Concepts of Illness in Icelandic Children

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Objective: To investigate the development of illness concepts among healthy Icelandic children.

Methods: Participants were 68 schoolchildren, 6-7, 10-11, and 14-15 years of age, and their parents. Cognitive developmental level and understanding of physical illness were assessed within a Piagetian framework. In addition, illness experience and illness behaviors (Child Illness Behavior Questionnaire) were assessed.

Results: Results were consistent with previous studies in that the development of illness concepts among Icelandic children was consistent with Piaget's theory of cognitive development. No relation was found between illness experience and understanding of illness. A more mature understanding of illness was related to willingness to report the onset of illness.

Conclusions: The results suