tummy?" 31- A. "Tina should eat only little bits of food." 31- B. "Tina should eat lots and lots of food."				.30**	.30**
32. "How will Tina get better from her upset tummy?" 32- A. "Tina needs to rest." 32- B. "Tina needs to play."				.29	.41**

ID – identify, CA – cause, CO – consequence, CU – cure **Correlation significant at the 0.01 level

Item difficulty and discrimination index

Item difficulty level and discrimination index were evaluated among the total IKQ scores of four and five year old participants to assess the IKQ as a measure of preschoolers' cognitive ability. Discrimination index values were generated by comparing total IKQ scores of the 10 highest scoring four and five year old participants to the 10 lowest scoring four and five year old participants (i.e., subtracting the total correct of the 10 lowest scoring from the total correct of the 10 highest scoring) and dividing that value by 10. Overall, the IKQ had adequate difficulty level and discrimination index values (see Table 46). The majority of items ($n = 27$, 84%) had a discrimination index of + .3 or greater and difficulty levels between 30 and 95 percent. Over one third of total IKQ items ($n = 11$, 34%) had ideal difficulty levels (i.e., 50% to 75%). Only item # 11 had a difficulty level < 30; however, the discrimination index was +.3. Four items (i.e., # 9, # 15, # 29 and # 31) were too easy and poor discriminators with difficulty levels > 90 and discrimination index < .3.

Table 46. Item Analysis among Total IKQ scores for IKQ Target Population

ITEMS	E/D	Difficulty P level	Discrimination Index
1. "What is a cold?" 1- A. "A cold is an illness that makes your nose grow longer."1- B. "A cold is an illness that makes you have a runny nose."	E	.86	+3
2. "What is a cold?" 2- A. "A cold is an illness that makes you cough." 2- B. "A cold is an illness that makes you itch."	H	.84	+4
3. "How did Billy get a cold?" 3- A. "Billy got a cold by playing with a friend who has a cold." 3- B. "Billy got his cold by playing with his own toys."	E	.69	+9
4. "How did Billy get a cold?" 4- A. "Billy got a cold because cold-germs he could not see got inside his body." 4- B. "Billy got a cold because he ate ice cream."	H	.49	+8
5. "What happens to Billy when he has a cold?" 5- A. "Billy will feel yucky and not want to play." 5- B. "Billy will feel happy and want to play."	H	.71	+4
6. "What happens to Billy when he has a cold?" 6- A. "Billy will stay at home and sleep." 6-B. "Billy will stay at home and play outside."	E	.86	+3
7. "How will Billy get better from his cold?" 7- A. "Billy needs medicine."7- B. "Billy needs a toy."	E	.89	+3
8. "How will Billy get better from his cold?" 8- A. "Billy needs to sleep." 8- B. Another kid says, "Billy needs to play."	H	.94	+3
9. "What is asthma?" 9- A. "Asthma is a disease that makes you burp." 9-B. "Asthma is a disease that makes you cough."	E	.94	+1
10. "What is asthma?" 10-A. "Asthma is a disease that makes it hard to swallow." 10- B. "Asthma is a disease that makes it hard to breathe."	H	.43	+6
11. "How did Annie get asthma?" 11- A. "Annie got asthma playing with a friend who has asthma." 11- B. "Annie just has it."	E	.25	+3
12. "How did Annie get asthma?" 12- A. "The pumping muscles that move blood from her heart are too tight." 12- B. "The breathing tubes that bring air to her lungs are too tight."	H	.45	+3
13. "What happens to Annie when she has an asthma attack?" 13- A. "Annie needs to stay at home and play." 13- B. "Annie needs to stay at home and sleep."	E	.82	+5
14. "What happens to Annie when she has an asthma attack?" 14- A. "Annie will have a hard time moving." 14- B. "Annie will have a hard time breathing."	H	.63	+5
15. "How will Annie get better from her asthma attack?" 15- A. "Annie needs to eat candy." 15- B. "Annie needs to take medicine."	E	.92	+1
16. "How will Annie get better from her asthma attack?" 16- A. "Annie needs to go to her doctor." 16- B. "Annie needs to go to her teacher."	H	.86	+4
17. "What is a skinned knee?" 17- A. "A skinned knee is a boobo that hurts."17- B. "A skinned knee is a bumpy rash that itches."	E	.65	+6

Table 46. cont'd

ITEMS	E/D	Difficulty P level	Discrimination Index
18. "What is a skinned knee?" 18- A. "A skinned knee is a sore that is red and bleeds."18- B. "A skinned knee is a rash that is bumpy and leaks."	H	.82	+3
19. The teacher asks the kids, "How did Cory get a skinned knee?" 19- A. "Cory fell down."19- B. "Cory sat down."	E	.86	+3
20. "How did Cory get a skinned knee?" 20- A. "Cory fell down and the skin on his knee was broke open" 20- B. "Cory played with a friend with a skinned knee."	H	.65	+4
21. "What happens to Cory when he has a skinned knee?" 21- A. "Cory will cry." 21- B. "Cory will laugh."	E	.80	+6
22. "What happens to Cory when he has a skinned knee?" 22- A. "Cory's knee will hurt when he walks." 22- B. "Cory's knee will itch when he walks."	H	.82	+5
23. "How will Cory's skinned knee get better?" 23- A. "Put a band aid on Cory's skinned knee to keep it clean." 23- B. "Put a cast on Cory's skinned knee to keep it clean."	E	.65	+6
24. "How will Cory's skinned knee get better?" 24- A. "Clean Cory's skinned knee with soap and water to kill the germs." 24- B. "Rub Cory's skinned knee with hand lotion and baby powder to kill the germs."	H	.69	+8
25. "What is an upset tummy?" 25- A. "An upset tummy is an illness that makes you feel sick."25- B. "An upset tummy is an illness that makes you scratch your bellybutton."	E	.67	+7
26. "What is an upset tummy?" 26- A. "An upset tummy is an illness that makes your tummy hurt." 26- B. "An upset tummy is an illness that makes your tummy strong."	H	.67	+8
27. "How did Tina get an upset tummy?" 27- A. "Tina played with a friend who had an upset tummy." 27- B. "Tina played a game lying on her tummy."	E	.67	+5
28. "How did Tina get an upset tummy?" 28- A. "Tina ate some food with germs on it." 28- B. "Tina saw some old food with that might have germs on it."	H	.71	+6
29. "What happens to Tina when she has an upset tummy?" 29- A. "Tina will stay home." 29- B. "Tina will stay in school."	E	.96	+2
30. "What happens to Tina when she has an upset tummy?" 30- A. "Tina will feel yucky and not want to eat any food."30- B. "Tina will feel happy and want to eat all of her food."	H	.80	+5
31. "How will Tina get better from her upset tummy?" 31- A. "Tina should eat only little bits of food." 31- B. "Tina should eat lots and lots of food."	H	.74	.0
32. "How will Tina get better from her upset tummy?" 32- A. "Tina needs to rest." 32- B. "Tina needs to play."	E	.90	+4

E = A priori assignment as easy item

H = A priori assignment as hard item

Items retained

Twenty items were retained (see Table 47) because the items had significant correlations, discrimination index of + .3 or greater and difficulty levels between 30 and 95 percent. Twelve items (38%) were dropped from the IKQ for either poor correlations and/or poor difficulty/discrimination ability (see Table 48).

Table 47. Number of Retained IKQ Items by Dimension & Illness

	COLD	ASTHMA	SKINNED KNEE	UPSET TUMMY
IDENTITY	2	0	2	2
CAUSE	2	0	2	1 ^H
CONSEQUENCE	2	2	0	1 ^H
CURE	2	1 ^H	1 ^H	0

^H = Hard item

Table 48. Dropped IKQ Items

ITEMS	REASON DROPPED
9. "What is asthma?" 9- A. "Asthma is a disease that makes you burp." 9-B. "Asthma is a disease that makes you cough."	<ul style="list-style-type: none"> • Low item-subscale correlation • Low item-scale correlation • Too easy • Poor discrimination
10. "What is asthma?" 10-A. "Asthma is a disease that makes it hard to swallow." 10- B. "Asthma is a disease that makes it hard to breathe."	<ul style="list-style-type: none"> • Low item-subscale correlation
11. "How did Annie get asthma?" 11- A. "Annie got asthma playing with a friend who has asthma." 11- B. "Annie just has it."	<ul style="list-style-type: none"> • Low item-subscale correlation • Low item-scale correlation • Too difficult
12. "How did Annie get asthma?" 12- A. "The pumping muscles that move blood from her heart are too tight." 12- B. "The breathing tubes that bring air to her lungs are too tight."	<ul style="list-style-type: none"> • Low item-subscale correlation • Negative inter-item correlation
15. "How will Annie get better from her asthma attack?" 15- A. "Annie needs to eat candy." 15- B. "Annie needs to take medicine."	<ul style="list-style-type: none"> • Too easy • Poor discrimination
21. "What happens to Cory when he has a skinned knee?" 21- A. "Cory will cry." 21- B. "Cory will laugh."	<ul style="list-style-type: none"> • Several non-significant inter-item correlations

Table 48. cont'd

ITEMS	REASON DROPPED
22. "What happens to Cory when he has a skinned knee?" 22- A. "Cory's knee will hurt when he walks." 22- B. "Cory's knee will itch when he walks."	<ul style="list-style-type: none"> • Low item-subscale correlation
23. "How will Cory's skinned knee get better?" 23- A. "Put a band aid on Cory's skinned knee to keep it clean." 23- B. "Put a cast on Cory's skinned knee to keep it clean."	<ul style="list-style-type: none"> • Low item-subscale correlation • Negative inter-item correlations
27. "How did Tina get an upset tummy?" 27- A. "Tina played with a friend who had an upset tummy." 27- B. "Tina played a game lying on her tummy."	<ul style="list-style-type: none"> • Low item-subscale correlation • Low item-scale correlation • Negative inter-item correlations
29. "What happens to Tina when she has an upset tummy?" 29- A. "Tina will stay home." 29- B. "Tina will stay in school."	<ul style="list-style-type: none"> • Low item-subscale correlation • Low item-scale correlation • Negative inter-item correlations
31. "How will Tina get better from her upset tummy?" 31- A. "Tina should eat only little bits of food." 31- B. "Tina should eat lots and lots of food."	<ul style="list-style-type: none"> • Poor discrimination
32. "How will Tina get better from her upset tummy?" 32- A. "Tina needs to rest." 32- B. "Tina needs to play."	<ul style="list-style-type: none"> • Low item-subscale correlation • Negative inter-item correlations

Reliability

The KR-20 alpha for the 20 item IKQ was .88. Coefficient alphas for the dimension subscales were greater than .70 except for the Cure subscale (see Table 49). The low coefficient alpha for the Cure subscale may be related to the number of items in the subscale. The Cure subscale had only four items whereas the other subscales had five to six items.

Table 49. Coefficient Alpha – 20 Item IKQ

SCALE	SCALE KR20 ALPHA
Identify	.72
Cause	.72
Consequence	.71
Cure	.57

Inter-item correlations for subscales were much improved after dropping inadequate items. The range of inter-item correlations for each subscale was as follows: .16 to .60 Identify (see Table 50); .22 to .63 Cause (see Table 51); .16 to .59 Consequence (see Table 52); and .22 to .40 Cure (see Table 53).

Table 50. Identify Scale – 20 Item IKQ

	C1	C2	SK17	SK18	UT25	UT26
Cold 1^H	1.00					
Cold 2^E	.45**	1.00				
Skinned knee 17^E	.17**	.22**	1.00			
Skinned knee 18^H	.34**	.16*	.27**	1.00		
Upset tummy 25^E	.27**	.33**	.34**	.29**	1.00	
Upset tummy 26^H	.26**	.31**	.31**	.28**	.60**	1.00

^E = Easy item

^H = Hard item

** Correlation significant at the 0.01 level

* Correlation significant at the 0.05 level

Table 51. Cause Scale – 20 Item IKQ

	C3	C4	SK19	SK20	UT28
Cold 3^E	1.00				
Cold 4^H	.63**	1.00			
Skinned knee 19^E	.41**	.38**	1.00		
Skinned knee 20^H	.41**	.39**	.28**	1.00	
Upset tummy 28^H	.23**	.32**	.29**	.22**	1.00

^E = Easy item

^H = Hard item

** Correlation significant at the 0.01 level

Table 52. Consequence Scale – 20 Item IKQ

	C5	C6	A13	A14	UT30
Cold 5^H	1.00				
Cold 6^E	.54**	1.00			
Asthma 13^E	.40**	.59**	1.00		
Asthma 14^H	.29**	.26**	.16*	1.00	
Upset tummy 30^H	.42**	.42**	.37**	.23**	1.00

^E = Easy item

^H = Hard item

** Correlation significant at the 0.01 level

* Correlation significant at the 0.05 level

Table 53. Cure Scale – 20 Item IKQ

	C7	C8	A16	SK24
Cold 7^E	1.00			
Cold 8^H	.25**	1.00		
Asthma 16^H	.30**	.40**	1.00	
Skinned knee 24^H	.22**	.32**	.37**	1.00

^E = Easy item

^H = Hard item

** Correlation significant at the 0.01 level

Descriptive Statistics

The mean for total IKQ scores across all participants was 19 ($SD = 3$) and mean subscale scores across all participants were; Identify 6 ($SD = 1$), Cause 5 ($SD = 1$), Consequence 6 ($SD = 1$), and Cure 4 ($SD = 0.5$). Table 54 provides an overview of mean IKQ scores across the three different age groups.

Table 54. Mean Total and Subscale Scores Across Age Groups

SCALE	AGE GROUP	MEAN	SD	MINIMUM	MAXIMUM
TOTAL	4-6	16.40	4.00	6	20
	7-9	19.53	0.85	16	20
	10-12	19.74	0.66	16	20
Identity	4-6	4.92	1.50	0	6
	7-9	5.88	.36	4	6
	10-12	5.86	.43	4	6
Cause	4-6	3.77	1.40	0	5
	7-9	4.86	.46	2	5
	10-12	4.93	.26	4	5
Consequence	4-6	4.89	1.50	0	6
	7-9	5.87	.34	5	6
	10-12	5.96	.18	5	6
Cure	4-6	3.58	.82	0	4
	7-9	3.91	.28	3	4
	10-12	3.96	.18	0	4

Assessment of Validity

Hypothesis # 1

Simple linear regression with age as a predictor of total IKQ scores and IKQ subscale scores revealed statistically significant positive relationships among the independent and dependent variables. Age predicts 28% of the variance in total IKQ scores and 11% to 25% of the variance in subscale scores.

Table 55 depicts age as a predictor of IKQ scores.

Table 55. Age as a Predictor of IKQ Total and Subscale Scores

DEPENDENT VARIABLE	R^2	(Beta) B	F (df)	p
Total IKQ	.28	.53	90.38 (1, 228)	< .01
Identify subscale	.18	.42	48.61 (1, 228)	< .01
Cause Subscale	.25	.50	74.64 (1, 228)	< .01
Consequence Subscale	.24	.49	72.97 (1, 228)	< .01
Cure Subscale	.11	.34	28.83 (1, 228)	< .01

Mean differences across the three age groups IKQ scores were significant ($F[2, 227] = 46, p < .01$). Likewise, mean illness dimension subscales scores were found to be significantly different among the three groups (see Table 56). The assumption of homogeneity of variance was not met for any of the ANOVA; therefore, alpha for each ANOVA was set at .01. Post hoc analyses using Tamhane's T2 test to account for unequal variance revealed significant difference between four and five year old children and both of the older age groups. Mean subscale scores between the two older groups were not significantly different. This finding may represent a ceiling effect by the IKQ because the mean scores of the two older groups were very close to the maximum possible score. Table 57 displays mean subscale scores among the three age groups.

Table 56. Analysis of Variance – IKQ Scores by Age Groups

SUBSCALE	F (df)	p
IDENTIFY	28 (2, 227)	< .01
CAUSE	42 (2, 227)	< .01
CONSEQUENCE	33 (2,227)	< .01
CURE	11 (2, 227)	< .01

Table 57. Mean Illness Dimension Scores

	AGE GROUPS		
	4-6	7-9	10-12
IDENTIFY	4.9	5.9 ^a	5.9 ^a
CAUSE	3.8	4.9 ^a	4.9 ^a
CONSEQUENCE	4.9	5.9 ^a	6.0 ^a
CURE	3.6	3.9 ^a	4.0 ^a

a = means are not significantly different at the .01 level

Hypothesis # 2

Of the 48 four and five year old children, preschoolers whose parents/guardians discussed health issues ($n = 25$) had significantly higher total IKQ, identify subscale and cause subscales scores than preschoolers whose parents/guardians did not discuss health issues ($n = 23$). Table 58 provides results of ANOVA analyses. The assumption of homogeneity of variance was met for ANOVA analyses with total IKQ score ($p = .12$), identify subscale score ($p = .44$) and consequence subscale score ($p = .68$) as dependent variables. The analyses with cause and cure subscale scores did not have equal variance across groups; therefore, the alpha level was set at .01 for these statistical analyses. The cause subscale was significant at the .01 level while the total IKQ and identify scores were significant at the .05 level (see Table 59).

Table 58. Analysis of Variance - IKQ Scores by Parent Who Discusses Health Issues with 4 -5 Year Old Children

DEPENDENT VARIABLE	F (df)	p
Total IKQ	4.83 (1, 46)	.03
Identify subscale	4.20 (1, 46)	.05
Cause Subscale	9.10 (1, 46)	>.01
Consequence Subscale	.37 (1, 46)	.54
Cure Subscale	1.47 (1, 46)	.23

Table 59. Means of Illness Dimension Scores Parent/Guardian Who Discusses Health Issues with Child

	HAS PARENT WHO DISCUSSES HEALTH ISSUES	
	YES	NO
Total IKQ	16.4	13.6
Identify subscale	5.0	4.0
Cause Subscale	4.0	2.7
Consequence Subscale	4.6 ^a	4.3 ^a
Cure Subscale	3.6 ^a	3.2 ^a

a = means are not significantly different at the .05 level

Hypothesis # 3

Only three asthma items were retained; therefore, the reliability of the asthma scale was evaluated prior to assessing Hypothesis # 3. Cronbach's alpha was low ($r = .40$) but inter-item correlations were significant (see Table 60).

Hypothesis # 3 was evaluated despite the low reliability. Preschool children with asthma or a family history of asthma ($n = 18$) did not score higher on the asthma items than preschool children who do not have or are not exposed to persons with asthma ($n = 30$). The F value was .08 (df 1, 47) with $p = .77$.

Table 60. Asthma Scale – 20 Item IKQ

	A13	A14	A16
Asthma 13 ^E	1.00		
Asthma 14 ^H	.16*	1.00	
Asthma 16 ^H	.40**	.14*	1.00

^E = Easy item

^H = Hard item

** Correlation significant at the 0.01 level

* Correlation significant at the 0.05 level

Exploratory Factor Analysis

Exploratory factor analysis was performed on the 20 IKQ items using principal components as the initial method of factor extraction and Varimax as the method for rotation. Bartlett test of sphericity (1776.96, $p < .001$) and Kaiser-Meyer-Olkin measure of sampling adequacy (.80) were adequate; therefore, factor analyses were performed (Tabachnick & Fidell, 1996). Five factors had eigenvalues of greater than one. Sixty percent of the variance was explained by the five factor solution. The five factor solution was not considered further because Factor 5 had only one item (item # 18) with an adequate factor loading. Table 61 depicts the five factor solution.

Table 61. Principal Components Factor Analysis – 5 Factors

ITEMS	F1	F2	F3	F4	F5
1. "What is a cold?" A. "A cold is an illness that makes your nose grow longer." B. "A cold is an illness that makes you have a runny nose."				.58	.46
2. "What is a cold?" A. "A cold is an illness that makes you cough." B. "A cold is an illness that makes you itch."				.79	
3. "How did Billy get a cold?" A. "Billy got a cold by playing with a friend who has a cold." B. "Billy got his cold by playing with his own toys."	.52		.38	.36	

Table 61. cont'd

ITEMS	F1	F2	F3	F4	F5
4. "How did Billy get a cold?" A. "Billy got a cold because cold-germs he could not see got inside his body." B. "Billy got a cold because he ate ice cream."	.49			.47	
5. "What happens to Billy when he has a cold?" A. "Billy will feel yucky and not want to play." B. "Billy will feel happy and want to play."		.74			
6. "What happens to Billy when he has a cold?" A. "Billy will stay at home and sleep." B. "Billy will stay at home and play outside."		.87			
7. "How will Billy get better from his cold?" A. "Billy needs medicine." B. "Billy needs a toy."				.64	
8. "How will Billy get better from his cold?" "Billy needs to sleep." B. "Billy needs to play."			.83		
13. "What happens to Annie when she has an asthma attack?" A. "Annie needs to stay at home and play." B. "Annie needs to stay at home and sleep."		.70	.34		
14. "What happens to Annie when she has an asthma attack?" A. "Annie will have a hard time moving." B. "Annie will have a hard time breathing."	.57			.36	-.36
16. "How will Annie get better from her asthma attack?" A. "Annie needs to go to her doctor." B. "Annie needs to go to her teacher."	.40		.64		
17. "What is a skinned knee?" A. "A skinned knee is a boobo that hurts." B. "A skinned knee is a bumpy rash that itches."	.69				
18. "What is a skinned knee?" A. "A skinned knee is a sore that is red and bleeds." B. "A skinned knee is a rash that is bumpy and leaks."					.79
19. The teacher asks the kids, "How did Cory get a skinned knee?" A. "Cory fell down." B. "Cory sat down."	.34		.61		.42
20. "How did Cory get a skinned knee?" A. "Cory fell down and the skin on his knee was broke open" B. "Cory played with a friend with a skinned knee."	.65				
24. "How will Cory's skinned knee get better?" A. "Clean Cory's skinned knee with soap and water to kill the germs." B. "Rub Cory's skinned knee with hand lotion and baby powder to kill the germs."	.30		.39		
25. "What is an upset tummy?" A. "An upset tummy is an illness that makes you feel sick." B. "An upset tummy is an illness that makes you scratch your bellybutton."	.57			.32	
26. "What is an upset tummy?" A. "An upset tummy is an illness that makes your tummy hurt." B. "An upset tummy is an illness that makes your tummy strong."	.61	.40			
28. "How did Tina get an upset tummy?" A. "Tina ate some food with germs on it." B. "Tina saw some old food with that might have germs on it."	.49				
30. "What happens to Tina when she has an upset tummy?" A. "Tina will feel yucky and not want to eat any food." B. "Tina will feel happy and want to eat all of her food."		.55	.38	.40	

Following the initial factor analysis a more parsimonious solution was evaluated. The theoretical processes hypothesized to underlie the IKQ were the four illness dimensions; therefore, a four factor solution was examined. The method used for factor extraction was principal components analysis and the method used for factor rotation was Varimax. The four factor solution explained 54% of the variance and eigenvalues ranged from 1.2 to 6.3 (see Table 62).

Table 62. Eigenvalues and Percentage of Variance – 4 Factors

FACTOR	EIGENVALUE	% OF VARIANCE	CUMULATIVE % VARIANCE
1	6.3	31.7	31.7
2	1.7	8.7	40.4
3	1.5	7.7	48.0
4	1.2	6.0	54.0

Using the criteria of factor loadings greater than .40, the factor structure yielded was partially consistent with the theorized illness dimension structure. Table 63 depicts factor loadings for each factor. Factor 1 was comprised of seven items that were from either the Identify or Cause subscales. The factor loadings for Factor 1 ranged from .41 to .63. The four items in Factor 2 were all from the Consequence subscale and the factor loadings ranged from .52 to .87. Item # 30 loaded on Factor 4 in addition to Factor 2. This item was assigned to Factor 2 because the item’s content and factor loading were both more favorable for Factor 2. The five items in Factor 3 were from all four illness dimension subscales; however, the items were all respiratory-type illnesses (i.e., four “cold” items and one “asthma” item). The factor loadings for Factor 3 ranged from .45 to .78. Factor 4 included three items from the Cure subscale with loadings ranging

from .57 to .85. Item # 24, a Cure subscale item, loaded on Factor 4; however, the factor loading was sub par at .39. This item was included in subsequent reliability testing of Factor # 4 to improve the factor's interpretability.

Table 63. Principal Components Factor Analysis – 4 Factors

ITEMS	F1	F2	F3	F4
3. "How did Billy get a cold?" 3- A. "Billy got a cold by playing with a friend who has a cold." 3- B. "Billy got his cold by playing with his own toys."	.41			
17. "What is a skinned knee?" 17- A. "A skinned knee is a booboo that hurts."17- B. "A skinned knee is a bumpy rash that itches."	.63			
18. "What is a skinned knee?" 18- A. "A skinned knee is a sore that is red and bleeds."18- B. "A skinned knee is a rash that is bumpy and leaks."	.53			
20. "How did Cory get a skinned knee?" 20- A. "Cory fell down and the skin on his knee was broke open" 20- B. "Cory played with a friend with a skinned knee."	.61	.33		
25. "What is an upset tummy?" 25- A. "An upset tummy is an illness that makes you feel sick."25- B. "An upset tummy is an illness that makes you scratch your bellybutton."	.59		.37	
26. "What is an upset tummy?" 26- A. "An upset tummy is an illness that makes your tummy hurt." 26- B. "An upset tummy is an illness that makes your tummy strong."	.53	.44	.37	
28. "How did Tina get an upset tummy?" 28- A. "Tina ate some food with germs on it." 28- B. "Tina saw some old food with that might have germs on it."	.57			
5. "What happens to Billy when he has a cold?" 5- A. "Billy will feel yucky and not want to play." 5- B. "Billy will feel happy and want to play."		.73		
6. "What happens to Billy when he has a cold?" 6- A. "Billy will stay at home and sleep." 6-B. "Billy will stay at home and play outside."		.87		
13. "What happens to Annie when she has an asthma attack?" 13- A. "Annie needs to stay at home and play." 13- B. "Annie needs to stay at home and sleep."		.70		.35
30. "What happens to Tina when she has an upset tummy?" 30- A. "Tina will feel yucky and not want to eat any food."30- B. "Tina will feel happy and want to eat all of her food."		.52	.38	.44
1. "What is a cold?" 1- A. "A cold is an illness that makes your nose grow longer."1- B. "A cold is an illness that makes you have a runny nose."			.61	
2. "What is a cold?" 2- A. "A cold is an illness that makes you cough." 2- B. "A cold is an illness that makes you itch."			.78	
4. "How did Billy get a cold?" 4- A. "Billy got a cold because cold-germs he could not see got inside his body." 4- B. "Billy got a cold because he ate ice cream."			.52	
7. "How will Billy get better from his cold?" 7- A. "Billy needs medicine."7- B. "Billy needs a toy."			.65	

Table 63. cont'd

ITEMS	F1	F2	F3	F4
14. "What happens to Annie when she has an asthma attack?" 14- A. "Annie will have a hard time moving." 14- B. "Annie will have a hard time breathing."		.32	.45	
8. "How will Billy get better from his cold?" 8- A. "Billy needs to sleep." 8- B. Another kid says, "Billy needs to play."				.85
16. "How will Annie get better from her asthma attack?" 16- A. "Annie needs to go to her doctor." 16- B. "Annie needs to go to her teacher."	.41			.62
19. "How did Cory get a skinned knee?" 19- A. "Cory fell down." 19- B. "Cory sat down."	.54			.57
24. "How will Cory's skinned knee get better?" 24- A. "Clean Cory's skinned knee with soap and water to kill the germs." 24- B. "Rub Cory's skinned knee with hand lotion and baby powder to kill the germs."				.39

Interpretive labels were assigned to each factor: Factor 1 – Illness identify & cause; Factor 2 – Illness consequences; Factor 3 – Respiratory illness and Factor 4 – Illness cure. Coefficient alphas for the refactored IKQ subscales were improved from illness dimension subscale KR-20 alphas. Table 64 depicts coefficient alphas.

Table 64. Coefficient Alpha – Refactored IKQ Subscales

SCALE	SCALE KR20 ALPHA
Illness Identify & Cause	.78
Illness Consequence	.76
Respiratory Illness	.67
Illness Cure	.64

IKQ subscales inter-item correlations were significant. The range of inter-item correlations for the each subscale was as follows: .19 to .60 Identify/Cause (see Table 65); .37 to .59 Illness Consequence (see Table 66); .22 to .45 Respiratory illness (see Table 67); and .30 to .48 Illness Cure (see Table 68).

Table 65. Identify/Cause Scale

	C3	SK17	SK18	SK20	UT25	UT26	UT28
Cold 3^E	1.00						
Skinned knee 17^E	.43**	1.00					
Skinned knee 18^H	.23**	.27**	1.00				
Skinned knee 20^H	.41**	.34**	.20**	1.00			
Upset tummy 25^E	.40**	.34**	.29**	.56**	1.00		
Upset tummy 26^H	.50**	.37**	.28**	.49**	.60**	1.00	
Upset tummy 28^H	.23**	.21**	.19**	.22**	.40**	.24**	1.00

^E = Easy item

^H = Hard item

** Correlation significant at the 0.01 level

Table 66. Illness Consequence Scale

	C5	C6	A13	UT30
Cold 5^H	1.00			
Cold 6^E	.54**	1.00		
Asthma 13^E	.40**	.59**	1.00	
Upset tummy 30^H	.42**	.42**	.37**	1.00

^E = Easy item

^H = Hard item

** Correlation significant at the 0.01 level

Table 67. Respiratory Illness Scale

	C1	C2	C4	C7	A14
Cold 1^H	1.00				
Cold 2^E	.45**	1.00			
Cold 4^H	.27**	.42**	1.00		
Cold 7^E	.26**	.39**	.35**	1.00	
Asthma 14^H	.23**	.22**	.41**	.30**	1.00

^E = Easy item

^H = Hard item

** Correlation significant at the 0.01 level

Table 68. Illness Cure Scale

	C8	A16	SK19	SK24
Cold 8^H	1.00			
Asthma 16^H	.40**	1.00		
Skinned knee 19^E	.40**	.48**	1.00	
Skinned knee 24^H	.32**	.37**	.30**	1.00

^E = Easy item

^H = Hard item

** Correlation significant at the 0.01 level

Reassessment of Validity Using New Factor Structure

Given the improved reliability of the new factor structure, hypotheses # 1 and # 2 were reassessed to evaluate whether the validity improves as well. Hypothesis #3 was not reassessed because none of the new factors reflected an asthma scale—the three asthma items all loaded on different factors.

Hypothesis # 1

Hypothesis # 1 was supported when the IKQ new subscale scores were used as the dependent variables. The results from simple linear regression with age as a predictor of the IKQ new subscale scores (see Table 69) and from ANOVA (see Table 70) were similar to the results found with the original IKQ subscales (i.e., identify, cause, consequence, and cure). Age predicted between 11% and 25% of the variance in the original IKQ subscales. Similarly 11% to 23% of the variance was explained in the new subscale scores. The mean new subscale scores were significantly different between the three age groups and only the mean subscale scores of the four to six year old children were significantly different from the two other age groups. Table 71 depicts mean new

subscale scores among the three age groups.

Table 69. Age as a Predictor of IKQ New Subscale Scores

DEPENDENT VARIABLE	R^2	(Beta) B	F (df)	P
Identify/Cause subscale	.23	.48	67.05 (1, 228)	< .01
Illness Consequence Subscale	.15	.39	40.07 (1, 228)	< .01
Respiratory Subscale	.22	.47	63.30 (1, 228)	< .01
Illness Cure Subscale	.11	.33	27.02 (1, 228)	< .01

Table 70. Analysis of Variance – IKQ New Subscale Scores by Age Groups

SUBSCALE	F (df)	p
IDENTIFY/CAUSE	38 (2, 227)	< .01
ILLNESS CONSEQUENCE	19 (2, 227)	< .01
RESPIRATORY ILLNESS	34 (2,227)	< .01
ILLNESS CURE	11 (2, 227)	< .01

Table 71. Means of IKQ New Subscale Scores

DEPENDENT VARIABLE	AGE GROUPS		
	4-6	7-9	10-12
IDENTIFY/CAUSE	5.4	6.8 ^a	6.8 ^a
ILLNESS CONSEQUENCE	3.4	3.9 ^a	4.0 ^a
RESPIRATORY ILLNESS	4.0	4.9 ^a	5.0 ^a
ILLNESS CURE	3.6	3.9 ^a	3.9 ^a

a = means are not significantly different at the .01 level

Hypothesis # 2

Hypothesis # 2 was not supported by the new subscale scores as well as it had been supported by the original IKQ subscales. Two of the original subscale

(i.e., Identify and Consequence) scores were significantly higher for preschoolers whose parents/guardians discussed health issues compared to preschoolers whose parents/guardians did not discuss health issues. In contrast, only the identify/cause subscale scores were significantly different between the two groups (see Table 72 and 73)

Table 72. Analysis of Variance – IKQ Refactored Subscale Scores by Parent Who Discusses Health Issues with Child

DEPENDENT VARIABLE	F (df)	p
Identify/cause subscale	5.40 (1, 46)	.03
Illness Consequence subscale	.17 (1, 46)	.69
Respiratory illness subscale	3.21 (1, 46)	.08
Illness Cure subscale	2.47 (1, 46)	.12

Table 73. Means of Refactored Subscale Scores Parent/Guardian Who Discusses Health Issues with Child

	HAS PARENT WHO DISCUSSES HEALTH ISSUES	
	YES	NO
Identify subscale	5.5	4.1
Consequence subscale	3.0 ^a	3.2 ^a
Respiratory illness subscale	4.1 ^a	3.4 ^a
Cure subscale	3.6 ^a	3.1 ^a

a = means are not significantly different at the .05 level

Phase III Summary

Twenty of the IKQ items had adequate correlations, item difficulty levels and discrimination index scores. The construct validity of the IKQ was supported by two of the three hypotheses. A significant linear trend in knowledge by age and significant differences between preschoolers' and older children's mean IKQ scores supported hypothesis # 1. Supporting hypothesis # 2, preschoolers whose

parents/guardians discuss health issues had higher mean IKQ, identify subscale and cause subscale scores than preschoolers whose parents/guardians do not discuss health issues. Using exploratory factor analysis, the factor structure of the IKQ included four factors; however, the factors were not completely consistent with the four illness dimensions. Factor analysis revealed two factors (i.e., consequence and cure) consistent with a priori subscales and two factors (i.e., identify/cause factor and respiratory illnesses) that depart from original subscales. The refactored IKQ subscales had slightly improved coefficient alphas when compared to the original subscales; however, the construct validity of the refactored subscales was supported by only hypothesis # 1.

CHAPTER V

DISCUSSION

This chapter provides a summary of the development and initial psychometric evaluation of the illness knowledge questionnaire (IKQ), strengths and weaknesses of the study, implications for research, and recommendations for future research within the context of existing knowledge.

The IKQ was developed to evaluate preschoolers' knowledge related to illness. To date, other psychometrically tested measures have only examined illness perceptions (i.e., an individual's interpretation of concrete and abstract sources information about illnesses) in children (e.g., Hagger & Orbell, 2003; Moss-Morris et al., 2002; Weinman et al., 1996). The newly developed 20-item IKQ fills an important gap in the literature in that it measures illness knowledge (i.e., an individual's understanding or familiarity with facts about illnesses) in preschoolers in a developmentally appropriate format that can be administered in a relatively short period of time (15-20 min.).

Content Validity

Content validity is the establishment of the adequacy and relevance of the items in an instrument to reflect the content domain (DeVellis, 1991; Lynn, 1986). It is a critical aspect in the development of a new tool. The content domain of the IKQ included the domain of illness knowledge within the context of a

preschooler's cognitive ability. The 20 items of the IKQ were developed using the dimensions identified by several researchers (e.g., Lau & Hartman, 1983; Leventhal et al., 1992; Leventhal et al., 1980) as those dimensions that most adults and children apply to illnesses. The IKQ items examined preschoolers' knowledge of four illness dimensions; disease identify (i.e., what it is), cause (i.e., how do you get it), consequences (i.e., what happens when you have it), and cure (i.e., how do you get better from it).

Timeline is an illness dimension identified in prior studies (e.g., Lau & Hartman, 1983; Leventhal et al., 1992; Leventhal et al., 1980; Myant & Williams, 2005; Williams & Binnie, 2002) but was not included in the IKQ. The concept of "time" was deemed too abstract for preschoolers. Excluding the concept of timeline may be considered a limitation of the IKQ by some researchers. Recent studies (i.e., Myant & Williams, 2005; Williams & Binnie, 2002) suggest that some preschoolers may have cursory knowledge of the incubation period and recovery time of an illness. However, researchers (e.g., Espinosa-Fernandez et al., 2004) who investigate children's knowledge of time report that this is still a difficult concept for preschoolers to grasp. Indeed, children's acquisition of conventional units of time and accurate estimates of time intervals do not occur until after age seven (Espinosa-Fernandez et al.). These findings about children's development of knowledge about time supported the exclusion of timeline items in the IKQ.

Pediatric content experts evaluated the IKQ, provided feedback related to the relevance, clarity and appropriateness of the IKQ components (i.e., vignettes, vignette images, illness dimension items, choices, images of choices, and

question posed to child participants), and reviewed subsequent revisions. Using a panel of pediatric researchers, clinicians, and an expert in instrument development, strengthened the development process of the initial instrument by ensuring that the individual items and the IKQ as a whole was representative of preschoolers' illness knowledge.

Pilot Testing for Feasibility and Format

The IKQ was field tested with 49 children who ranged from 4 to 12 years of age to assess the feasibility and format of the instrument. Most of the children used the terms like “confusing” or “no right answer” to characterize problem items when given the IKQ post-administration checklist. Several children were able to specifically identify why an item was problematic. This phase of the study was beneficial to the refinement of the IKQ and the administration procedures for the questionnaire.

Over the past decade, researchers (e.g., Hatano & Inagaki, 1993; Hergenrather & Rabinowitz, 1991; Williams & Binnie, 2002) have chosen forced-choice questions over open-ended questions to evaluate preschoolers' illness knowledge. Preschoolers' knowledge is often underestimated by open-ended questions that tax preschoolers' limited vocabulary (Kalish, 1996). In addition, administration times for forced-choice questionnaires are typically shorter than administration times for interviews with open-ended questions. For example, Williams and Binnie examined three, four, six, and seven year old children's knowledge about the cause, timeline, and recovery of six illnesses (i.e.,

chickenpox, cold, asthma, cancer, scraped knee, and broken arm) using forced-choice questions. The interviews took between 10 and 15 minutes. Similarly the format and administration time (i.e., 10 to 20 min.) of the IKQ makes it a practical questionnaire for clinical practice and research as a marker of preschoolers' illness knowledge.

Not all researchers regard forced-choice questionnaires as an ideal way to examine preschoolers' knowledge (R. Bibace, personal communication, March 1, 2005). According to Valsiner, Bibace, and LaPushin (2005), questionnaires limit the exchange of communication between a researcher and a study participant to a unidirectional model where the researcher assumes that his or her message on a questionnaire will be understood and interpreted by the participant as the researcher intended. However, this assumption may be questionable because most participants project their own meaning to the researcher's questionnaire and respond to the questionnaire based on their personal interpretation of it. Valsiner et al. suggest that communication is bidirectional (i.e., meaning produced by the exchange between the researcher and participant); therefore, researchers need to use data collection methods that capture this process of meaning construction. According to several researchers (e.g., Bowman, Donovan, & Burns, 2000; Valsiner et al.) the clinical interview (i.e. open-ended questions and probes) developed by Piaget is a testing format well suited to assess preschoolers' knowledge development. Likewise some researchers may consider the forced-choice format of the IKQ limited by adhering to a unidirectional communication model.

Children's personal interpretation of images and choices was evident when children provided unsolicited explanations about why they chose one choice over another choice. Often their explanations were different from the explanations expected. Although the unidirectional communication model and forced-choice format of the IKQ may be subject to children's personal interpretation and seen as a limitation, the underlying purpose of the IKQ is to quickly assess preschoolers' illness knowledge. The forced-choice format is better suited than open-ended questions for this purpose.

One strategy identified to minimize this limitation is the development of correct and incorrect choices based on children's explanations of illness vis-à-vis qualitative analysis. The salient value of informant generated data for item development is well established (Fleury, 1993; Imle & Atwood, 1988; Lynn, 1995). Items for the IKQ were initially developed based on the literature and modifications included feedback from the children (n = 49) who participated in the field test. This strengthened the inclusion of accurate and familiar terminology used by children and preschoolers (Whaley, 1999).

Like the forced-choice responses, the accompanying images in the IKQ strengthen the utility of the questionnaire for preschoolers because images serve to aid preschoolers' understanding and maintain their attention (House & Rule, 2005). Images have been identified in several studies (Kalish, 1996a, 1996b; Rebok et al., 2001; Solomon & Cassimatis, 1999; Springer & Ruckel, 1992; Williams & Binnie, 2002) as a means to maximize the assessment of preschoolers' illness knowledge; however, few of these researchers formally

evaluated the accompanying images. Only Rebok et al. explicitly describe the development of the images (i.e., a professional cartoonist drew the images) and its evaluation (i.e., the investigative team provided feedback to the cartoonist). In contrast, the appropriateness and clarity of IKQ images were evaluated by an expert panel and children in the pilot test. Their feedback was used as the basis for image revisions.

The quality of the IKQ images may have been improved if an expert on images designed for young children had also evaluated the images. Although the IKQ images were created by a professional artist and evaluated by experts familiar with preschoolers' thinking, an expert on images for children may have been better equipped to predict how preschoolers might interpret the images (House & Rule, 2005). In a study to evaluate preschoolers' ideas about what makes a picture book image beautiful, House and Rule found that the images preferred by preschoolers were familiar (i.e., setting), active (e.g., jumping, playing, hugging, eating, etc.), detailed with attractive items (i.e., clothing, accessories, body features, babies, small things, flowers, and food), personally relevant (i.e., same gender, self identification, familial identification), and stimulants to the imagination. Preschoolers considered an image not beautiful when (1) something in the image was out of place or perceived by the child as incorrect, (2) an image character was suffering or (3) the image was repulsive or gross (House & Rule). These findings suggest that evaluating images for preschoolers is no simple matter and that an evaluation of images by an expert on children's images may be beneficial in future work.

Scale Structures

Two possible scale structures for the IKQ were identified; the original structure derived from theory and the empirical structure derived from factor analysis. Both scale structures had advantages and disadvantages that were evaluated before the theoretical derived scale was selected as the best scale structure for the IKQ and future research.

Empirically derived

An advantage of the scale structure derived from factor analysis (i.e., empirically derived) is that it provided an objective means to reveal the underlying conceptual structures of the measure. The scale structure emerging from factor analysis was unexpected. Although four factors (i.e., identify/cause, respiratory illness, illness consequence, and illness cure) were identified, these factors were not completely consistent with the a priori subscales of the IKQ (i.e., identify, cause, consequence and cure) or illness dimensions identified by others (e.g., Goldman et al., 1991; Lau & Hartman, 1983; Leventhal et al., 1992; Leventhal et al., 1980; Myant & Williams, 2005; Schmidt & Frohling, 2000; Williams & Binnie, 2002). This empirical evidence may bring into question the theoretical framework used to categorize dimensions of illness knowledge. A disadvantage of the empirically derived scale, however, is that it is an isolated finding without support from existing research. Given this disadvantage, it is likely premature to adopt the empirically derived scale structure over the theoretically derived scale structure at this time.

Theoretical derived

The theoretical foundation of the original scale structure is a major advantage for this structure. An integral part of developing a valid measure is beginning with theory (DeVellis, 1991; Pedhazur & Schmelkin, 1991) and representing the theoretical perspectives used in prior research. The IKQ is well grounded in theories about children's development of illness knowledge including the Piagetian perspective (e.g., Bibace & Walsh, 1980; Kister & Patterson, 1985; Perrin & Gerrity, 1980; Rozin et al., 1985), an intuitive theory perspective (e.g., Siegal, 1988; Siegal & Share, 1990; Springer & Ruckel, 1992; Wellman & Gelman, 1998), and illness dimensions from the common sense theories (e.g., Goldman et al., 1991; Lau & Hartman, 1983; Leventhal et al., 1992; Leventhal et al., 1980; Paterson et al., 1999). Using multiple perspectives is complex and often not used in research. However integrating multiple perspectives as was done in this study may enhance the applicability and usefulness of the tool in other research and clinical practice. Likewise, the scale structure based on the multiple theoretical perspectives provides a strong foundation for the IKQ.

An additional advantage of the theoretically derived scale structure is that it is consistent with an ever growing body of research on preschoolers' development of illness knowledge. Similar to other current researchers (Myant & Williams, 2005; Raman & Winer, 2002; Schmidt & Frohling, 2000; Williams & Binnie, 2002) the combination of Piagetian and intuitive perspectives and illness dimensions most accurately depicts the current understanding of preschoolers' development of illness knowledge. From this combination perspective, the

Piagetian stages are used by researchers to generally characterize preschoolers' illness knowledge; however, the researchers do not accept that preschoolers' illness knowledge is delimited by developmental stages (Schmidt & Frohling). The intuitive perspective is used by researchers as a foundation to explore preschoolers' ability to reason about biological processes related to illness; thereby, researchers attempt to demonstrate that preschoolers' illness knowledge is not constrained by developmental stages (Myant & Williams; Raman & Winer; Schmidt & Frohling; Williams & Binnie). The intuitive perspective of preschoolers' illness knowledge development is limited because preschoolers likely construct illness knowledge as biological and psychological processes and because preschoolers are not able to make inferences about illness from an intuitive biological theory (i.e., Kalish, 1996b; Solomon & Cassimatis, 1999; Springer & Belk, 1994). However, this newer perspective does support that preschoolers have the potential to benefit from interventions to increase their illness knowledge (Williams & Binnie).

A disadvantage of the theoretically derived scale structure is that more qualitative evidence was not available to support illness dimensions as a framework used by children to characterize illness knowledge or to accurately phrase questions about illness dimensions. Illness dimensions may not be a completely accurate framework to characterize children's illness knowledge because illness dimensions (i.e., identify, cause, consequence, timeline, and cure) originally identified by Leventhal et al., (1980) refer to elements of illness representations not illness knowledge. Illness representations are essentially

frameworks from which a person can make sense of information about illness. The sources of that information include social and cultural communications, authority figures such as health care providers and personal experiences of an individual (Hagger & Orbell, 2003). Although illness representations and illness knowledge intuitively appear to be the same concepts, they are likely different; therefore, perhaps illness dimensions are not components of illness knowledge.

Even if illness representations and illness knowledge are the same concept, the majority of the research that established illness dimensions as the content of illness representation did not include children participants (Hagger & Orbell). Researchers used qualitative methodologies to explore adults' conceptualization of illness representations; however, only one study (i.e., Goldman et al., 1991) used qualitative methods to examine children's illness representations. Although the study by Goldman et al. provides evidence suggesting that children use illness dimensions to characterize their representations of illness; additional qualitative research is needed to confirm their findings. For example, open ended questions about illness could be presented to focus groups of children divided into the three age groups used in my study.

The theoretical derived scale structure is also weakened because the IKQ items were based on prior research findings; therefore, the wording of items might not have been representative of preschoolers' lexicon. The immature lexicon and semantics of preschoolers' language may have influenced how the IKQ items were interpreted and understood by four and five year old participants.

The wording of items may not have accurately captured the illness dimension construct for preschoolers. For example, the cure dimension items (“How *the character* will get better?”) were written such that the items were not plausible to young children. The term “get better” suggests that an absolute remedy for the illness or disease, the magic bullet if you will, exists. In reality few illnesses are resolved with one specific intervention. A more plausible alternative was used by Myant and Williams (2005). These researchers asked the question “What could [name] do to make himself/herself feel better?” to assess children’s knowledge about illness recovery (Myant & Williams, p. 809). This question is likely phrased more accurately than the cure item used in the IKQ because “things to do to make one feel better” inquires about a range of interventions to recover from an illness. The subtleties of the wording may have effected children’s interpretation of the items, thereby, impacting the accuracy of the items’ depiction of illness dimensions. In other words, the anticipated factor structure (identify, cause, cure, and consequence) may have emerged from factor analysis if the IKQ items had been worded a bit differently. Findings from this study and the remaining gap of knowledge in the literature underscore the need for additional qualitative research to further evaluate the underlying factors of illness knowledge in young children and identify words and phrase used by young children when they discuss illnesses.

In summary, the theoretically derived scale structure (i.e., identify, cause, consequence, and cure) is the scale that appears to have the most promise for future research. Although the theoretical scale structure was not empirically

supported by the exploratory factor analysis in my study, the advantages of this scale structure outweigh its disadvantages. By selecting the theoretical scale structure, I have also provided researchers a scale structure by which reliability and construct validity of the IKQ can be evaluated.

Reliability

The IKQ appears to be a reliable measure of illness knowledge meaning error (e.g., random or systematic) has a minimal impact on IKQ scores (Pedhazur & Schmelkin, 1991). Overall, the coefficient alphas of the original subscales (i.e., theoretically derived) were acceptable; however, the limited number of items in the IKQ likely decreased subscale alphas (DeVellis, 1991). Most notably, the Cure subscale had four items that were retained in the subscale after unreliable, inappropriately difficult and/or poor discriminating items were removed and the resulting coefficient alpha was .57. Although the other subscales (i.e., identify, cause, and consequence) had five or six items, none of the subscales had the intended number of items representing two items from the same dimension from each vignette. In an ideal setting, three or four items should have been developed for each dimension per vignette; thereby, creating a larger pool of items and increasing the likelihood that subscales would have more items. This in turn could have improved the reliability of the subscales. The next revision of the IKQ needs to include the development of more items for each illness dimension to minimize the impact of dropped items and optimize the reliability of subscales.

Construct Validity

Conceptual and empirical evidence from this study supports that illness knowledge is not a unidimensional construct rather it includes four constructs. After analyzing the evidence, identity, cause, consequence, and cure are the four constructs that best characterize preschoolers' illness knowledge and the underlying subscales of the IKQ. As expected, preschoolers' IKQ scores increased with age and to a lesser extent scores increased with guardians/parents-to-child discussions about health issues. These findings begin to support the construct validity of the IKQ because it provides evidence that the IKQ performs like the underlying construct of illness knowledge (DeVellis, 1991). Establishing the construct validity of a measure is an ongoing process; therefore, this study is the first step in this process.

Strengths and Limitations

Every study has strengths and limitations. Major strengths of this study include the theoretical foundation of the IKQ and the study methods (i.e., data collection, recruitment and instrument evaluation). The homogeneous samples are a study limitation.

Strengths

Theoretical foundation. The theoretical foundation is not only an advantage to the theoretically derived scale structure of the IKQ, as discussed under the "Scales Structures" section (pgs 136 - 137) in this chapter, it is also a

strength of the study.

Methods. The methodology used in this project was clearly a strength of the study. Methods included a rigorous evaluation of the IKQ, the use of technology for data collection, and several subject recruitment strategies. The structured evaluation of the IKQ ensured that content experts assessed the six components of the IKQ (i.e., vignette stems, vignette images, the illness dimension items, choices, images of choices, and the question posed to child respondents) and specifically evaluated the relevance, clarity, and/or appropriateness of the IKQ components. This method of evaluating content validity provided a standardized assessment that enhanced the rigor of study findings (Lynn, 1986).

The IKQ content expert survey was conducted on-line. In general, major strengths of on-line surveys include global reach, flexibility, speed/timeliness, convenience, ease of data entry, low costs, and ease of follow-up (Evans & Mathur, 2005). Likewise, the on-line format of the content expert survey broadened the scope of recruitment to nationally known content experts, minimized the time of data collection to one month, and expedited the data entry process. On-line surveys have several weaknesses such as perception as junk mail, impersonal, privacy/security issues, respondent lack of on-line experience/expertise, technological variations, and low response rate (Evans & Mathur). In my study, technical difficulties were encountered by two experts who completed the survey and required alternative response methods (i.e., phone interview and paper-pencil version). The weaknesses of on-line surveys may have contributed to the low response rate of nationally known experts, although

most experts explicitly stated via e-mail that time demands prevented them from responding. Despite these limitations, the on-line format of the expert survey was beneficial to the study design.

Data collection with a PDA is an innovative and efficient methodology that was used in Phase II and Phase III of the study. The PDA has been shown to be a useful tool for data collection that is equivalent to if not superior to paper-pencil data collection methods (Jaspan et al.; Sarkar et al.; Vivoda & Eby). In this study, advantages of using a PDA for data collection included the customized data entry form that was easy to use and relatively inexpensive, the device was portable, and the data entry process was simplified. The electronic form used for data entry was created using PDA software (i.e., HandBase). The HandBase software was reasonably priced (i.e. < \$50.00) and easy to use. Research assistants, including those who were not computer savvy, oriented quickly to the electronic form. The small size of the PDA was beneficial because the IKQ was large and heavy (i.e., 10 x 15 spiral flip chart that weighs approximately 10 pounds) and the PDA eliminated the need to carry paper data collection forms. Finally, data entry was simplified and data entry errors were minimized because data on the PDA were transferred via hot syncing to a desktop computer where data were saved to statistical software.

Collaborating with novice research agencies played a key role in my ability to recruit minority populations. Novice research agencies are agencies where participation in research is not a central mission (Butterfield, Yates, Rogers, & Healow, 2003). Given the novelty of research endeavors to these agencies, it is

incumbent upon the researcher to educate, respect, support, and establish a trusting relationship with agency supervisors and personnel. The researcher who invests energy in developing a relationship with the novice research agency likely will find that this relationship will aid the recruitment of participants (Butterfield et al.). In this study, child care centers, elementary schools, and a primary care clinic were novice research agencies. Several steps (i.e., face-to-face meetings, information packets) were taken to engage, inform, and establish a relationship with site administrators and gained their acceptance and endorsement. The author, a Caucasian female, witnessed the administrators of the two child care centers that predominately serve African American families encourage parents/guardians to talk to her. As suggested by Butterfield et al., collaborating with novice research agencies played a central role in enhancing subject recruitment and minority participants in particular.

Limitations

Sample. Overall, the sample in each phase of this study was an adequate size but samples were somewhat homogeneous. In Phase I, the sample included experts from three different disciplines (i.e., nursing, medicine, and psychology); however, the majority of experts were from the same university, possibly limiting the diversity of the sample. Phase II was a pilot study; therefore, the sample size did not need to be large. The sample from Phase II was primarily comprised of low income African American children; therefore, the comments made by respondents may not be generalizable to other racial, ethnic, and cultural groups.

Like Phase II, the sample in Phase III limited the generalizability of study findings because that sample included predominately children from private catholic schools. Implications for research findings must be interpreted with these sample limitations in mind.

Study Implications

Research

The findings from this study support and extend findings from existing literature on preschoolers' development of illness knowledge. Results suggest that children's knowledge about illnesses increases with age. These findings are consistent with other studies (Bibace & Walsh, 1980; Myant & Williams, 2005; Peltzer & Promtussananon, 2003; Perrin & Gerrity, 1980; Schimdt & Frohling, 2000; Smith & Williams, 2004; Williams & Binnie, 2002). Although preschoolers' illness knowledge as measured by the IKQ was significantly less than both older age groups, the IKQ scores between seven to nine year old children and 10 to 12 year old children were not significantly different. This finding likely is related to a ceiling effect created by the IKQ meaning the IKQ identified differences in preschoolers' illness knowledge but is not sensitive to knowledge levels beyond preschoolers'.

Children whose parents/guardians discussed health issues with them appeared to have higher illness knowledge scores. Parent-child communication about illnesses or disease has been referred to as parent-child socialization

(Sigelman, Mukai, Woods, & Alfed, 1995). The phenomenon of parents/guardian socialization of children's illness knowledge currently has not been examined by researchers, although it is has been hypothesized to have a profound effect on children's development of illness knowledge (Myant & Williams, 2005; Sigelman et al.). Others (DeLoye, Henggeler, & Daniels, 1993; Sigelman et al.) have examined parent socialization of acquired immunodeficiency syndrome (AIDS); however, the results were inconsistent perhaps related to different methodologies. When DeLoye et al. examined whether children's knowledge about AIDS was associated with maternal AIDS knowledge, the researchers found no association between knowledge levels (i.e., unknowledgeable or knowledgeable). Later, Sigelman et al. reexamined the relationship between child AIDS knowledge and parental AIDS knowledge. The researchers assessed whether or not parents communicated to their children about AIDS as well as the length of parent-child communication about AIDS to see if these factors predicted children's knowledge about AIDS. Although parent-child communication about AIDS did not predict children's AIDS knowledge, parents' rejection of AIDS transmission myths (i.e., AIDS is not transmitted by hand holding, kissing, and drinking after a person with AIDS) was predictive of children rejecting the same myths (Sigelman et al.). It appears that a thorough exploration of what and how long parents discuss illness/health issues is needed before the impact of parental socialization about illness/health topics can be appreciated. The health history questionnaire (HHQ) used in this study did not ask parent/guardians for detailed information about their illness/health discussions with their children. It would be

important to include this aspect in future studies.

Experience with asthma (i.e., self or family member) did not appear to increase the illness knowledge of preschoolers in this study; however, a measure of general cognitive function was not included. Crisp, Ungerer, and Goodnow (1996) suggest that the impact of experience on children's illness knowledge is determined by comparing the level of illness knowledge with general cognitive function. If experience has increased illness knowledge then one would expect to find that illness knowledge exceeds general cognitive function (Crisp et al.). Measures of cognitive function have not been used by many researchers (Eiser, Town, & Tripp, 1988; Veldtman et al., 2000) who have found that children's personal experience with a chronic disease (e.g., asthma, heart disease) were no more knowledgeable about the disease than children who did not have a disease. In contrast Crisp et al. used the Peabody Picture Vocabulary test – Revised (PPVT-R) to measure cognitive function among children with and without a chronic illness. The researchers found that the illness knowledge of 10 to 14 year old children with cancer was no different from healthy controls; however, results from the PPVT-R indicated that the children with cancer had impaired cognitive function. Based on this finding, Crisp et al. suggested that perhaps chronic illness experience explained how children with chronic illnesses performed equally with their healthy peers on illness knowledge despite deficits in general cognitive function. Crisp et al. could have further explored the relationship between experience and illness knowledge by using analysis of covariance (ANCOVA) and controlled for cognitive functioning. If they would have

done that they probably could have stated whether controlling for cognitive functioning supported that individuals with more illness experience had higher levels of illness knowledge. The effect of experience on children's illness knowledge would be an important area to include in future work.

Children's familiarity with different illnesses appears to influence their level of illness knowledge. In this study, children had higher mean knowledge scores for cold and skinned knee items when compared to asthma and stomach ache items. Myant and Williams (2005) also found different levels of knowledge about different types of illness and suggested that children's experiences with common illnesses likely influence their knowledge of those illnesses. For example, asthma items on the IKQ were difficult for even older children, which supported the findings of other researchers (e.g., Myant & Williams; Peltzer & Promtussananon, 2003; Williams & Binnie, 2002) who found that older children's knowledge of asthma was not different from younger age groups.

The upset stomach items were difficult for children; however, this finding is probably not related to lack of familiarity. A likely explanation is that a stomach ache is a symptom that can be associated with a variety of conditions, such as over eating, appendicitis, or a stomach virus, and children responded to stomach ache items using different conditions as a referent. Several children used the images to make inference. For example, the image of the child lying on her stomach was interpreted as a cause for an upset stomach because, as explained by several children, if a person has a full stomach then lying on his or her stomach would make it hurt. The differences in children's knowledge about

various illnesses suggest that a comprehensive assessment of children's illness knowledge should include a variety of conditions. Williams and Binnie (2002) identified contagious (e.g., chicken pox and cold), non-contagious (e.g., asthma and cancer) and injury (e.g., scrapped knee and broken arm) as three ailment types that encompass common conditions. The IKQ includes conditions that can be categorized as non-contagious (i.e., asthma) and injury (i.e., skinned knee) and contagious conditions (i.e., cold) type ailments. Although an upset stomach cannot be categorized into a type of ailment, the author intended for the upset stomach items to be a contagious condition (i.e., a stomach virus). These findings suggest that modifications to the IKQ might include changes to "upset tummy" items such that "stomach virus" is the referent illness.

Practice

Although this study is limited in generalizable knowledge to the practice setting, it underscores several points regarding illness communications among preschoolers, their parents/guardians and health care practitioners. Preschoolers are knowledgeable about illnesses. In clinical settings, practitioners need to direct developmentally appropriate information about illnesses to preschool children. Health care providers are among those individuals who participate in children's experiences with illness; therefore, practitioners can act as role models for parents/guardians. For example, practitioners can use correct terminology (e.g., germs) and avoid euphemisms (e.g., bugs) when explaining illnesses to preschoolers. In addition practitioners need to encourage parents to discuss

health issues with their preschooler and insure that parents are delivering correct information.

Future Research

Revising the IKQ is the next step for future research. It may be helpful to use a mixed methods approach that includes a qualitative component to assess whether young children conceptualize illness within the context of illness dimensions and to more clearly identify terminology and explanations used by children to describe illness. In addition, the qualitative analysis could be used to develop a pool of new items to replace IKQ items that were dropped because of either poor correlations and/or poor difficulty/discrimination ability. The 20 IKQ items and newly developed items need to be pilot tested by replicating the methods used in Phase III of this study. This pilot testing would also include a revised health history questionnaire that includes specific questions about health issues that the parent does or does not discuss with his/her child, thereby, evaluating the impact of parent-child communication about health and illness issues. The scale structure and reliabilities of the scales of the revised IKQ should be assessed to either support or dispute the theoretically derived scale structure. Next, the construct validity of the IKQ needs to be further assessed using confirmatory factor analyses with a large sample of primarily preschoolers. Finally, the IKQ needs to be further evaluated with preschoolers from different racial, ethnic, and cultural backgrounds (e.g., Hispanic/Latina). Research needs to include preschoolers from varied locations (e.g., rural, suburban, and urban),

and with different health states (e.g., chronically ill with well-controlled disease or chronically ill with poorly controlled disease).

APPENDIX A

FIRST DRAFT OF THE ILLNESS REPRESENTATIONS QUESTIONNAIRE

Illness Representations Questionnaire

This is Billy/Breanna. He/she has a cold. I am going to ask you questions about his/her cold. With each question I have three pictures of possible answers. You chose the picture that you think is the best answer.

1. What is a cold? (Identification)
 - a. An illness that makes you sick
 - b. An illness that makes you have a runny nose
 - c. An illness that makes you have a hurt toe
2. How did Billy/Breanna get a cold? (Cause)
 - a. Playing with a friend who has a cold
 - b. Getting cold-germs inside your body
 - c. Playing outside in the cold
3. How long does a cold last? (Timeline)
 - a. For a little bit
 - b. For a few days
 - c. For ever and ever
4. What happens to Billy/Breanna when he/she has a cold? (Consequence)
 - a. He/she must stay inside
 - b. He/she will feel yucky and not want to play
 - c. He/she will watch TV
5. How will Billy/Breanna get better from his/her cold? (Cure)
 - a. Take medicine to make it better
 - b. Rest, drink lots of juice, and take medicine
 - c. Sit outside in the sunshine

This is Alex/Annie. He/she has asthma. I am going to ask you questions about his/her asthma. With each question I have three pictures of possible answers. You chose the picture that you think is the best answer.

1. What is asthma? (Identification)
 - a. An illness that makes you sick
 - b. An illness that makes you cough
 - c. An illness that makes you hiccup
2. How did Alex/Annie get asthma? (Cause)
 - a. He/she just has it
 - b. His/her lungs are extra sensitive
 - c. Playing with a friend who has asthma
3. How long will Alex/Annie have asthma? (Timeline)
 - a. For a little bit
 - b. For a few days
 - c. For ever and ever
4. What happens to Alex/Annie when he/she has an asthma attack? (Consequence)
 - a. He/she must stay inside
 - b. He/she will have a hard time breathing and not want to play

- c. He/she will watch TV
- 5. How will Alex/Annie get better from his/her asthma attack? (Cure)
 - a. Take medicine to make it better
 - b. Breath-in the medicine to help him/her breath
 - c. Sit outside in the sunshine

This is Cory/Cassie. He/she has a skinned knee. I am going to ask you questions about his/her skinned knee. With each question I have three pictures of possible answers. You chose the picture that you think is the best answer.

1. What is a skinned knee? (Identification)
 - a. A booboo
 - b. A sore that is red and bleeds
 - c. A place on your leg
2. How did Cory/Cassie get a skinned knee? (Cause)
 - a. He/she hurt his/her knee
 - b. He/she fell down and scratched the skin on his/her knee
 - c. He/she was playing outside
3. How long will Cory/Cassie have a skinned knee? (Timeline)
 - a. For a little bit
 - b. For a few days
 - c. For ever and ever
4. What happens to Cory/Cassie when he/she has a skinned knee? (Consequence)
 - a. He/she needs to be careful to not hit his/her knee again
 - b. He/she needs to keep a bandaid on his/her knee
 - c. He/she needs to walk not run
5. How will Cory/Cassie get better from his/her skinned knee? (Cure)
 - a. Put medicine on it to make it better
 - b. Put medicine that kills germs on it
 - c. Put makeup on it

This is Thomas/Tina. He/she has an upset tummy. I am going to ask you questions about his/her an upset tummy. With each question I have three pictures of possible answers. You chose the picture that you think is the best answer.

1. What is an upset tummy? (Identification)
 - a. An illness that makes you feel sick
 - b. An illness that makes you not want to eat
 - c. An illness that makes you scratch your bellybutton
2. How did Thomas/Tina get an upset tummy? (Cause)
 - a. He/she ate food that was in the garbage
 - b. He/she ate some yucky food with germs on it
 - c. He/she ate an ice cream cone
3. How long will Thomas/Tina have an upset tummy? (Timeline)
 - a. For a little bit
 - b. For a few days
 - c. For ever and ever
4. What happens to Thomas/Tina when he/she has an upset tummy? (Consequence)
 - a. He/she must stay inside
 - b. He/she will feel yucky and not want to play
 - c. He/she will watch TV
5. How will Thomas/Tina get better from his/her upset tummy? (Cure)
 - a. He/she will be careful about what he/she eats and drinks
 - b. He/she will drink Gatorade or 7up and maybe eat crackers or toast
 - c. He/she will eat cake and ice cream

APPENDIX B

SECOND DRAFT OF ILLNESS REPRESENTATION QUESTIONNAIRE

Illness Representations Questionnaire

This is Billy/Breanna. He/she has a cold. He/she has friends who ask questions about the cold. With each question, I have pictures of the friends who answer the questions. You tell me which friend has the best answer.

1. Two friends ask, "What is a cold?" (Identification).
 - d. One friend says "a cold makes you sick"
 - e. The other friend says "a cold makes you have a runny nose"Which friend has the best answer?

2. Two other friends ask, "What is a cold?"
 - f. One friend says "that a cold makes you have a sore toe"
 - g. The other friend says "that a cold makes you sick"Which friend has the best answer?

3. Two friends ask, "How did Billy/Breanna get a cold?" (Cause)
 - a. One friend says "He/she got a cold by playing outside"
 - b. The other friend says "He/she got a cold by playing with a friend who has a cold"Which friend has the best answer?

4. Two other friends ask, "How did Billy/Breanna get a cold?"
 - a. One friend says "He/she got a cold by getting cold-germs inside his/her body"
 - b. The other friend says "He/she got a cold by playing with a friend who has a cold"Which friend has the best answer?

5. Two friends ask, "How long does a cold last?" (Timeline)
 - a. One friend says, "a cold doesn't last long, like as long as it takes to see a movie"
 - b. The other friend says, "a cold lasts a couple of days, like as long as it takes when you go on a trip away from home"Which friend is right?

6. Two other friends ask, "How long does a cold last?"
 - a. One friend says, "a cold lasts a couple of days, like as long as it takes when you go on a trip away from home"
 - b. The other friend says, "a cold last for ever and ever, like in story books where the person in the story lives happily ever after for ever and ever."Which friend is has the best answer?

7. Two friends ask "What happens to Billy/Breanna when he/she has a cold?" (Consequence)
 - a. One friend says, "He/she will have to stay home"
 - b. The other friend says, "He/she will feel yucky and not want to play"Which friend has the best answer?

8. Two other friends ask, "What happens to Billy/Breanna when he/she has a cold?"
 - a. One friend says, "He/she will put on a coat"
 - b. The other friend says, "He/she will have to stay home"
 Which friend has the best answer?

9. Two friends ask, "How will Billy/Breanna get better from his/her cold?" (Cure)
 - a. One friend says, "He/she needs to take medicine"
 - c. The other friend says, "He/she needs to sit outside in the sunshine"
 Which friend has the best answer?

10. Two other friends ask, "How will Billy/Breanna get better from his/her cold?"
 - a. One friend says, "He/she needs to rest, drink lots of juice, and take medicine"
 - b. The other friend says, "He/she needs to take medicine"
 Which friend has the best answer?

This is Alex/Annie. He/she has asthma. He/she has friends who have questions about Alex/Annie's asthma. With each question, I have pictures of the friends who answer the questions. You tell me which friend has the best answer.

1. Two friends ask, "What is asthma?" (Identification)
 - d. One friend says, "it makes you sick."
 - e. The other friend says, "it makes you hiccup"
 Which friend has the best answer?

2. Two other friends ask, "What is asthma?"
 - a. One friend says, "it can make you cough a lot and makes it hard to breathe"
 - b. The other friend says, "it makes you sick"
 Which friend has the best answer?

3. Two friends ask, "How did Alex/Annie get asthma?" (Cause)
 - a. One friend says, "he/she got it playing with a friend who has asthma"
 - b. The other friend says, "He/she just has it"
 Which friend has the best answer?

4. Two other friends ask, "How did Alex/Annie get asthma?"
 - a. The other friend says, "He/she just has it"
 - b. The other friend says, "His/her lungs are extra sensitive"
 Which friend has the best answer?

5. Two friends ask, "How long will Alex/Annie have a really bad asthma attack?" (Timeline)
 - a. One friend says, "a really bad asthma attack does not last long, like as long as it takes to see a movie"
 - b. The other friend says, "a really bad asthma attack lasts a couple of days, like as long as it takes when you go on a trip away from home"
 Which friend has the best answer?

6. Two other friends ask, "How long will Alex/Annie have a really bad asthma attack?"
 - a. One friend says, "a really bad asthma attack lasts a couple of days, like as long as it takes when you go on a trip away from home"
 - b. The other friend says that, "a really bad asthma attack lasts for ever and ever, like in story books where the person in the story lives happily ever after for ever and ever."
 Which friend has the best answer?

7. Two friends ask, "What happens to Alex/Annie when he/she has an asthma attack?" (Consequence)
 - a. One friend says, "He/she will want to stay home and rest"

b. The other friend says, "He/she will wear a coat"
Which friend has the best answer?

8. Two other friends ask, "What happens to Alex/Annie when he/she has an asthma attack?"
a. One friend says, "He/she will have a hard time breathing and not want to play"
b. The other friend says, "He/she will want to stay home and rest"
Which friend has the best answer?

9. Two friends ask, "How will Alex/Annie get better from his/her asthma attack?" (Cure)
a. One friend says, "He/she needs to sit outside in the sunshine"
b. The other friend says, "He/she needs to take medicine to make it better"
Which friend has the best answer?

10. Two other friends ask, "How will Alex/Annie get better from his/her asthma attack?"
a. One friend says, "He/she needs to take medicine to make it better"
b. The other friend says, "He/she needs to take special medicine that he/she breathes into his/her lungs"
Which friend has the best answer?

This is Cory/Cassie. He/she has a skinned knee. He/she has friends who have questions about Cory/Cassie's skinned knee. With each question, I have pictures of the friends who answer the questions. You tell me which friend has the best answer.

1. Two friends ask, "What is a skinned knee?" (Identification)
d. One friend says, "it is a booboo"
e. The other friend says, "it is a place on your leg"
Which friend has the best answer?

2. Two other friends ask, "What is a skinned knee?"
a. One friend says, "it is a sore that is red and bleeds"
b. The other friend says, "it is a booboo"
Which friend has the best answer?

3. Two friends ask, "How did Cory/Cassie get a skinned knee?" (Cause)
d. One friend says, "He/she was playing outside"
e. The other friend says, "He/she hurt his/her knee"
Which friend has the best answer?

4. Two other friends ask, "How did Cory/Cassie get a skinned knee?"
a. One friend says, "He/she fell down and scratched the skin on his/her knee"
b. The other friend says, "He/she hurt his/her knee"
Which friend has the best answer?

5. Two friends ask, "How long will Cory/Cassie have a skinned knee?" (Timeline)
a. One friend says, "a skinned knee does not last long, like about as long as it takes to see a movie"
b. The other friend says, "a skinned knee lasts a couple of days, like as long as it takes when you go on a trip away from home"
Which friend has the best answer?

6. Two other friends ask, "How long will Cory/Cassie have a skinned knee?"
a. One friend says, "a skinned knee lasts a couple of days, like as long as it takes when you go on a trip away from home"
b. The other friend says, "a skinned knee lasts for ever and ever, like in story books where the person in the story lives happily ever after for ever and ever."

Which friend has the best answer?

7. Two friends ask, "What happens to Cory/Cassie when he/she has a skinned knee?" (Consequence)
- One friend says, "He/she needs to be careful to not hit his/her knee again"
 - The other friend says, "He/she needs to walk"

Which friend has the best answer?

8. Two other friends ask, "What happens to Cory/Cassie when he/she has a skinned knee?"
- One friend says, "He/she needs to keep a bandaid on his/her knee so the skin will heal."
 - The other friend says, "He/she needs to be careful to not hit his/her knee again"

9. Two friends ask, "How will Cory/Cassie's skinned knee get better?" (Cure)
- One friend says, "a band aid will make it better"
 - The other friend says, "peanut butter will make it better"

Which friend has the best answer?

10. Two other friends ask, "How will Cory/Cassie's skinned knee get better?"
- One friend says, "cleaning it with soap and water to kill the germs will make it better"
 - The other friend says, "a band aid will make it better"

Which friend has the best answer?

This is Thomas/Tina. He/she has an upset tummy. He/she has friends who have questions about Thomas/Tina's upset tummy. With each question, I have pictures of the friends who answer the questions. You tell me which friend has the best answer.

1. Two friends ask, "What is an upset tummy?" (Identification)
- One friend says that, "it makes you feel sick"
 - The other friend say, "it makes you scratch your bellybutton"

Which friend has the best answer?

2. Two other friends ask, "What is an upset tummy?"
- One friend says, "it makes you not want to eat and your tummy hurt"
 - The other friend says, "it makes you feel sick"

Which friend has the best answer?

3. Two friends ask, "How did Thomas/Tina get an upset tummy?" (Cause)
- One friend says, "He/she ate food that was in the garbage"
 - The other friend says, "He/she ate an ice cream cone"

Which friend has the best answer?

4. Two other friends ask, "How did Thomas/Tina get an upset tummy?"
- One friend says, "He/she ate food that was in the garbage"
 - The other friend says, "He/she ate some yucky food with germs on it"

Which friend has the best answer?

5. Two friends ask, "How long will Thomas/Tina have an upset tummy?" (Timeline)
- One friend says, "an upset tummy does not last long, like about as long as it takes to see a movie"
 - The other friend says, "an upset tummy lasts a couple of days, like as long as it takes when you go on a trip away from home"

Which friend has the best answer?

6. Two other friends ask, "How long will Thomas/Tina have an upset tummy?"
- One friend says, "an upset tummy lasts a couple of days, like as long as it takes when you go on a trip away from home"

b. The other friend says, “an upset tummy lasts for ever and ever, like in story books where the person in the story lives happily ever after for ever and ever.”
Which friend has the best answer?

7. Two friends ask, “What happens to Thomas/Tina when he/she has an upset tummy?”
(Consequence)

- a. One friend says, “He/she must stay home”
- b. The other friend says, “He/she will put on a coat”

Which friend has the best answer?

8. Two other friends ask, “What happens to Thomas/Tina when he/she has an upset tummy?”

- a. One friend says, “He/she will feel yucky and not want to eat or play”
- b. The other friend says, “He/she must stay home”

Which friend has the best answer?

9. Two friends ask, “How will Thomas/Tina get better from his/her upset tummy?” (Cure)

- a. One friend says, “He/she needs to eat cake and ice cream”
- b. The other friend says, “He/she needs to be careful about what he/she eats and drinks”

Which friend has the best answer?

10. Two other friends ask, “How will Thomas/Tina get better from his/her upset tummy?”

- a. One friend says, “He/she needs to rest and drink Gatorade or 7up and maybe eat crackers or toast

b. The other friend says, “He/she needs to be careful about what he/she eats and drinks”

Which friend has the best answer?

APPENDIX C

INITIAL VERSION OF THE ILLNESS KNOWLEDGE QUESTIONNAIRE



This is Billy. He has a cold. He has friends who ask questions about the cold. With each question, I have pictures of the friends' answers. You tell me which friend has the best answer.

1. Cold Identification

A. Two friends ask, "What is a cold?"



- One friend says "a cold makes you have a sore toe"



- The other friend says "a cold makes you have a runny nose"

Which friend has the best answer?

A. Two other friends ask, "What is a cold?"



- One friend says "a cold makes you cough"



- The other friend says "a cold makes you hiccup"

Which friend has the best answer?

2. Cold Cause

A. Two friends ask, "How did Billy get a cold?"



- One friend says "He got a cold by playing with his toys"



- The other friend says “He got a cold by playing with a friend who has a cold”

Which friend has the best answer?

B. Two other friends ask, “How did Billy get a cold?”



- One friend says “He got a cold because cold-germs got inside his body”



- The other friend says “He got a cold because he ate ice cream”

Which friend has the best answer?

3. Cold Consequence

A. Two friends ask “What happens to Billy when he has a cold?”



- One friend says, “He will feel happy and want to play”



- The other friend says, “He will feel yucky and not want to play”

Which friend has the best answer?

B. Two other friends ask, “What happens to Billy when he has a cold?”



- One friend says, “He will stay at a playground and play”



- The other friend says, “He will stay at home and rest”

Which friend has the best answer?

4. Cold Cure

A. Two friends ask, “How will Billy get better from his cold?”



- One friend says, “He needs medicine”



- The other friend says, "He needs a new toy"

Which friend has the best answer?

B. Two other friends ask, "How will Billy better from his cold?"



- One friend says, "He needs to rest, drink lots of juice, and take medicine"



- The other friend says, "He needs to jump, run and play"

Which friend has the best answer?



This is Annie. She has asthma. She has friends who have questions about Annie's asthma. With each question, I have pictures of the friends' answers. You tell me which friend has the best answer.

5. Asthma Identification

A. Two friends ask, "What is asthma?"



- One friend says, "it makes you sick."



- The other friend says, "it makes you hiccup"

Which friend has the best answer?

B. Two other friends ask, "What is asthma?"



- One friend says, "it can make you cough a lot and makes it hard to breath"



- The other friend says, "it makes you smile a lot and makes it easy to giggle"

Which friend has the best answer?

6. Asthma Cause

A. Two friends ask, "How did Annie get asthma?"



- One friend says, “She got it playing with a friend who has asthma”



- The other friend says, “She just has it”

Which friend has the best answer?

B. Two other friends ask, “How did Annie get asthma?”



- The other friend says, “The pumping muscles that move blood from her heart are too tight.”



- The other friend says, “The tubes that bring air to her lungs are too tight”

Which friend has the best answer?

7. Asthma Consequence

A. Two friends ask, “What happens to Annie when she has an asthma attack?”



- One friend says, “She will need to stay at home and rest”



- The other friend says, “She will need to stay at a playground and play”

Which friend has the best answer?

B. Two other friends ask, “What happens to Annie when she has an asthma attack?”



- One friend says, “She will have a hard time breathing and not want to play”



- The other friend says, “She will have an easy time singing and want to play”

Which friend has the best answer?

8. Asthma Cure

A. Two friends ask, “How will Annie get better from her asthma attack?”



- One friend says, “She needs a toy”



- The other friend says, “She needs medicine”

Which friend has the best answer?

- B. Two other friends ask, “How will Annie get better from his/her asthma attack?”



- One friend says, “She needs to use special soap that she rubs into her skin”



- The other friend says, “She needs to take special medicine that she breathes into her lungs”

Which friend has the best answer?



This is Cory. He has a skinned knee. He has friends who have questions about Cory’s skinned knee. With each question, I have pictures of the friends’ answers. You tell me which friend has the best answer.

9. Skinned knee Identification

- A. Two friends ask, “What is a skinned knee?”



- One friend says, “it is a booboo”



- The other friend says, “it is a place on your leg”

Which friend has the best answer?

- B. Two other friends ask, “What is a skinned knee?”



- One friend says, “it is a sore that is red and bleeds”



- The other friend says, “it is a bump that is clear and leaks”

Which friend has the best answer?

10. Skinned knee Cause

A. Two friends ask, "How did Cory get a skinned knee?"



- One friend says, "He hurt his arm"



- The other friend says, "He hurt his knee"

Which friend has the best answer?

B. Two other friends ask, "How did Cory get a skinned knee?"



- One friend says, "He fell down and the skin on his knee was torn"



- The other friend says, "He spilled juice on his leg and it gave him a booboo."

Which friend has the best answer?

11. Skinned knee Consequence

A. Two friends ask, "What happens to Cory when he has a skinned knee?"



- One friend says, "He needs to be careful to not hit his knee again"



- The other friend says, "He needs to be careful to not wash his knee again"

Which friend has the best answer?

B. Two other friends ask, "What happens to Cory when he has a skinned knee?"



- One friend says, "It might leave a tattoo."



- The other friend says, "It might leave a scar"

12. Skinned knee Cure

A. Two friends ask, "How will Cory's skinned knee get better?"



- One friend says, “put a band aid on his skinned knee to keep it protected”



- The other friend says, “put peanut butter on his skinned knee to keep it protected”

Which friend has the best answer?

B. Two other friends ask, “How will Cory’s skinned knee get better?”



- One friend says, “clean it with soap and water to kill the germs”



- The other friend says, “rub it with salt and pepper to kill the germs”

Which friend has the best answer?



This is Tina. She has an upset tummy. She has friends who have questions about Tina’s upset tummy. With each question, I have pictures of the friends’ answers. You tell me which friend has the best answer.

13. Upset tummy Identification

A. Two friends ask, “What is an upset tummy?”



- One friend says that, “it makes you feel sick”



- The other friend say, “it makes you scratch your bellybutton”

Which friend has the best answer?

B. Two other friends ask, “What is an upset tummy?”



- One friend says, “it makes your tummy hurt”



- The other friend says, "it makes your tummy strong"
Which friend has the best answer?

14. Upset tummy Cause

A. Two friends ask, "How did Tina get an upset tummy?"



- One friend says, "She ate food that was in the garbage"



- The other friend says, "She saw food that was in the garbage"
Which friend has the best answer?

B. Two other friends ask, "How did Tina get an upset tummy?"



- One friend says, "She saw some food with germs on it"



- The other friend says, "She ate some food with germs on it"
Which friend has the best answer?

15. Upset tummy Consequence

A. Two friends ask, "What happens to Tina when she has an upset tummy?"



- One friend says, "She must stay home"



- The other friend says, "She must stay in school"

Which friend has the best answer?

B. Two other friends ask, "What happens to Tina when she has an upset tummy?"



- One friend says, "She will feel yucky and not want to eat"



- The other friend says, “She will feel happy and not want to frown”
- Which friend has the best answer?

16. Upset tummy Cure

A. Two friends ask, “How will Tina get better from her upset tummy?”



- One friend says, “She should eat lots and lots of food”



- The other friend says, “She should eat only little bits of food”

Which friend has the best answer?



B. Two other friends ask, “How will Tina get better from her upset tummy?”

- One friend says, “She needs to rest, drink Gatorade, and eat crackers”



- The other friend says, “She needs to play, drink milkshakes and eat French fries”

Which friend has the best answer?

APPENDIX D

E-MAIL MESSAGE SENT TO CONTENT EXPERTS

Dear (Content experts name/Colleague),

My name is Catherine Reisenberg. I am a doctoral candidate in nursing science at Vanderbilt University School of Nursing currently working on my dissertation research. The purpose of my study is to examine the content validity of a forced-choice questionnaire called the Illness Knowledge Questionnaire (IKQ) that evaluates preschoolers' illness knowledge. I am seeking your participation in this phase of my study because you are an expert in either the field of children's development of health/illness knowledge and/or instrument development. Completion and submission of the on-line evaluation form for this study phase will serve as your consent to participate.

If you choose to participate, you can access the on-line evaluation form using the following link:

<http://webapps.nursing.vanderbilt.edu/survey/reisenberg/TakeSurvey.asp?PageNumber=1&SurveyID=ILHnI3K376651>.

The on-line evaluation form will include a description of the IKQ, instructions to complete the survey, definitions of major constructs, the 32 IKQ items and associated images, item evaluation scale, and space for comments. You will evaluate the relevance, clarity, and appropriateness of vignettes, items (i.e., questions), forced-choice responses, and images. It will take approximately 30-90 minutes to complete the survey.

Your participation in this research study is voluntary and if you choose not to participate, it will not affect you or your rights in any way. You are also free to withdraw from this study at any time by "exiting" the survey program or by not clicking on "submit". Your response will be deleted and will not be traceable.

The risks involved in participating in this study are minimal. All reasonable efforts will be made to keep the personal information in your research record private and confidential but absolute confidentiality cannot be guaranteed. The surveys are conducted over the internet creating a potential risk to maintaining confidentiality. No identifying information will be used; however, demographic information including education level, occupation and years of expertise in content area will be requested. The PI will not be able to track your IP address and information will be protected using password only access to prevent breaching confidentiality.

Your information may be shared with institutional and/or governmental agencies, such as the Vanderbilt University Review Board, if you or someone else is in danger or if we are required to do so by law. There are no circumstances under which I may withdraw you from study participation unless you fail to review the questionnaire.

Your recommendations in combination with the guidance of my dissertation committee will be used to revise IKQ items. Quantitative and qualitative data from the on-line survey will be evaluated and modifications made to the IKQ. The revised version of the IKQ will be posted and you will be asked to evaluate it.

The potential benefits to science and humankind that may result from this study are gaining an instrument that can be used to evaluate preschoolers' illness knowledge that can later

be used to further researchers' understanding of preschoolers' illness knowledge development. Information may then guide the development of appropriate interventions to young children. The potential benefits to you from this study are minimal and likely nonexistent other than the personal satisfaction of contributing to the instrument development process.

Feel free to examine the instrument at your leisure. Please respond to the survey by (four weeks after initial email sent). If you have questions or need additional information please contact me at cathy.reisenberg@vanderbilt.edu or 615-343-0765 or my faculty advisor Dr. Melanie Lutenbacher at mealanie.lutenbacher@vanderbilt.edu or (615) 343-3314.

For additional information about giving consent or your rights as a participant in this study, please feel free to contact the Vanderbilt University Institutional Review Board Office at (615) 322-2918 or toll free at (866) 224-8273.

Thank you,

Cathy Reisenberg, PhD (c), MSN, APRN, BC, FNP
206 Godchaux Hall
Vanderbilt University School of Nursing
21st Ave South
Nashville TN 37240

APPENDIX E

EXCERPT OF HARD COPY OF SURVEY POSTED ON THE WEB

INTRODUCTION

The Illness Knowledge Questionnaire (IKQ), a 32-item questionnaire, has been developed to assess four dimensions of preschoolers' illness knowledge using a forced-choice format. The four dimensions include identification (i.e., what it is), cause (i.e., factors that led to illness), consequences (i.e., effects/symptoms), and cure (i.e., how to recover from illness).

The IKQ includes four brief vignettes followed by two questions related to each of the four illness dimensions. Each vignette describes a child who has an illness (i.e., a cold, skinned knee, an upset stomach, and asthma). Following each vignette are four subgroups of questions representing each illness dimension. All questions have forced-choice responses. Two responses, one correct and one incorrect, are provided for each question. Simple line drawings accompany each vignette (e.g., a picture of the child who is ill) and responses (i.e., pictures that illustrate the condition).

In the actual use of the instrument in the field, participants will be read the vignette by the examiner. Then the participant will be asked a question and read the two responses. The participant must choose one of the two responses.

The items and responses for this scale were drawn from a variety of sources including literature on the dimensions of illness and children's conceptualizations of illness. Two levels of illness knowledge (advanced and limited) are included on the questionnaire to develop correct and incorrect responses. Correct answers are advanced in so much as illness is identified using physiologic and anatomic terms and internal physiologic processes. Incorrect responses are limited by magical-thinking and temporal/spatial orientation.

INSTRUCTIONS

Evaluation of the IKQ will be done sequentially. First, the vignette will be presented. Evaluate the vignette for clarity and appropriateness for preschool age children (4-5 years old). Use the two point rating scale of clarity to select the response (clear/unclear) that most closely matches your evaluation. Then, use the two point rating scale of appropriateness and select the response (appropriate/inappropriate) that most closely matches your evaluation. If the vignette is identified as unclear and/or inappropriate, please provide suggestions.

The second task is for you to examine the content validity (content relevance) of the IKQ items. Following each vignette, associated items (i.e., questions) are presented. Immediately following the item is where you evaluate the content relevance of the item to the corresponding illness dimension. Using the two-point scale, select the response that most closely matches your evaluation. If any level of revision is indicated, please provide suggestions.

The third task is for you to evaluate the clarity and appropriateness of each item using the two-point scales (i.e., clear/unclear and appropriate/inappropriate) for preschool age children (4-5 years old). If an item is identified as unclear and/or inappropriate, please provide suggestions.

The last task is to evaluate the clarity and appropriateness of the responses including corresponding pictures for preschool age children (4-5 years old). Again, the two point rating scales are to be used to circle the response that most closely matches your evaluation. If a response/picture is identified as unclear, please provide suggestions.

Please rate the clarity and appropriateness of the following vignette and accompanying image.

Vignette # 1 Cold



This is Billy. He has a cold. He has friends who ask questions about the cold. With each question, I have pictures of the friend's answer. You tell me which friend has the best answer.

- **Clarity of Vignette** Clear Unclear
- **Appropriateness of Vignette** Appropriate Inappropriate

- **Clarity of Image** Clear Unclear
- **Appropriateness of Image** Appropriate Inappropriate

Suggestions

Please rate the relevance, clarity and appropriateness of the following questions. To facilitate your ability to rate the relevance of the questions, the illness knowledge dimension is identified and defined. Next rate the clarity and appropriateness of the force choice responses for the questions.

1. Two friends ask, "What is a cold?" (Dimension = identify: what it is)

- **Relevance of question** Relevant Not relevant
- **Clarity of question** Clear Unclear
- **Appropriateness of question** Appropriate Inappropriate

Suggestions

1- A. One friend says, "A cold makes you have a sore toe."



- **Clarity of Response** Clear Unclear
- **Appropriateness of Response** Appropriate Inappropriate

- **Clarity of Image** **Clear** **Unclear**
- **Appropriateness of Image** **Appropriate** **Inappropriate**

Suggestions

2- B. The other friend says, “A cold makes you have a runny nose.”



- **Clarity of Response** **Clear** **Unclear**
- **Appropriateness of Response** **Appropriate** **Inappropriate**

- **Clarity of Image** **Clear** **Unclear**
- **Appropriateness of Image** **Appropriate** **Inappropriate**

Suggestions

Which friend has the best answer?

- **Clarity of question** **Clear** **Unclear**
- **Appropriateness of question** **Appropriate** **Inappropriate**

2. Two other friends ask, “What is a cold?” (**Dimension = identify: what it is**)

- **Relevance of question** **Relevant** **Not relevant**
- **Clarity of question** **Clear** **Unclear**
- **Appropriateness of question** **Appropriate** **Inappropriate**

Suggestions

2- A. One friend says “A cold makes you cough.”



- **Clarity of Response** **Clear** **Unclear**
- **Appropriateness of Response** **Appropriate** **Inappropriate**

- **Clarity of Image** **Clear** **Unclear**
- **Appropriateness of Image** **Appropriate** **Inappropriate**

Suggestions

2- B. The other friend says, “A cold makes you hiccup.”



- **Clarity of Response** **Clear** **Unclear**
- **Appropriateness of Response** **Appropriate** **Inappropriate**

- **Clarity of Image** **Clear** **Unclear**
- **Appropriateness of Image** **Appropriate** **Inappropriate**

Suggestions

Which friend has the best answer?

- **Clarity of question** **Clear** **Unclear**
- **Appropriateness of question** **Appropriate** **Inappropriate**

Suggestions

Please rate the relevance, clarity and appropriateness of the following questions. To facilitate your ability to rate the relevance of the questions, the illness knowledge dimension is identified and defined. Next rate the clarity and appropriateness of the force choice responses for the questions.

3. Two friends ask, “How did Billy get a cold?” (**Dimension = Cause: factors that lead to the illness**)

- **Relevance of question** **Relevant** **Not relevant**
- **Clarity of question** **Clear** **Unclear**
- **Appropriateness of question** **Appropriate** **Inappropriate**

Suggestions

3- A. One friend says, “He got a cold by playing with his toys.”



- **Clarity of Response** **Clear** **Unclear**
- **Appropriateness of Response** **Appropriate** **Inappropriate**

- **Clarity of Image** **Clear** **Unclear**
- **Appropriateness of Image** **Appropriate** **Inappropriate**

Suggestions

3- B. The other friend says, “He got a cold by playing with a friend who has a cold.”



- **Clarity of Response** **Clear** **Unclear**
- **Appropriateness of Response** **Appropriate** **Inappropriate**

- **Clarity of Image** **Clear** **Unclear**
- **Appropriateness of Image** **Appropriate** **Inappropriate**

Suggestions

Which friend has the best answer?

- **Clarity of question** **Clear** **Unclear**
- **Appropriateness of question** **Appropriate** **Inappropriate**

4. Two other friends ask, “How did Billy get a cold?” (**Dimension = Cause: factors that lead to the illness**)

- **Relevance of question** **Relevant** **Not relevant**
- **Clarity of question** **Clear** **Unclear**
- **Appropriateness of question** **Appropriate** **Inappropriate**

Suggestions

4- A. One friend says, “He got a cold because cold-germs got inside his body.”



- **Clarity of Response** **Clear** **Unclear**
- **Appropriateness of Response** **Appropriate** **Inappropriate**

- **Clarity of Image** **Clear** **Unclear**
- **Appropriateness of Image** **Appropriate** **Inappropriate**

Suggestions

4- B. The other friend says, “He got a cold because he ate ice cream.”



- **Clarity of Response** **Clear** **Unclear**
- **Appropriateness of Response** **Appropriate** **Inappropriate**

- **Clarity of Image** **Clear** **Unclear**
- **Appropriateness of Image** **Appropriate** **Inappropriate**

Suggestions

Which friend has the best answer?

- **Clarity of question** **Clear** **Unclear**
- **Appropriateness of question** **Appropriate** **Inappropriate**

Please rate the relevance, clarity and appropriateness of the following questions. To facilitate your ability to rate the relevance of the questions, the illness knowledge dimension is identified and defined. Next rate the clarity and appropriateness of the force choice responses for the questions.

5. Two friends ask, “What happens to Billy when he has a cold?”
(Dimension = Consequence: Effects/symptoms)

- **Relevance of question** **Relevant** **Not relevant**
- **Clarity of question** **Clear** **Unclear**
- **Appropriateness of question** **Appropriate** **Inappropriate**

Suggestions

5- A. One friend says, “He will feel happy and want to play.”



- **Clarity of Response** **Clear** **Unclear**
- **Appropriateness of Response** **Appropriate** **Inappropriate**

- **Clarity of Image** **Clear** **Unclear**
- **Appropriateness of Image** **Appropriate** **Inappropriate**

Suggestions

5- B. The other friend says, "He will feel yucky and not want to play."



- **Clarity of Response** **Clear** **Unclear**
- **Appropriateness of Response** **Appropriate** **Inappropriate**

- **Clarity of Image** **Clear** **Unclear**
- **Appropriateness of Image** **Appropriate** **Inappropriate**

Suggestions

Which friend has the best answer?

- **Clarity of question** **Clear** **Unclear**
- **Appropriateness of question** **Appropriate** **Inappropriate**

6. Two other friends ask, "What happens to Billy when he has a cold?"
(Dimension = Consequence: Effects/symptoms)

- **Relevance of question** **Relevant** **Not relevant**
- **Clarity of question** **Clear** **Unclear**
- **Appropriateness of question** **Appropriate** **Inappropriate**

Suggestions

6- A. One friend says, "He will stay at a playground and play."



- **Clarity of Response** **Clear** **Unclear**
- **Appropriateness of Response** **Appropriate** **Inappropriate**

- **Clarity of Image** **Clear** **Unclear**
- **Appropriateness of Image** **Appropriate** **Inappropriate**

Suggestions

6- B. The other friend says, “He will stay at home and rest.”



- **Clarity of Response** **Clear** **Unclear**
- **Appropriateness of Response** **Appropriate** **Inappropriate**

- **Clarity of Image** **Clear** **Unclear**
- **Appropriateness of Image** **Appropriate** **Inappropriate**

Suggestions

Which friend has the best answer?

- **Clarity of question** **Clear** **Unclear**
- **Appropriateness of question** **Appropriate** **Inappropriate**

Please rate the relevance, clarity and appropriateness of the following questions. To facilitate your ability to rate the relevance of the questions, the illness knowledge dimension is identified and defined. Next rate the clarity and appropriateness of the force choice responses for the questions.

7. Two friends ask, “How will Billy get better from his cold?”
(Dimension = Cure: How to recover from illness)

- **Relevance of question** **Relevant** **Not relevant**
- **Clarity of question** **Clear** **Unclear**
- **Appropriateness of question** **Appropriate** **Inappropriate**

Suggestions

7- A. One friend says, “He needs medicine.”



- **Clarity of Response** **Clear** **Unclear**
- **Appropriateness of Response** **Appropriate** **Inappropriate**

- **Clarity of Image** **Clear** **Unclear**
- **Appropriateness of Image** **Appropriate** **Inappropriate**

Suggestions

7- B. The other friend says, “He needs a new toy.”



- **Clarity of Response** **Clear** **Unclear**
- **Appropriateness of Response** **Appropriate** **Inappropriate**

- **Clarity of Image** **Clear** **Unclear**
- **Appropriateness of Image** **Appropriate** **Inappropriate**

Suggestions

Which friend has the best answer?

- **Clarity of question** **Clear** **Unclear**
- **Appropriateness of question** **Appropriate** **Inappropriate**

8. Two other friends ask, “How will Billy get better from his cold?”
 (Dimension = Cure: How to recover from illness)

- **Relevance of question** **Relevant** **Not relevant**
- **Clarity of question** **Clear** **Unclear**
- **Appropriateness of question** **Appropriate** **Inappropriate**

Suggestions

8- A. One friend says, “He needs to rest, drink lots of juice, and take medicine. “



- **Clarity of Response** Clear Unclear
- **Appropriateness of Response** Appropriate Inappropriate

- **Clarity of Image** Clear Unclear
- **Appropriateness of Image** Appropriate Inappropriate

Suggestions

8- B. The other friend says, “He needs to jump, run and play.”



- **Clarity of Response** Clear Unclear
- **Appropriateness of Response** Appropriate Inappropriate

- **Clarity of Image** Clear Unclear
- **Appropriateness of Image** Appropriate Inappropriate

Suggestions

Which friend has the best answer?

- **Clarity of question** Clear Unclear
- **Appropriateness of question** Appropriate Inappropriate

Please choose response that best describes:

1. Highest Educational Level Completed

- PhD in nursing
- PhD in field other than nursing
Please specify field _____

- M.D.
- MSN
- Masters in field other than nursing
Please specify field_____

2. Occupation

- Nurse practitioner
- Nurse researcher
- Physician
- Psychologist
- Other, please specify_____

3. Years of expertise in content area or in instrument development

APPENDIX F

REVISION PLAN

Vignettes

VIGNETTE	TEXT CHANGES	IMAGE CHANGES
#1 COLD	Need to eliminate the use of best and provide clearer wording for question.	Fix unequal pupil size
#2 ASTHMA	For example: This is Billy. He has a cold. His teacher asks the kids in his class questions about the cold. You tell me which kid has the right answer.	None
#3 SKINNED KNEE	All vignettes will be changed to this format if approved by committee	Need to show Cory's face and his knee.
#4 UPSET TUMMY		None

Dimension Items

DIMENSION	ITEM #	TEXT CHANGES
IDENTIFY	1	Need to change wording to reflect new vignette. For example: The teacher asks, "What is a cold" All introductions (i.e., across dimensions and vignettes) will be changed to this format if approved by committee
	2	None, except above
CAUSE	3	Possibly change wording to " how did Billy get the cold or get his cold ".
	4	See # 1 & # 3
CONSEQUENCE	5	None, except see # 1
	6	None, except see # 1
CURE	7	None, except see # 1
	8	None, except see # 1

Question Posed to Child-respondents

QUESTION	REVISION
Which friend has the best answer?	Need to eliminate the word "best" and change wording of question to reflect new vignette. For example: Which kid is right? All questions will be changed to this format if approved by committee

Choices/Images: Mutually Endorsed. Possible changes recommended in experts' comments

CHOICE	TEXT CHANGES	IMAGE CHANGE
3-B. He got a cold playing		

with a friend who has a cold. Cold - Cause		
4-B. He got a cold because he ate ice cream. Cold - Cause		
5-A. He will feel happy and want to play. Cold - Consequence		
5-B. He will feel yucky and not want to play. Cold - Consequence		
7-A. He needs medicine. Cold - Cure		
7-B. He needs a toy. Cold - Cure		
10-A. It can make you cough a lot and makes it hard to breath. Asthma - Identify		
11-A. She got it playing with a friend who has asthma. Asthma - Cause		Need to make the characters look happy
11-B. She just has it. Asthma - Cause		
12-B. The tubes that bring air to her lungs are too tight. Asthma - Cause		
13-A. She will need to stay at home and rest. Asthma - Consequence	Change rest to sleep	
14-A. She will have a hard time breathing and not want to play. Asthma - Consequence		
15-B. She needs medicine. Asthma - Cure	Need to change wording to be clearer. For example, She needs to take medicine.	Need to include an inhaler among medicine.
16-B. She needs to take special medicine that she breathes into her lungs. Asthma - Cure		
17-A. It is a booboo. Skinned Knee - Identify	Need to be more descriptive. For example, "it is a booboo that hurts."	
18-A. It is a sore that is red and bleeds. Skinned knee - Identify		
19-A. He hurt his knee. Skinned knee - Cause	Need response to be more descriptive. For example, he fell down.	
21-A. He needs to be careful to not hit his knee again. Skinned knee - Consequence	Need to change text to something more feasible for a preschooler. For example, He will cry.	Show entire character
22-B. It might leave a scar.	Suggestion for revision. For example, His	Need image to

Skinned knee - Consequence	knee might hurt when he walks.	reflect
23-A. Put a band aid on his skinned knee to keep it protected. Skinned knee - Cure	Need to use terminology appropriate for preschooler. For example, put a band-aid on his skinned knee to keep it clean.	
24-A. Clean it with soap and water to kill the germs. Skinned knee - Cure		
25-A. It makes you feel sick. Upset tummy - Identify		
26-A. It makes your tummy hurt. Upset tummy - Identify		
29-A. She must stay at home. Upset tummy - Consequence	Need to change wording. For example, she gets to stay at home.	
30-A. She will feel yucky and not want to eat. Upset tummy - Consequence		
31-B. She should eat only little bits of food. Upset tummy - cure		Need character 's eating to be more obvious

Problem Choice - Images okay

CHOICE	TEXT REVISION	IMAGE SUGGESTIONS
1-A. A cold makes you have a sore toe. Cold - Identify	Need a response that is related to the correct answer and change introductory wording. For example: One kid says "a cold makes your nose grow longer"	Need image to reflect change
3-A. He got a cold by playing with his toys. Cold - Cause	Experts suggested that children might rationalize that germs can be transmitted via toys. Need to make clear that Billy is playing with his own toys...not the sick friend's. For example: One kid says "Billy got a cold playing with his toys."	Possibly need full image of child playing with his toy.
8-A. He needs to rest, drink lots of juice, and take medicine. Cold - Cure	Experts recommend dropping medicine and use water instead of juice.	
9-B. It makes you hiccup. Asthma - Identify	Need to change identifying characteristic. For example it makes you sleep.	Need image to reflect change
10-B. It makes you smile a lot and makes it easy to giggle. Asthma - Consequence	Need to change wording. For example; It makes you laugh a lot and makes it easy to smile.	
13-B. She will need to stay at a playground and play.	Need to change wording to better evaluate effects of symptoms. For example, She will still be able to play at the playground.	Need to show more of the swing

Asthma - Consequence		
16-A. She needs special soap that she rubs into her skin. Asthma - Cure	Need to make distracter more related to correct answer. For example, She needs to use special lotion that she rubs on her nose.	Need image to reflect change.
17-B. It is a place on you leg. Skinned knee - Identify	Need to change text so that choices are clearly right/wrong. For example, it is a bumpy rash that itches.	Need image to reflect change
19-A. He hurt his arm. Skinned knee - Cause	Need to change text so that is more difficult. For example, he sat down.	Need image to reflect change
20-B. He spilled juice on his leg and it gave him a booboos. Skinned knee - Cause	Need to be more consistent with set-up of other vignettes. For example, he got a skinned knee because he played with a friend with a skinned knee.	Need image to reflect change
23-B. Put peanut butter on his skinned knee to keep it protected. Skinned knee - Cure	Need distracter to be feasible. For example, Put a cast on his skinned knee to keep it clean.	Need image to reflect change
24-B. Rub it with salt and pepper to kill the germs. Skinned knee - Cure	Need distracter to be feasible. For example, Rub it with hand lotion and baby powder to kill the germs.	Need image to reflect change
25-B. It makes you scratch your bellybutton. Upset tummy - Identify	No comments made specifically about the text. Two experts indicated that this response was not appropriate. I think it is okay but I do agree with the image suggestion.	Need to show more of the abdomen so the child can get the landmarks
29-B. She must stay in school. Upset tummy - Consequence	Need to change wording. For example, she gets to stay at school.	
30-B. She will feel happy and not want to frown. Upset tummy - Consequence	Need to change wording to be more consistent with correct answer. For example, She will feel happy and want to eat all of her food.	
31-A. She should eat lots and lots of food. Upset tummy - Cure	Two experts indicated that this response was not appropriate. I think it is okay.	
32-B. She needs to play, drink milkshakes and eat French fries. Upset tummy - Cure	Two experts indicated that this response was not appropriate. I think it is okay.	

Problem Image – Choice okay

CHOICE	IMAGE REVISIONS	TEXT SUGGESTIONS
1-B. A cold makes you have a runny nose. Cold - Identify	Need the whole face	
2-A. A cold makes you cough. Cold - Identify	Need to emphasize coughing	
4-A. He got a cold because cold-germs got inside his body. Cold - Cause	Need to erase germs and change text.	Need to change wording to reflect that germs are invisible. For example: He got a cold because cold-germs he could not see got inside his nose.
6-B. He will stay at home and rest. Cold - Consequence	Need to move plant from top of his head.	Need to change wording sleep
20-A. He fell down and the skin on his knee was torn. Skinned knee - Cause	Need image to be of full figure	Need to use terminology better suited for preschooler. For example, he got a skinned knee because he fell down and the skin was broke open.
27-A. She ate food that was in the garbage. Upset tummy - Cause	Need to show child with garbage can.	
28-B. She ate some food with germs on it. Upset tummy - Cause	Need to change food to hamburger so the distracter matches the correct answer	

Choice/Image: Complete Revision

CHOICE	TEXT REVISIONS	IMAGE REVISIONS
2-B. A cold makes you hiccup. Cold - Identify	Experts questioned whether preschoolers would recognize "hiccup". My 3 yr old nephew got it. New distracter needs to be a common natural action of the face...like burp?	If keep "hiccup" need image to include chest and head.
6-A. He will stay at a playground and play. Cold - Consequence	Need to make more difficult. For example, He will stay at home and play outside.	Image difficult to interpret. Need "playground" equipment to be more obvious.
8-B. He needs to jump, run, and play. Cold - Consequence	No comments made about text.	Need image to show more of child jumping rope.
9-A. It makes you sick. Asthma - Identify	Possible too simple. I think that the term "asthma" might be new to several children; therefore making this question challenging. My 6 year old nephew was pretty distraught that he did not "know what asthma" was.	Need image to look more like picture in vignette.
12-A. The pumping muscles that move blood from her	Experts question whether the wording is too sophisticated.	Need to change so that the image is only of the heart

heart are too tight. Asthma - Cause	Probably need a completely different distracter and correct answer. I find this difficult because the real cause of asthma is physiologic.	
14-B. She will have an easy time singing and want to play. Asthma - Consequence	No specific comments from experts but may need to change wording so that the distracter is not obviously wrong. For example, She will have a hard time moving and not want to play.	Image too sophisticated
15-A. She needs a toy. Asthma - Cure	Need a better distracter. For example, She needs to eat candy.	Need image to reflect change in response
18-B. It is a bump that is clear and leaks. Skinned knee - Identify	No specific comments given.	Image needs to be refined so that bump does not look like it is alive
21-B. He needs to be careful to not wash his knee again. Skinned knee - Consequence	Need to eliminate negative wording and image. Also need to change wording if revision to accompanying correct answer (He will cry) is adopted. For example, He will laugh.	Need image to reflect change in response
22-A. It might leave a tattoo. Skinned knee - Consequence	Need to completely revise. For example, His knee might squeak when he walks.	Image needs to reflect. Probably will use a simple drawing of a boy walking. Do not think that a "squeak" can be illustrated.
26-B. It makes your tummy strong. Upset tummy - Identify	No specific comments about changing text	Show child flexing bicep and pointing to his stomach
27-B. She saw food that was in the garbage. Upset tummy - Cause		Show more of the garbage can
28-A. She saw some food with germs on it. Upset tummy - Cause	Need to change wording so that germs are introduced but need image of food with no visible germs. For example, She saw some old food that might have germs on it.	Need image to reflect change in response
32-A. She needs to rest, drink Gatorade, and eat crackers Upset tummy - Cure	Need to eliminate "Gatorade" and use a neutral term	Need a drink in the picture

APPENDIX G

REVISED ILLNESS KNOWLEDGE QUESTIONNAIRE BASED ON EXPERTS' SUGGESTIONS

Vignette # 1 Cold



This is Billy. He has a cold. His teacher asks the kids in his class questions about his cold. You tell me which kid has the right answer.

1. The teacher asks the kids, "What is a cold?" (**Dimension = identify: what it is**)

1- A. One kid says, "A cold makes your nose grow longer."



1- B. Another kid says, "A cold makes you have a runny nose."



Which kid is right?

2. Two other kids answer the teacher's question, "What is a cold?" (**Dimension = identify: what it is**)

2- A. One kid says "A cold makes you cough."



2- B. Another kid says, "A cold makes you hiccup."



Which kid is right?

3. The teacher asks the kids, "How did Billy get a cold?" (**Dimension = Cause: factors that lead to the illness**)

3- A. One kid says, "Billy got a cold by playing with a friend who has a cold."



3- B. Another kid says, "Billy got his cold by playing with his toys."



Which kid is right?

4. Two other kids answer the teacher's question, "How did Billy get a cold?" (**Dimension = Cause: factors that lead to the illness**)

4- A. One friend says, "Billy got a cold because cold-germs he could not see got inside his body."



4- B. Another kid says, "Billy got a cold because he ate ice cream."



Which kid is right?

5. The teacher asks the kids, "What happens to Billy when he has a cold?" (**Dimension = Consequence: Effects/symptoms**)

5- A. One kid says, "Billy will feel yucky and not want to play."



5- B. Another kid says, "Billy will feel happy and want to play."



Which kid is right?

6. Two other kids answer the teacher's question, "What happens to Billy when he has a cold?"
(Dimension = Consequence: Effects/symptoms)

6- A. One kid says, "Billy will stay at home and sleep."



6-B. Another kid says, "Billy will stay at home and play outside."



Which kid is right?

7. The teacher asks the kids, "How will Billy get better from his cold?"
(Dimension = Cure: How to recover from illness)

7- A. One kid says, "Billy needs medicine."



7- B. Another kid says, "Billy needs a toy."



Which kid is right?

8. Two other kids answer the teacher's question, "How will Billy get better from his cold?"
(Dimension = Cure: How to recover from illness)

8- A. One kid says, "He needs to sleep and drink lots of water."



8- B. Another kid says, "He needs to play and drink lots of water."



Which kid is right?

Vignette # 2 Asthma



This is Annie. She has asthma. Her teacher asks the kids in her class questions about her asthma. You tell me which kid has the right answer.

9. The teacher asks the kids, "What is asthma?" (**Dimension = identify: what it is**)

9- A. One kid says, "Asthma makes you burp."



9-B. Another kid says, "Asthma makes you sick."



Which kid is right?

10. Two other kids answer the teacher's question, "What is asthma?" (**Dimension = identify: what it is**)

10-A. One kid says, "Asthma can make you burp a lot and makes it hard to breathe."



10- B. Another kid says, "Asthma can make you cough a lot and makes it hard to breathe."



Which kid is right?

11. The teacher asks the kids, "How did Annie get asthma?" (**Dimension = Cause: factors that lead to the illness**)

11- A. One kid says, "Annie got asthma playing with a friend who has asthma."



11- B. The other friend says, "Annie just has it."



Which kid is right?

12. Two other friends ask, "How did Annie get asthma?" (**Dimension = Cause: factors that lead to the illness**)

12- A. One friend says, "The pumping muscles that move blood from her heart are too tight."



12- B. The other friend says, "The breathing tubes that bring air to her lungs are too tight."



Which kid is right?

13. The teacher asks the kids, "What happens to Annie when she has an asthma attack?"
(Dimension = Consequence: Effects/symptoms)

13- A. One kid says, "Annie needs to stay at home and play."



13- B. Another kid says, "Annie needs to stay at home and sleep."



Which kid is right?

14. Two other kids answer the teacher's question, "What happens to Annie when she has an asthma attack?"

14- A. One kid says, "Annie will have a hard time moving and not want to play."



14- B. Another kid says, "Annie will have a hard time breathing and not want to play."



Which kid is right?

15. The teacher asks the kids, "How will Annie get better from her asthma attack?"
(Dimension = Cure: How to recover from illness)

15- A. One kid says, "Annie needs to eat candy."



15- B. Another kid says, "Annie needs to take medicine."



Which kid is right?

16. Two other kids answer the teacher's question, "How will Annie get better from her asthma attack?"

(Dimension = Cure: How to recover from illness)

16- A. One friend says, "Annie needs to use special lotion that she rubs on her nose."



16- B. The other friend says, "Annie needs to take special medicine that she breathes into her lungs."



Which kid is right?
Vignette # 3 skinned knee



This is Cory. He has a skinned knee. His teacher asks the kids in his class questions about his skinned knee. You tell me which kid has the right answer.

17. The teacher asks the kids, "What is a skinned knee?" (**Dimension = identify: what it is**)

17- A. One kid says, "A skinned knee is a booboo that hurts."



17- B. Another kid says, "A skinned knee is a bumpy rash that itches."



Which kid is right?

18. Two other kids answer the teacher's question, "What is a skinned knee?" (**Dimension = identify: what it is**)

18- A. One friend says, "A skinned knee is a sore that is red and bleeds."



18- B. The other friend says, "A skinned knee is a rash that is bumpy and leaks."



Which kid is right?

19. The teacher asks the kids, "How did Cory get a skinned knee?" (**Dimension = Cause: factors that lead to the illness**)

19- A. One kid says, "Cory fell down."



19- B. Another kid says, "Cory sat down."



Which kid is right?

20. Two other kids answer the teacher's question, "How did Cory get a skinned knee?"
(Dimension = Cause: factors that lead to the illness)

20- A. One friend says, "Cory fell down and the skin on his knee was broke open"



20- B. The other friend says, "Cory played with a friend with a skinned knee."



Which kid is right?

21. The teacher asks the kids, "What happens to Cory when he has a skinned knee?"
(Dimension = Consequence: Effects/symptoms)

21- A. One kid says, "Cory will cry."



21- B. Another kid says, "Cory will laugh."



Which kid is right?

22. Two other kids answer the teacher's question, "What happens to Cory when he has a skinned knee?"

(Dimension = Consequence: Effects/symptoms)

22- A. One kid says, "Cory's knee will hurt when he walks."



22- B. Another kid says, "Cory's knee will itch when he walks."



Which kid is right?

23. The teacher asks the kids, "How will Cory's skinned knee get better?"

(Dimension = Cure: How to recover from illness)

23- A. One kid says, "Put a band aid on Cory's skinned knee to keep it clean."



23- B. Another kid says, "Put a cast on Cory's skinned knee to keep it clean."



Which kid is right?

24. Two other friends ask, "How will Cory's skinned knee get better?"

(Dimension = Cure: How to recover from illness)

24- A. One friend says, "Clean Cory's skinned knee with soap and water to kill the germs."



24- B. The other friend says, "Rub Cory's skinned knee with hand lotion and baby powder to kill the germs."



Which kid is right?

Vignette # 4 upset tummy



This is Tina. She has an upset tummy. Her teacher asks the kids in her class questions about her upset tummy. You tell me which kid has the right answer.

25. The teacher asks the kids, "What is an upset tummy?" (**Dimension = identify: what it is**)

25- A. One friend says, "An upset tummy makes you feel sick."



25- B. The other friend says, "An upset tummy makes you scratch your bellybutton."



Which kid is right?

26. Two other kids answer the teacher's question, "What is an upset tummy?" (**Dimension = identify: what it is**)

26- A. One kid says, "An upset tummy makes your tummy hurt."



26- B. The other kid says, “An upset tummy makes your tummy strong.”



Which kid is right?

27. The teacher asks the kids, “How did Tina get an upset tummy?” (**Dimension = Cause: factors that lead to the illness**)

27- A. One friend says, “Tina ate food that was in the garbage.”



27- B. The other friend says, “Tina saw food that was in the garbage.”



Which kid is right?

28. Two other kids answer the teacher’s question, “How did Tina get an upset tummy?” (**Dimension = Cause: factors that lead to the illness**)

28- A. The other friend says, “Tina ate some food with germs on it.”



28- B. The other kid says, “Tina saw some old food with that might have germs on it.”



Which kid is right?

29. The teacher asks the kids, "What happens to Tina when she has an upset tummy?"
(Dimension = Consequence: Effects/symptoms)

29- A. One kid says, "Tina will stay home."



29- B. Another kid says, "Tina will stay in school."



Which kid is right?

30. Two other kids answer the teacher's question, "What happens to Tina when she has an upset tummy?"

(Dimension = Consequence: Effects/symptoms)

30- A. One kid says, "Tina will feel yucky and not want to eat any food."



30- B. The other kid says, "Tina will feel happy and want to eat all of her food."



Which kid is right?

31. The teacher asks the kids, "How will Tina get better from her upset tummy?"

(Dimension = Cure: How to recover from illness)

31- A. One kid says, "Tina should eat only little bits of food."



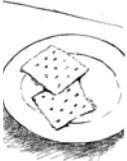
31- B. Another kid says, "Tina should eat lots and lots of food."



Which kid is right?

32. Two other friends ask, "How will Tina get better from her upset tummy?"
(Dimension = Cure: How to recover from illness)

32- A. One friend says, "Tina needs to rest, and eat crackers."



32- B. The other friend says, "Tina needs to play and eat French fries."



Which kid is right?

APPENDIX H

E-MAIL REQUESTING EXPERTS' CONFIRMATION OF REVISIONS

Dear Expert reviewer,

Thank you for reviewing and offering revision suggestions for the Illness Knowledge Questionnaire (IKQ). Your input has been invaluable.

I want to obtain your confirmation that the revisions are an accurate reflection of your suggestions. I have attached an executive summary of the IKQ revisions and the resulting revised IKQ to this e-mail. I ask that you review these documents and respond to this e-mail message with your impression. Please consider.

1. Do the changes reflect your recommendations? If not, please explain why.
2. What are the strengths of the revised IKQ?
3. Are there areas that you feel still need revision? If so, please describe.
4. Overall, how do you rate the revised IKQ?

1- poor 2- fair 3 – good 4 - excellent

Thank you,

Cathy

APPENDIX I

EXECUTIVE SUMMARY OF THE ILLNESS KNOWLEDGE QUESTIONNAIRE REVISONS

Currently, researchers cannot easily test preschoolers' illness knowledge because a psychometrically valid instrument specifically designed for preschoolers is not available. The specific aim of this presentation is to report the results of Phase I of a 3-phase study designed to examine the validity of a newly developed instrument; the Illness Knowledge Questionnaire (IKQ). The IKQ is a 32 item instrument designed to detect different levels of illness knowledge across four-illness dimensions (i.e., identification, cause, consequences, and cure) for various common illnesses (i.e., cold, asthma, skinned knee, and stomach virus) in young children. The IKQ includes four vignettes that each have eight questions (i.e., two questions relate to each of the four illness dimensions) for which the child respondent must choose one of two responses. Simple line drawings accompany each vignette (i.e., an image of a child who has an illness) and all responses (i.e., pictures that illustrate the condition).

The purpose of phase I was to examine the content validity of the Illness Knowledge Questionnaire (IKQ) with a sample of pediatric professionals with clinical and research expertise. Nineteen experts (10 published experts; 5 pediatric nurse researchers, 1 practicing pediatrician, 1 practicing nurse practitioner, 1 developmental pediatrician, and 1 social psychologist) were identified and contacted by e-mail. The inclusion criteria for experts were: (1) clinical or research expertise in child development or expertise in instrument development and (2) masters or higher degree in nursing, medicine or psychology. Seven content experts (4 pediatric nurse researchers, a practicing nurse practitioner, a developmental pediatrician and a social psychologist).

Vignettes were evaluated for appropriateness (i.e., developmentally appropriate) for preschool age children (4-5 years old) and clarity (i.e., clear wording or clear illustration). Introductions to illness dimensions (i.e., identity, cause, consequence, and cure) were evaluated

for appropriateness, clarity and content validity (content relevance). Responses and corresponding pictures were evaluated for appropriateness and clarity and questions posed to children were evaluated for appropriateness and clarity.

The IKQ received favorable evaluations from content experts. Most of the vignettes and all of the dimension introductions received endorsement by at least 86% of the experts. Of the 64 response/image pairs, 78% received adequate endorsement. Revision of the IKQ include; rewording the vignettes to improve clarity, changing the scale for the questions, and changing select responses and images either partially or completely.

Vignettes

The wording of the vignettes was changed to the following format: "This is *the ill character*. He/she has a *name of illness*. His/her teacher asks the kids in his/her class questions about the illness. You tell me which kid has the right answer." The original wording of the vignettes (e.g., "This is Billy. He has a cold. His friends ask questions about his cold.") was confusing because it was not clear whether the character's friends were asking the questions or giving the answers. The vignettes were reworded to delineate that the teacher is asking the questions and the kids in the class are answering the questions. The ratings and comments about the vignette images were overall favorable; however, several experts suggested that the skinned knee of the character in the skinned knee vignette needs to be visible. This suggestion was not adopted because all of the vignette images were busts of the character and uniformity among vignette images was important to preserve.

Dimension Introduction

One change was made to the dimension introductions. The wording of the "cause" dimension introduction was changed from "How did *character* get an *illness*?" to "How did *character* get his/her *illness*?" to clarify that the character is the referent to the illness. Although one expert suggested that the "consequence" introduction be altered from what "happens" to "how come" to better reflect the lexicon of a preschooler, this change was not made because the phrases are not interchangeable. The phrase "how come" connotes the word "why" not the phrase "what happens".

Question

The overwhelming consensus of the experts was that the “best” scale be eliminated and replaced with a scale using right or wrong; therefore, this suggestion was adopted.

Responses and Accompanying Images

The majority of the 64 response/image pairs received either complete endorsement of response/image pairs or partial endorsement of pairs meaning that either the image but not the response was endorsed or the response but not the image was endorsed. Although 40% (n = 26) of the pairs received positive evaluation by experts for both response and image, many of these response and images were refined using expert suggestions. The majority of pairs that were mutually endorsed were “correct” response/images.

Thirty-eight percent (n = 24) of pairs received partial endorsement. The majority of response/image pairs that received partial endorsements (n = 17) had a response that was inappropriate or not clear. For example, experts recommended that the wording of an asthma consequence response (i.e., Annie will need to stay at a playground and play) be changed to reflect effect “She will still be able to play at the playground (E-6)”. Recommendations for image revisions were focused typically on providing broader views of characters and their actions. Revisions were made on all partially endorsed response/image pairs based on expert suggestions.

Less than one quarter (n= 14) of response/image pairs needed complete revision because neither the response nor the image was adequately endorsed by the experts. When neither the response nor the image was endorsed, the experts’ comments suggested that these response/images were not developmentally appropriate for preschoolers. Response/images were evaluated as too sophisticated, (e.g., asthma cause 12-A “Her heart is extra sensitive”), too easy (e.g., skinned knee cause 19-B “He hurt his arm”) or poorly worded and portrayed (e.g., upset tummy identify 26-B “It makes your tummy strong”). Revisions were made to almost all of these response/image pairs with the exception of the asthma cause response/image (“Her heart is extra sensitive”). Experts suggested that this response/image was too difficult for preschoolers. During informal piloting of the IKQ, however, preschoolers accepted and appeared to understand both

the response and image. One expert recommended that the image (i.e., child with “X-ray view of heart) be changed such that only the heart is shown. This suggestion was considered but ultimately rejected because similar images have been used in children’s books and health/illness educational materials designed for children of all ages.

Additional Recommendation

An additional comment was made regarding the formatting of the responses. One expert suggested that responses be counterbalanced to minimize primacy/recency effects; therefore, vignette responses were arranged to have either all wrong response first or all correct response first. The correct response was positioned first in the cold and the skinned knee vignettes while the incorrect response was made first in the asthma and the upset tummy vignettes.

Conclusion

The author’s dissertation committee approved revisions prior to implementing any changes.

APPENDIX J

DRAFT OF HEALTH HISTORY FORM FOR CHILDREN WITHOUT ASTHMA

ID# _____

Child's Birth date _____

Child's gender

Male Female

Child's Ethnicity

Chose one answer

African America American Indian Asian Hispanic/Latino White Other

Birth history

Birth weight _____ (in pounds and ounces)

Choose one answer

1. Did you receive prenatal care Yes No
2. Was your child born: on or close to your due date (1 to 3 weeks before due date)
 4 or more weeks before your due date
 more than 2 weeks after due date
 not sure
3. Did you use any of the following substances during your pregnancy?
 - a. Smoke cigarettes Yes No
 - b. Alcoholic beverages (beer, wine, whiskey) Yes No
 - c. Marijuana Yes No
 - d. Cocaine Yes No
 - e. Prescription drugs such as narcotics or amphetamines Yes No
4. Did you have any of the following during your pregnancy:
 - a. Bladder infection Yes No Not sure
 - b. Vaginal infection Yes No Not sure
 - c. High blood pressure Yes No Not sure
 - d. Gestational diabetes Yes No Not sure
5. Did your child have any problems while in the newborn nursery: Yes No Not sure

If yes please explain:

Child's Health History

Choose one answer

1. Does your child have (or had) any of the following conditions:
- | | | |
|---|------------------------------|-----------------------------|
| a. seizures | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| b. headaches | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| c. allergies to foods/pet dander/trees or grass | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| d. vision problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| e. hearing problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| f. chronic or recurrent ear infections | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| g. speech problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| h. dental cavities | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| i. heart problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| j. pneumonia | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| k. asthma | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| l. stomach problems (such as ulcers, Crohn's disease) | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| m. chronic diarrhea | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| n. chronic constipation | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| o. bladder infections | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| p. muscle, joint, or bone problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| q. eczema | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| r. sickle cell disease | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| s. thalasemia | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| t. leukemia | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
2. Are your child's immunizations up to date Yes No
3. Is your child currently experiencing any health problems (such as colds, stomach virus, eye infection, or skin infection) Yes No

If yes, please explain

4. Does your child take medication on a daily basis Yes No

If yes, please identify medications

5. Is your child routinely exposed to cigarette smoke? Yes No

Family History

1. Does anyone in your family have asthma? Yes No

If yes, identify how related to your child.

- brother
- sister
- mother

- father
- grandmother
- grandfather
- aunt/uncle
- cousin

2. Does anyone who lives with your child have a chronic condition (such as asthma hypertension, diabetes, seizures, heart problems, stomach ulcers, etc) Yes No

If yes please explain who has the condition and what the condition is

Family Income

Select one

- less than \$10,000 per year
- \$10,001 to \$20,000 per year
- \$21,001 to \$30,000 per year
- \$31,001 to \$40,000 per year
- \$41,001 to \$50,000 per year
- greater than \$50,000 per year

Guardian/parent Education

Select one

Years of education

- Less than 12 years
- 12 years (high school diploma or GED certificate)
- 13 to 16 years
- more than 16 years

APPENDIX K

DRAFT OF HEALTH HISTORY FORM FOR CHILDREN WITH ASTHMA

ID# _____

Birth date _____

Child's gender

Male Female

Child's Ethnicity

Chose one answer

African America American Indian Asian Hispanic/Latino White
 Other

Birth history

Birth weight _____ (in pounds and ounces)

Choose one answer

1. Did you receive prenatal care Yes No
2. Was your child born: on or close to your due date (1 to 3 weeks before due date)
 4 or more weeks before your due date
 more than 2 weeks after due date
 not sure
3. Did you use any of the following substances during your pregnancy?
 - a. Smoke cigarettes Yes No
 - b. Alcoholic beverages (beer, wine, whiskey) Yes No
 - c. Marijuana Yes No
 - d. Cocaine Yes No
 - e. Prescription drugs such as narcotics or amphetamines Yes No
4. Did you have any of the following during your pregnancy:
 - a. Bladder infection Yes No Not sure
 - b. Vaginal infection Yes No Not sure
 - c. High blood pressure Yes No Not sure
 - d. Gestational diabetes Yes No Not sure
4. Did your child have any problems while in the newborn nursery: Yes No Not sure

If yes please explain:

Child's Health History

Choose one answer

1. Does your child have (or had) any of the following conditions:

- | | | |
|--|------------------------------|-----------------------------|
| a. seizures | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| b. headaches | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| c. allergies to foods/pet dander/trees or grass | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| d. vision problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| e. hearing problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| f. chronic or recurrent ear infections | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| g. speech problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| h. dental cavities | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| i. heart problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| j. pneumonia | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| k. asthma | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| l. stomach problems(such as ulcers, Crohn's disease) | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| m. chronic diarrhea | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| n. chronic constipation | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| o. bladder infections | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| p. muscle, joint, or bone problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| q. eczema | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| r. sickle cell disease | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| s. thalasemia | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| t. leukemia | Yes <input type="checkbox"/> | No <input type="checkbox"/> |

2. Are your child's immunizations up to date Yes No

3. Is your child currently experiencing any health problems (such as colds, stomach virus, eye infection, or skin infection) Yes No

If yes please explain

4. Does your child take medication on a daily basis Yes No
If yes, please identify medications

5. Is your child routinely exposed to cigarette smoke? Yes No

Asthma History

Symptoms

1. Before your child began taking asthma medication, how many times during the week did your child have the following symptoms of asthma?

- a. Coughing
Occasionally/not every week 1 2 3 4 5 6 7

b. Wheezing,
Occasionally/not every week 1 2 3 4 5 6 7

c. Shortness of breath
Occasionally/not every week 1 2 3 4 5 6 7

d. Tight chest
Occasionally/not every week 1 2 3 4 5 6 7

2. Before your child began taking asthma medication, how often did your child have asthma symptoms at nighttime while sleeping?

- | | |
|---|---|
| <input type="checkbox"/> Occasionally but not every month | <input type="checkbox"/> 2 times a week |
| <input type="checkbox"/> 1 time a month | <input type="checkbox"/> 3 times a week |
| <input type="checkbox"/> 2 times a month | <input type="checkbox"/> 4 times a week |
| <input type="checkbox"/> 3 times a month | <input type="checkbox"/> 5 times a week |
| <input type="checkbox"/> 1 time a week | <input type="checkbox"/> 6 times a week |
| | <input type="checkbox"/> Every night |

Exacerbations

3. Before your child began taking asthma medication, how many times during the week did your child have asthma exacerbations that:

a. Require additional medication
Occasionally/not every week 1 2 3 4 5 6 7

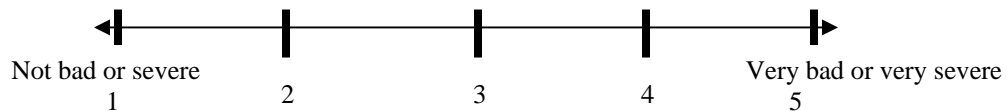
b. Require consulting with his/her healthcare provider
Occasionally/not every week 1 2 3 4 5 6 7

c. Require going to the emergency room
Occasionally/not every week 1 2 3 4 5 6 7

d. Cause him/her to be less active
Occasionally/not every week 1 2 3 4 5 6 7

4. Before your child began taking asthma medication, how long did your child's asthma exacerbations last?
Few hours 1 day 2 days 3 days 4 days 5 days 6 days 7 days

5. How bad are your child's asthma exacerbations? (Please mark on the line)



Medications

6. How many times during the week does your child use his/her short acting beta2 agonist (e.g., Accuneb, Alupent, Proventil, Ventolin, and Xopenex)?
Occasionally/not every week 1 2 3 4 5 6 7

7. Identify asthma medications that your child currently is taking.

Inhaled corticosteroids

- Aerobid
- Azmacort
- Flovent
- Pulmicort

Inhaled long-acting beta2 agonist

- Foradil
- Serevent

Leukotriene antagonist

- Accolate
- Singular

Combination medicines

- Advair

Corticosteroids syrups taken by mouth

- Orapred
- Pediapred
- Prelone

Family History

1. Does anyone in your family have asthma? Yes No

If yes, identify how related to your child.

- | | |
|----------------------------------|--------------------------------------|
| <input type="checkbox"/> brother | <input type="checkbox"/> grandmother |
| <input type="checkbox"/> sister | <input type="checkbox"/> grandfather |
| <input type="checkbox"/> mother | <input type="checkbox"/> aunt/uncle |
| <input type="checkbox"/> father | <input type="checkbox"/> cousin |

2. Does anyone who lives with your child have a chronic condition (such as, asthma, hypertension, diabetes, seizures, heart problems, stomach ulcers, etc) Yes No

If yes, please explain who has the condition and what the condition is.

Family Income

Select one

- less than \$10,000 per year
- \$10,001 to \$20,000 per year
- \$21,001 to \$30,000 per year
- \$31,001 to \$40,000 per year
- \$41,001 to \$50,000 per year
- greater than \$50,000 per year

Guardian/parent Education

Select one

Years of education

- Less than 12 years
- 12 years (High school diploma or GED certificate)
- 13 to 16 years
- more than 16 years

APPENDIX L

PHASE I REVISED HEALTH HISTORY FORM

ID# _____

Child's Birth date _____

Child's gender

Male Female

Child's Race/Ethnicity

Chose one answer

African America American Indian/Alaska Native Asian Hispanic/Latino
 Not Hispanic/Latino Native Hawaiian/Other Pacific Islander White other

Birth history

Birth weight _____ (in pounds and ounces)

Gestational age _____

Choose one answer

1. Did you receive prenatal care Yes No
2. Was your child born: on or close to your due date (1 to 3 weeks before due date)
 4 or more weeks before your due date
 more than 2 weeks after due date
 not sure
3. Did you use any of the following substances during your pregnancy?
 - a. Smoke cigarettes Yes No
 - b. Alcoholic beverages (beer, wine, whiskey) Yes No
 - c. Marijuana Yes No
 - d. Cocaine Yes No
 - e. Prescription drugs such as narcotics or amphetamines Yes No
4. Did you have any of the following during your pregnancy:
 - a. Bladder infection Yes No Not sure
 - b. Vaginal infection Yes No Not sure
 - c. High blood pressure Yes No Not sure
 - d. Gestational diabetes Yes No Not sure
5. Did your child have any problems while in the newborn nursery: Yes No Not sure

If yes please explain:

Child's Health History

Choose one answer

1. Does your child have (or had) any of the following conditions:

- | | | |
|---|------------------------------|-----------------------------|
| a. seizures | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| b. headaches | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| c. allergies to foods/pet dander/trees or grass | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| d. vision problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| e. hearing problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| f. chronic or recurrent ear infections | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| g. speech problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| h. dental cavities | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| i. heart problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| j. pneumonia | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| k. asthma | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| l. stomach problems (such as ulcers, Crohn's disease) | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| m. chronic diarrhea | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| n. chronic constipation | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| o. bladder infections | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| p. muscle, joint, or bone problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| q. eczema | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| r. sickle cell disease | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| s. thalasemia | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| t. leukemia | Yes <input type="checkbox"/> | No <input type="checkbox"/> |

2. Are your child's immunizations up to date Yes No

3. Is your child currently experiencing any health problems (such as colds, stomach virus, eye infection, or skin infection) Yes No

If yes, please explain

4. Does your child take medication on a daily basis? Yes No

If yes, please identify medications

5. Is your child routinely exposed to cigarette smoke daily? Yes No

Family History

1. Does anyone in your family have asthma? Yes No

If yes, identify how related to your child.

- brother
- sister
- mother
- father
- grandmother
- grandfather
- aunt/uncle
- cousin

2. Does anyone who lives with your child have a chronic condition (such as asthma hypertension, diabetes, seizures, heart problems, stomach ulcers, etc) Yes No

If yes please explain who has the condition and what the condition is

Family Income

Select one

- less than \$10,000 per year
- \$10,001 to \$20,000 per year
- \$21,001 to \$30,000 per year
- \$31,001 to \$40,000 per year
- \$41,001 to \$50,000 per year
- greater than \$50,000 per year

Guardian/parent Education

Select one

Years of education

- Less than 12 years
- 12 years (high school diploma or GED certificate)
- 13 to 16 years
- more than 16 years

Complete this section only if your child has asthma

Asthma History

Symptoms

1. Before your child began taking asthma medication, how many days during the week did your

child have the following symptoms of asthma?

a. Coughing

Occasionally/not every week 1 2 3 4 5 6 7

b. Wheezing,

Occasionally/not every week 1 2 3 4 5 6 7

c. Shortness of breath

Occasionally/not every week 1 2 3 4 5 6 7

d. Tight chest

Occasionally/not every week 1 2 3 4 5 6 7

2. Before your child began taking asthma medication, how often did your child have asthma symptoms at nighttime while sleeping?

- | | |
|---|---|
| <input type="checkbox"/> Occasionally but not every month | <input type="checkbox"/> 2 times a week |
| <input type="checkbox"/> 1 time a month | <input type="checkbox"/> 3 times a week |
| <input type="checkbox"/> 2 times a month | <input type="checkbox"/> 4 times a week |
| <input type="checkbox"/> 3 times a month | <input type="checkbox"/> 5 times a week |
| <input type="checkbox"/> 1 time a week | <input type="checkbox"/> 6 times a week |
| | <input type="checkbox"/> Every night |

Exacerbations (asthma attacks)

3. Before your child began taking asthma medication, how many days during the week did your child have asthma exacerbations that:

a. Require additional medication

Occasionally/not every week 1 2 3 4 5 6 7

b. Require consulting with his/her healthcare provider

Occasionally/not every week 1 2 3 4 5 6 7

c. Require going to the emergency room

Occasionally/not every week 1 2 3 4 5 6 7

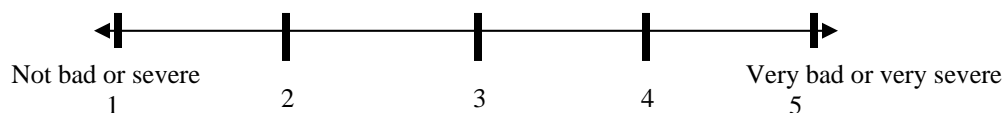
d. Cause him/her to be less active

Occasionally/not every week 1 2 3 4 5 6 7

4. Before your child began taking asthma medication, how long did your child's asthma exacerbations last?

Few hours 1 day 2 days 3 days 4 days 5 days 6 days 7 days

5. How bad are your child's asthma exacerbations? (Please mark on the line)



Medications

6. How many days during the week does your child use his/her short acting beta2 agonist (e.g., Accuneb, Alupent, Proventil, Ventolin, Xopenex)?

Occasionally/not every week 1 2 3 4 5 6 7

7. Identify asthma medications that your child currently is taking.

Inhaled corticosteroids

- Aerobid
- Azmacort
- Flovent
- Pulmicort

Inhaled long-acting beta2 agonist

- Foradil
- Serevent

Leukotriene antagonist

- Accolate
- Singular

Combination medicines

- Advair

Corticosteroids syrups taken by mouth

- Orapred
- Pediapred
- Prelone

APPENDIX M

PHASE II LETTER TO CHILD CARE ADMINISTRATORS

Dear Administrator,

Thank you for the opportunity to meet with you to discuss the possibility of using your institution as a site to recruit volunteers for my study.

I am interested in recruiting children ages 4-5 years, 8-9 years, and 11-12 years to pilot an instrument that measures children's illness knowledge. I would like to send letters (please see attached letter) to the guardians of children within the three age groups to introduce the study and inform parents when I will be on campus. The introduction letters will be distributed according to your preference either mailed directly to child homes or distributed by classroom teachers. About one week after sending the introduction letters, I would like to set-up a table in a central location at your facility on a prearranged date. On this day, I would be available to answer guardians' questions about the study, identify interested guardians, answer questions about the informed consent (see attached informed consent and assent forms) and inform guardians of their and their child's rights before they sign the consent. I will also be available to your teachers prior to child recruitment to explain the purpose and procedures of the study and to ask your teachers to identify the best times during the day for interviews with children to occur. I can meet with teachers either individually or as a group according to your preference.

If guardians and their child choose to participate, then parents will receive two questionnaires including a health history questionnaire and a checklist to evaluate the health history form. It will take guardians about 15 to 25 minutes to complete. Guardians will complete these forms either at your facility after signing the consent form or guardians may take the forms home to complete and return the forms on a prearranged day/time to me at your facility. After a guardian has submitted his/her questionnaires, then I will schedule a day and time for their child to complete the Illness Knowledge Questionnaire and a post administration checklist. Interviews

with children will take 30 to 40 minutes and will be scheduled only during the acceptable times identified by classroom teachers. I will interview children in a prearranged semi-private location at your facility that you identify. In addition, I will be the only person to accompany children during the interviews unless guardians prefer to be present.

I plan to recruit a total number of 48 children (i.e., 16 children from each age group). I will recruit children from your facility and other childcare facilities. I anticipate the recruitment and data collection process to take approximately one to two months.

I appreciate you considering my request. In order to show my appreciation, I would like to provide a health education class, such as cardiopulmonary resuscitation (CPR) for which the PI is qualified to administer, to you and your teachers. Please feel free to call me at 343-0765 (w), 386-3401 (h), or cathy.reisenberg@vanderbilt.edu if you have additional questions or need more information

Sincerely

Catherine E. Reisenberg, PhD(c), APRN, BC, FNP

APPENDIX N

PHASE II INFORMATIONAL LETTER TO CHILD CARE TEACHERS

Dear Teacher,

Hello, my name is Cathy Reisenberg. I am a nursing doctoral student at Vanderbilt University. The administrator of your childcare program has given me permission to invite children from your classroom to participate in my study. The purpose of this letter is to provide you with information about my study and how the study may affect you.

I am developing a questionnaire called the Illness Knowledge Questionnaire to measure preschoolers' knowledge of illness. The purpose of my study is to use the questionnaire on a trial basis. I am interested in recruiting children ages 4-5 years, 8-9 years, and 11-12 years to pilot an instrument that measures children's illness knowledge. I would like to send letters (please see attached letter) to the guardians of children within the three age groups to introduce the study and inform parents when I will be on campus. The introduction letters will be distributed according to your administrator's preference either mailed directly to child homes or distributed by classroom teachers. If your administrator chooses to have letters distributed by you, I will prepare and label the letters and deliver the letters to you at your convenience.

About one week after the letters have been sent to the homes of age appropriate children, I will come to your campus on a pre-arranged date. On this day, I will set-up a table in a central location at your facility making myself available to answer guardians' questions about the study, identify interested guardians, answer questions about the informed consent (see attached informed consent and assent forms) and inform guardians of their and their child's rights before they sign the consent.

If guardians and their child choose to participate, then parents will receive two questionnaires including a health history questionnaire and a checklist to evaluate the health history form. It will take guardians about 15 to 25 minutes to complete the forms. Guardians will complete these forms either at your facility after signing the consent form or guardians may take

the forms home to complete and return the forms on a prearranged day/time to me at your facility. I will emphasize to guardians that they return forms directly to me; therefore, I do not anticipate that you will collect these forms.

After a guardian has submitted his/her questionnaires, then I will schedule a day and time for their child to complete the Illness Knowledge Questionnaire and a post administration checklist. I plan to interview children individually; therefore, I am interested in knowing from you what times during the day are least disruptive for me to bring children out of the classroom. The interviews with children will take 30 to 40 minutes. I will interview children in a prearranged semi-private location at your facility that you identify. In addition, I will be the only person to accompany children during the interviews unless guardians prefer to be present.

I plan to recruit a total number of 48 children (i.e., 16 children from each age group). I will recruit children from your facility and other childcare facilities. I anticipate the recruitment and data collection process to take approximately one to two months.

I appreciate your participation. As a token of my gratitude, I will provide a health education class to you and your colleagues. The specifics of this class will be negotiated with your administrator. Please visit this web site <http://webapps.nursing.vanderbilt.edu/creisenberg/> for additional information about me and my research. Please feel free to call me at 343-0765 (w), 386-3401 (h), or cathy.reisenberg@vanderbilt.edu if you have additional questions or need more information

Sincerely

Catherine E. Reisenberg, PhD(c), APRN, BC, FNP

APPENDIX O

PHASE II LETTER TO PARENTS INTRODUCING STUDY

Dear Parent,

Hello, my name is Cathy Reisenberg. I am a nursing doctoral student at Vanderbilt University. Your child's childcare program has given me permission to invite you and your child to participate in my study. I am developing a questionnaire called the Illness Knowledge Questionnaire to measure preschoolers' knowledge of illness. The purpose of my study is to use the questionnaire on a trial basis.

If you and your child choose to participate, you will each have two questionnaires to complete. You will be asked to complete a health history questionnaire and a checklist to evaluate the health history questionnaire. It will take a total of 15 to 25 minutes for you to complete both questionnaires. You may complete these forms during child drop-off or pick-up times at the childcare center or you may take the forms home. After you have completed your forms, your child will be scheduled for an individual interview and you will be made aware of the interview date. He/she will be asked to answer the Illness Knowledge Questionnaire and then he/she will be asked to answer questions that evaluate the questionnaire. It will take about 30 to 40 minutes for you child to answer both of these questionnaires. Your child will be interviewed by me at the childcare center; however, arrangements can be made if you want to attend the interview.

To join the study, your child must be in one of three age groups; 4 to 5 years old, 8 to 9 years old, or 11-12 years old, and he/she must speak English. In addition, your child must not have any severe learning problems and he/she must not have a vision problem that cannot be corrected with glasses or contacts. Your child will receive a small gift for participating.

I plan to be at your child's care program on the following days: _____ to answer questions and give more details about the study if you and your child decide to join. Please visit

this web site <http://webapps.nursing.vanderbilt.edu/creisenberg/> for additional information about me and my research. If you have any questions before the date listed, please feel free to call me at 343-0765.

Thank you,

Cathy Reisenberg, PhD(c), APRN, BC, FNP

APPENDIX P

ADMINISTRATION OBSERVATION NOTES

ID # _____

Item	P.comment	Nonverbal responses/reactions	Comments
This is Billy. He has a cold. His teacher asks the kids in his class questions about his cold. With each question, you tell me which kid is right.			
1. The teacher asks the kids, "What is a cold?" (Dimension = identify: what it is) 1- A. One kid says, "A cold makes you have a runny nose."			
1-B. Another kid says, "A cold makes your nose grow longer." Which kid is right?			
2. Two other kids answer the teacher's question, "What is a cold?" (Dimension = identify: what it is) 2- A. One kid says "A cold makes you cough."			
2- B. Another kid says, "A cold makes you hiccup." Which kid is right?			
3. The teacher asks the kids, "How did Billy get a cold?" (Dimension = Cause: factors that lead to the illness) 3- A. One kid says, "Billy got a cold by playing with a friend who has a cold."			
3- B. Another kid says, "Billy got his cold by playing with his toys." Which kid is right?			
4. Two other kids answer the teacher's question, "How did Billy get a cold?" (Dimension = Cause: factors that lead to the illness) 4- A. One friend says, "Billy got a cold because cold-germs he could not see got inside his body."			
4- B. Another kid says, "Billy got a cold because he ate ice cream." Which kid is right?			
5. The teacher asks the kids, "What happens to Billy when he has a cold?" (Dimension = Consequence: Effects/symptoms) 5- A. One kid says, "Billy will feel yucky and not want to play."			
5- B. Another kid says, "Billy will feel happy and want to play." Which kid is right?			
6. Two other kids answer the teacher's question, "What happens to Billy when he has a cold?" (Dimension = Consequence: Effects/symptoms) 6- A. One kid says, "Billy will stay at home and sleep."			

6-B. Another kid says, "Billy will stay at home and play outside." Which kid is right?			
7. The teacher asks the kids, "How will Billy get better from his cold?" (Dimension = Cure: How to recover from illness) 7- A. One kid says, "Billy needs medicine."			
7- B. Another kid says, "Billy needs a toy." Which kid is right?			
8. Two other kids answer the teacher's question, "How will Billy get better from his cold?" (Dimension = Cure: How to recover from illness) 8- A. One kid says, "He needs to sleep and drink lots of water."			
8- B. Another kid says, "He needs to play and drink lots of water." Which kid is right?			
Vignette # 2 Asthma This is Annie. She has asthma. Her teacher asks the kids in her class questions about her asthma. You tell me which kid has the right answer.			
9. The teacher asks the kids, "What is asthma?" (Dimension = identify: what it is) 9- A. One kid says, "Asthma makes you burp."			
9-B. Another kid says, "Asthma makes you sick." Which kid is right?			
10. Two other kids answer the teacher's question, "What is asthma?" (Dimension = identify: what it is) 10-A. One kid says, "Asthma can make you burp a lot and makes it hard to breathe."			
10- B. Another kid says, "Asthma can make you cough a lot and makes it hard to breathe." Which kid is right?			
11. The teacher asks the kids, "How did Annie get asthma?" (Dimension = Cause: factors that lead to the illness) 11- A. One kid says, "Annie got asthma playing with a friend who has asthma."			
11- B. Another kid says, "Annie just has it." Which kid is right?			
12. Two other kids answer the teacher's question, "How did Annie get asthma?" (Dimension = Cause: factors that lead to the illness) 12- A. One kid says, "The pumping muscles that move blood from her heart are too tight."			
12- B. Another kid says, "The breathing tubes that bring air to her lungs are too tight." Which kid is right?			
13. The teacher asks the kids, "What happens to Annie when she has an asthma attack?" (Dimension = Consequence: Effects/symptoms) 13- A. One kid says, "Annie needs to stay at home and play."			
13- B. Another kid says, "Annie needs to stay at home and sleep." Which kid is right?			
14. Two other kids answer the teacher's question, "What happens to Annie when she			

has an asthma attack?" 14- A. One kid says, "Annie will have a hard time moving and not want to play."			
14- B. Another kid says, "Annie will have a hard time breathing and not want to play." Which kid is right?			
15. The teacher asks the kids, "How will Annie get better from her asthma attack?" (Dimension = Cure: How to recover from illness) 15- A. One kid says, "Annie needs to eat candy."			
15- B. Another kid says, "Annie needs to take medicine." Which kid is right?			
16. Two other kids answer the teacher's question, "How will Annie get better from her asthma attack?" (Dimension = Cure: How to recover from illness) 16- A. One kid says, "Annie needs to use special lotion that she rubs on her nose."			
16- B. Another kid says, "Annie needs to take special medicine that she breathes into her lungs." Which kid is right?			
Vignette # 3 skinned knee This is Cory. He has a skinned knee. His teacher asks the kids in his class questions about his skinned knee. You tell me which kid has the right answer.			
17. The teacher asks the kids, "What is a skinned knee?" (Dimension = identify: what it is) 17- A. One kid says, "A skinned knee is a boobo that hurts."			
17- B. Another kid says, "A skinned knee is a bumpy rash that itches." Which kid is right?			
18. Two other kids answer the teacher's question, "What is a skinned knee?" (Dimension = identify: what it is) 18- A. One kid says, "A skinned knee is a sore that is red and bleeds."			
18- B. Another kid says, "A skinned knee is a rash that is bumpy and leaks." Which kid is right?			
19. The teacher asks the kids, "How did Cory get a skinned knee?" (Dimension = Cause: factors that lead to the illness) 19- A. One kid says, "Cory fell down."			
19- B. Another kid says, "Cory sat down." Which kid is right?			
20. Two other kids answer the teacher's question, "How did Cory get a skinned knee?" (Dimension = Cause: factors that lead to the illness) 20- A. One kid says, "Cory fell down and the skin on his knee was broke open"			
20- B. Another kid says, "Cory played with a friend with a skinned knee." Which kid is right?			
21. The teacher asks the kids, "What happens to Cory when he has a skinned knee?" (Dimension = Consequence:			

Effects/symptoms) 21- A. One kid says, "Cory will cry."			
21- B. Another kid says, "Cory will laugh."			
Which kid is right?			
22. Two other kids answer the teacher's question, "What happens to Cory when he has a skinned knee?" (Dimension = Consequence: Effects/symptoms)			
22- A. One kid says, "Cory's knee will hurt when he walks."			
22- B. Another kid says, "Cory's knee will itch when he walks." Which kid is right?			
23. The teacher asks the kids, "How will Cory's skinned knee get better?" (Dimension = Cure: How to recover from illness)			
23- A. One kid says, "Put a band aid on Cory's skinned knee to keep it clean."			
23- B. Another kid says, "Put a cast on Cory's skinned knee to keep it clean." Which kid is right?			
24. Two other kids answer the teacher's question, "How will Cory's skinned knee get better?" (Dimension = Cure: How to recover from illness)			
24- A. One kid says, "Clean Cory's skinned knee with soap and water to kill the germs."			
24- B. Another kid says, "Rub Cory's skinned knee with hand lotion and baby powder to kill the germs." Which kid is right?			
Vignette # 4 upset tummy This is Tina. She has an upset tummy. Her teacher asks the kids in her class questions about her upset tummy. You tell me which kid has the right answer.			
25. The teacher asks the kids, "What is an upset tummy?" (Dimension = identify: what it is)			
25- A. One kid says, "An upset tummy makes you feel sick."			
25- B. Another kid says, "An upset tummy makes you scratch your bellybutton." Which kid is right?			
26. Two other kids answer the teacher's question, "What is an upset tummy?" (Dimension = identify: what it is)			
26- A. One kid says, "An upset tummy makes your tummy strong."			
26- B. Another kid says, "An upset tummy makes your tummy hurt." Which kids is right?			
27. The teacher asks the kids, "How did Tina get an upset tummy?" (Dimension = Cause: factors that lead to the illness)			
27- A. One kid says, "Tina saw food that was in the garbage."			
27- B. Another kid says, "Tina ate food that was in the garbage." Which kid is right?			
28. Two other kids answer the teacher's question, "How did Tina get an upset tummy?" (Dimension = Cause: factors that lead to			

<p>the illness) 28- A. One kid says, "Tina saw some old food with that might have germs on it."</p>			
<p>28- B. Another kid says, "Tina ate some food with germs on it." Which kid is right?</p>			
<p>29. The teacher asks the kids, "What happens to Tina when she has an upset tummy?" (Dimension = Consequence: Effects/symptoms) 29- A. One kid says, "Tina will stay in school."</p>			
<p>29- B. Another kid says, "Tina will stay home." Which kid is right?</p>			
<p>30. Two other kids answer the teacher's question, "What happens to Tina when she has an upset tummy?" (Dimension = Consequence: Effects/symptoms) 30- A. One kid says, "Tina will feel happy and want to eat all of her food."</p>			
<p>30- B. The other kid says, "Tina will feel yucky and not want to eat any food." Which kid is right?</p>			
<p>31. The teacher asks the kids, "How will Tina get better from her upset tummy?" (Dimension = Cure: How to recover from illness) 31- A. One kid says, "Tina should eat lots and lots of food."</p>			
<p>31- B. Another kid says, "Tina should eat only little bits of food." Which kid is right?</p>			
<p>32. Two other kids answer the teacher's questions, "How will Tina get better from her upset tummy?" (Dimension = Cure: How to recover from illness) 32- A. One kid says, "Tina needs to play and eat French fries."</p>			
<p>32- B. Another friend says, "Tina needs to rest, and eat crackers." Which kid is right?</p>			

APPENDIX Q

IKQ POST-ADMINISTRATION CHECKLIST

ID#	QUESTION	RESPONSE	
	1. Did any of the questions seem confusing? If YES, which question(s) was confusing?	YES	NO
Comments Q-1			
	2. Did it seem like some of the questions did not have a right answer? If YES, which question?	YES	NO
Comments Q-2			
	3. Did it seem like some of the questions had more than one right answer? If YES, which question?	YES	NO
Comments Q-3			
	4. Were there any words in the question hard to understand? If YES, what words were hard to understand?	YES	NO
Comments Q-4			
	5. Was there any question that you did not want to answer? If YES, which question did you not want to order?	YES	NO
Comments Q-5			
	6. Did any of the questions make you feel bad? If YES, which question and why did it make you feel bad?	YES	NO
Comments Q-6			
	7. Were the questions in the right order? If NO, what was wrong with the order?	YES	NO
Comments Q-7			
	8. Is there any question that should have been included? If YES, what should have been added?	YES	NO
Comments Q-8			
	9. Did my directions make sense? If NO, what did not make sense?	YES	NO
Comments Q-9			
	10. Did the pictures match the words? If NO, what picture did not match the words?	YES	NO
Comments Q-10			

APPENDIX R

HEALTH HISTORY POST-ADMINISTRATION CHECKLIST

ID# _____

QUESTION	RESPONSE	
1. Did any of the questions seem confusing? If YES, which question(s) was confusing?	YES	NO
Comments Q-1		
2. Did it seem like some of the questions did not have a right answer? If YES, which question?	YES	NO
Comments Q-2		
3. Did it seem like some of the questions had more than one right answer? If YES, which question?	YES	NO
Comments Q-3		
4. Were there any words in the question hard to understand? If YES, what words were hard to understand?	YES	NO
Comments Q-4		
5. Was there any question that you did not want to answer? If YES, which question did you not want to order?	YES	NO
Comments Q-5		
6. Did any of the questions make you feel bad? If YES, which question and why did it make you feel bad?	YES	NO
Comments Q-6		
7. Were the questions in the right order? If NO, what was wrong with the order?	YES	NO
Comments Q-7		
8. Is there any question that should have been included? If YES, what should have been added?	YES	NO
Comments Q-8		
9. Did my directions make sense? If NO, what did not make sense?	YES	NO
Comments Q-9		

APPENDIX S

REVISED PHASE II ILLNESS KNOWLEDGE QUESTIONNAIRE
FOR PHASE III

Vignette # 1 Cold



This is Billy. He has a cold. His teacher asks the kids in his class questions about his cold. You tell me which kid has the right answer.

1. The teacher asks the kids, "What is a cold?" (**Dimension = identify: what it is**)
1- A. One kid says, "A cold an illness that makes your nose grow longer."



- 1- B. Another kid says, "A cold is an illness that makes you have a runny nose."



Which kid is right?

2. Two other kids answer the teacher's question, "What is a cold?" (**Dimension = identify: what it is**)
2- A. One kid says "A cold is an illness that makes you cough."



- 2- B. Another kid says, "A cold is an illness that makes you itch."



Which kid is right?

3. The teacher asks the kids, "How did Billy get a cold?" (**Dimension = Cause: factors that lead to the illness**)

3- A. One kid says, "Billy got a cold by playing with a friend who has a cold."



3- B. Another kid says, "Billy got his cold by playing with his toys."



Which kid is right?

4. Two other kids answer the teacher's question, "How did Billy get a cold?" (**Dimension = Cause: factors that lead to the illness**)

4- A. One friend says, "Billy got a cold because cold-germs he could not see got inside his body."



4- B. Another kid says, "Billy got a cold because he ate ice cream."



Which kid is right?

5. The teacher asks the kids, "What happens to Billy when he has a cold?" (**Dimension = Consequence: Effects/symptoms**)

5- A. One kid says, "Billy will feel yucky and not want to play."



5- B. Another kid says, "Billy will feel happy and want to play."



Which kid is right?

6. Two other kids answer the teacher's question, "What happens to Billy when he has a cold?" (**Dimension = Consequence: Effects/symptoms**)

6- A. One kid says, "Billy will stay at home and sleep."



6-B. Another kid says, "Billy will stay at home and play outside."



Which kid is right?

7. The teacher asks the kids, "How will Billy get better from his cold?"
(Dimension = Cure: How to recover from illness)

7- A. One kid says, "Billy needs medicine."



7- B. Another kid says, "Billy needs a toy."



Which kid is right?

8. Two other kids answer the teacher's question, "How will Billy get better from his cold?"
(Dimension = Cure: How to recover from illness)

8- A. One kid says, "Billy needs to sleep and drink lots of water."



8- B. Another kid says, "Billy needs to play and drink lots of water."



Which kid is right?

Vignette # 2 Asthma



This is Annie. She has asthma. Her teacher asks the kids in her class questions about her asthma. You tell me which kid has the right answer.

9. The teacher asks the kids, “What is asthma?” (**Dimension = identify: what it is**)

9- A. One kid says, “Asthma is a disease that makes you burp.”



9-B. Another kid says, “Asthma is a disease that makes you cough.”



Which kid is right?

10. Two other kids answer the teacher’s question, “What is asthma?” (**Dimension = identify: what it is**)

10-A. One kid says, “Asthma is a disease that makes it hard to swallow.”



10- B. Another kid says, "Asthma is a disease that makes it hard to breathe."



Which kid is right?

11. The teacher asks the kids, "How did Annie get asthma?" (**Dimension = Cause: factors that lead to the illness**)

11- A. One kid says, "Annie got asthma playing with a friend who has asthma."



11- B. Another kid says, "Annie just has it."



Which kid is right?

12. Two other kids answer the teacher's question, "How did Annie get asthma?" (**Dimension = Cause: factors that lead to the illness**)

12- A. One kid says, "The pumping muscles that move blood from her heart are too tight."



12- B. Another kid says, "The breathing tubes that bring air to her lungs are too tight."



Which kid is right?

13. The teacher asks the kids, "What happens to Annie when she has an asthma attack?"
(Dimension = Consequence: Effects/symptoms)

13- A. One kid says, "Annie needs to stay at home and play."



13- B. Another kid says, "Annie needs to stay at home and sleep."



Which kid is right?

14. Two other kids answer the teacher's question, "What happens to Annie when she has an asthma attack?"

14- A. One kid says, "Annie will have a hard time moving and not want to play."



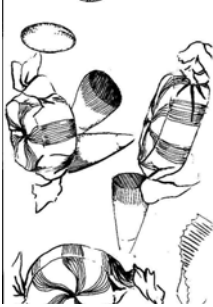
14- B. Another kid says, "Annie will have a hard time breathing and not want to play."



Which kid is right?

15. The teacher asks the kids, "How will Annie get better from her asthma attack?"
(Dimension = Cure: How to recover from illness)

15- A. One kid says, "Annie needs to eat candy."



15- B. Another kid says, "Annie needs to take medicine."



Which kid is right?

16. Two other kids answer the teacher's question, "How will Annie get better from her asthma attack?"
(Dimension = Cure: How to recover from illness)

16- A. One kid says, "Annie needs to go to the doctor's office."



16- B. Another kid says, "Annie needs to go to the teacher's office."



Which kid is right?

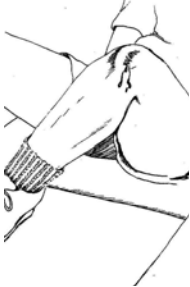
Vignette # 3 skinned knee



This is Cory. He has a skinned knee. His teacher asks the kids in his class questions about his skinned knee. You tell me which kid has the right answer.

17. The teacher asks the kids, "What is a skinned knee?" (**Dimension = identify: what it is**)

17- A. One kid says, "A skinned knee is a booboo that hurts."



17- B. Another kid says, "A skinned knee is a bumpy rash that itches."



Which kid is right?

18. Two other kids answer the teacher's question, "What is a skinned knee?" (**Dimension = identify: what it is**)

18- A. One kid says, "A skinned knee is a sore that is red and bleeds."



18- B. Another kid says, "A skinned knee is a rash that is bumpy and leaks."



Which kid is right?

19. The teacher asks the kids, "How did Cory get a skinned knee?" (**Dimension = Cause: factors that lead to the illness**)

19- A. One kid says, "Cory fell down."



19- B. Another kid says, "Cory sat down."



Which kid is right?

20. Two other kids answer the teacher's question, "How did Cory get a skinned knee?"
(Dimension = Cause: factors that lead to the illness)

20- A. One kid says, "Cory fell down and the skin on his knee was broke open"



20- B. Another kid says, "Cory played with a friend with a skinned knee."



Which kid is right?

21. The teacher asks the kids, "What happens to Cory when he has a skinned knee?"
(Dimension = Consequence: Effects/symptoms)

21- A. One kid says, "Cory will cry."



21- B. Another kid says, "Cory will laugh."



Which kid is right?

22. Two other kids answer the teacher's question, "What happens to Cory when he has a skinned knee?"

(Dimension = Consequence: Effects/symptoms)

22- A. One kid says, "Cory's knee will hurt when he walks."



22- B. Another kid says, "Cory's knee will itch when he walks."



Which kid is right?

23. The teacher asks the kids, "How will Cory's skinned knee get better?"
(Dimension = Cure: How to recover from illness)

23- A. One kid says, "Put a band aid on Cory's skinned knee to keep it clean."



23- B. Another kid says, "Put a cast on Cory's skinned knee to keep it clean."



Which kid is right?

24. Two other kids answer the teacher's question, "How will Cory's skinned knee get better?"
(Dimension = Cure: How to recover from illness)

24- A. One kid says, "Clean Cory's skinned knee with soap and water to kill the germs."



24- B. Another kid says, "Rub Cory's skinned knee with hand lotion and baby powder to kill the germs."



Which kid is right?

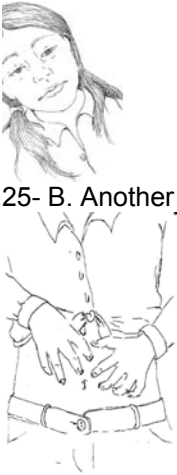
Vignette # 4 upset tummy



This is Tina. She has an upset tummy. Her teacher asks the kids in her class questions about her upset tummy. You tell me which kid has the right answer.

25. The teacher asks the kids, "What is an upset tummy?" (**Dimension = identify: what it is**)

25- A. One kid says, "An upset tummy is an illness that makes you feel sick."



25- B. Another kid says, "An upset tummy is an illness that makes you scratch your bellybutton."

Which kid is right?

26. Two other kids answer the teacher's question, "What is an upset tummy?" (**Dimension = identify: what it is**)

26- A. One kid says, "An upset tummy is an illness that makes your tummy hurt."



26- B. Another kid says, "An upset tummy is an illness that makes your tummy strong."



Which kids is right?

27. The teacher asks the kids, "How did Tina get an upset tummy?" (**Dimension = Cause:**

factors that lead to the illness)

27- A. One kid says, "Tina played with a friend who had an upset tummy."



27- B. Another kid says, "Tina played a game lying on her tummy."



Which kid is right?

28. Two other kids answer the teacher's question, "How did Tina get an upset tummy?"
(Dimension = Cause: factors that lead to the illness)

28- A. One kid says, "Tina saw some old food with that might have germs on it."



28- B. Another kid says, "Tina ate some food with germs on it."



Which kid is right?

29. The teacher asks the kids, "What happens to Tina when she has an upset tummy?"
(Dimension = Consequence: Effects/symptoms)

29- A. One kid says, "Tina will stay home."



29- B. Another kid says, "Tina will stay in school."



Which kid is right?

30. Two other kids answer the teacher's question, "What happens to Tina when she has an upset tummy?"

(Dimension = Consequence: Effects/symptoms)

30- A. One kid says, "Tina will feel yucky and not want to eat any food."



30- B. The other kid says, "Tina will feel happy and want to eat all of her food."



Which kid is right?

31. The teacher asks the kids, "How will Tina get better from her upset tummy?"

(Dimension = Cure: How to recover from illness)

31- A. One kid says, "Tina should eat only little bits of food."



31- B. Another kid says, "Tina should eat lots and lots of food."



Which kid is right?

32. Two other kids answer the teacher's questions, "How will Tina get better from her upset tummy?"

(Dimension = Cure: How to recover from illness)

32- A. One kid says, "Tina needs to play."



32- B. Another kid says, "Tina needs to rest."



Which kid is right?

APPENDIX T

REVISED PHASE II HEALTH HISTORY FORM: WILL USE IN PHASE III

ID# _____

Child's gender

Male Female

Child's Birth date ____/____/____
Month/Date/Year

Child's Race/Ethnicity

Chose one answer

African America American Indian/Alaska Native Asian Hispanic/Latino
 Not Hispanic/Latino Native Hawaiian/Other Pacific Islander White other

Birth history

Birth weight _____ (in pounds and ounces)

Choose one answer

1. Did you receive prenatal care? Yes No
2. Was your child born either on your due date or within 6 days of your due date?
Yes No

If you answered No to the above question:

Was your child born "early" that is a week or more before your due date or was your child born "late" that is a week or more after your due date?

My child was born: Early How many weeks early? _____
Late How many weeks late? _____

3. Did you use any of the following substances during your pregnancy?
- | | | |
|---|------------------------------|-----------------------------|
| a. Smoke cigarettes | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| b. Alcoholic beverages (beer, wine, whiskey) | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| c. Marijuana | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| d. Cocaine | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| e. Prescription drugs such as narcotics or amphetamines | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
4. Did you have any of the following during your pregnancy?
- | | | | |
|-------------------------|------------------------------|-----------------------------|-----------------------------------|
| a. Bladder infection | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Not sure <input type="checkbox"/> |
| b. Vaginal infection | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Not sure <input type="checkbox"/> |
| c. High blood pressure | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Not sure <input type="checkbox"/> |
| d. Gestational diabetes | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Not sure <input type="checkbox"/> |

5. Did your child have any problems while in the newborn nursery: Yes No Not sure

If yes please explain:

Child's Health History

1. Does your child have (or had) any of the following conditions? May choose more than one.

- | | | |
|---|------------------------------|-----------------------------|
| a. seizures | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| b. headaches | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| c. allergies to foods/pet dander/trees or grass | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| d. vision problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| e. hearing problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| f. chronic or recurrent ear infections | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| g. speech problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| h. dental cavities | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| i. heart problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| j. pneumonia | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| k. asthma | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| l. stomach problems (such as ulcers, Crohn's disease) | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| m. chronic diarrhea | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| n. chronic constipation | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| o. bladder infections | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| p. muscle, joint, or bone problems | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| q. eczema | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| r. sickle cell disease | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| s. thalasemia | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| t. leukemia | Yes <input type="checkbox"/> | No <input type="checkbox"/> |

2. Are your child's immunizations up to date? Yes No

3. Is your child currently experiencing any health problems (such as colds, stomach virus, eye infection, or skin infection)? Yes No

If yes, please explain

4. Does your child take medication on a daily basis? Yes No

If yes, please identify medications

5. Is your child routinely exposed to cigarette smoke daily? Yes No

6. Do you discuss health problems or health issues with your child? Yes No

If yes, what health problems or health issues have you discussed with your child?

Family History

1. Does anyone in your family have asthma? Yes No

If yes, identify how related to your child.

- | | |
|----------------------------------|--------------------------------------|
| <input type="checkbox"/> brother | <input type="checkbox"/> grandmother |
| <input type="checkbox"/> sister | <input type="checkbox"/> grandfather |
| <input type="checkbox"/> mother | <input type="checkbox"/> aunt/uncle |
| <input type="checkbox"/> father | <input type="checkbox"/> cousin |

2. Does anyone who lives with your child have a chronic condition (such as asthma hypertension, diabetes, seizures, heart problems, stomach ulcers, etc)? Yes No

If yes please explain who has the condition and what the condition is

Family Income

Select one

- less than \$10,000 per year
- \$10,001 to \$20,000 per year
- \$21,001 to \$30,000 per year
- \$31,001 to \$40,000 per year
- \$41,001 to \$50,000 per year
- greater than \$50,000 per year

Guardian/parent Education

Select one

Years of education

- Less than 12 years
- 12 years (high school diploma or GED certificate)
- 13 to 16 years
- more than 16 years

APPENDIX U

PARENTS' FEEDBACK ON REVISED HHQ

ID# _____

QUESTION	RESPONSE	
1. Is the new questionnaire clear? If NO, what is unclear?	YES	NO
Comments Q-1		
2. Are there any words in the new questionnaire that are hard to understand? If YES, what words are hard to understand?	YES	NO
Comments Q-2		
3. Is the new questionnaire difficult to use? If YES, what makes it hard?	YES	NO
Comments Q-3		
4. Is there any additional changes to the questionnaire that need to be made included? If YES, what should have been added?	YES	NO
Comments Q-4		

APPENDIX V

PHASE III LETTER TO PARENTS/GUARDIANS

Dear Parent,

Hello, my name is Cathy Reisenberg. I am a nursing doctoral student at Vanderbilt University. Your child's after school/summer care program has given me permission to invite you to participate in my study. I am studying preschoolers' knowledge about illness. If your child takes part in the study, he/she will answer an illness knowledge questionnaire. It takes about 20 to 30 minutes for me to ask these questions. To join the study, your child must be in one of three age groups; 4 to 5 years old, 8 to 9 years old, or 11-12 years old, and he/she must speak English. In addition, your child must not have any severe learning problems and he/she must not have a vision problem that cannot be corrected with glasses or contacts. Your child will receive a small gift for participating.

I plan to be at your child's after school/summer care program on the following days _____ to answer questions and give more details about the study if you and your child decide to join. If you have any questions before the date listed, please feel free to call me at 343-0765.

Thank you,

Cathy Reisenberg, PhD(c), APRN, BC, FNP

APPENDIX W

PHASE III INFORMATIONAL LETTER TO SCHOOL TEACHERS

Dear Teacher,

Hello, my name is Cathy Reisenberg. I am a nursing doctoral student at Vanderbilt University. (THE NAME OF THE PRINCIPAL) has given me permission to invite children from your classroom to participate in my study. The purpose of this letter is to provide you with information about my study and how the study may affect you.

I am developing a questionnaire called the Illness Knowledge Questionnaire (IKQ) to measure preschoolers' knowledge of illness. The purpose of my study is to examine the quality of the IKQ including: the cohesiveness of the questions, the accuracy and consistency of the questionnaire to measure illness knowledge and the soundness of it as a measure of illness knowledge. I am interested in recruiting children ages 4-12 years. I would like to send letters (please see attached letter) to the guardians of children to introduce the study and inform parents when I will be on campus. The introduction letters will be distributed according to (NAME OF PRINCIPAL)'s preference.

About one week after the letters have been sent to the homes of children, my research assistants and I will come to your campus on a pre-arranged date. On this day, the my research assistances and I will be available in a central location at your facility to answer guardians' questions about the study, identify interested guardians, answer questions about the informed consent (see attached informed consent and assent forms) and inform guardians of their and their child's rights before they sign the consent.

If guardians and their child choose to participate, then parents will receive one questionnaire including a health history questionnaire. It will take guardians about 10 to 15 minutes to complete the forms. Guardians will complete these forms either at your facility after signing the consent form or guardians may take the forms home to complete and return the forms on a prearranged day/time to me at your facility. I will emphasize to guardians that they return forms directly to me; therefore, I do not anticipate that you will collect these forms.

After a guardian has submitted his/her questionnaire, then I will schedule a day and time for their child to complete the Illness Knowledge Questionnaire. I plan to interview children individually; therefore, I am interested in knowing from you what times during the day are least disruptive for me to bring children out of the classroom. The interviews with children will take 15 to 20 minutes. A member of the research team will interview children in a prearranged semi-private location at your facility. In addition, the research assistant or I will be the only person to accompany children during the interviews unless guardians prefer to be present.

I plan to recruit a total number of 225 children. I will recruit children from your school and other Nashville Dioceses Catholic schools. I anticipate the recruitment and data collection process to take approximately one to two months.

I appreciate your participation. As a token of my gratitude, I will provide a health education class to you and your colleagues. The specifics of this class will be negotiated with your administrator. For additional information about me and my research, please visit this web site <http://webapps.nursing.vanderbilt.edu/creisenberg/> . Please feel free to contact me at 343-0765 (w), 386-3401 (h), or cathy.reisenberg@vanderbilt.edu if you have additional questions or need more information. Sincerely

Catherine E. Reisenberg, PhD(c), APRN, BC, FNP

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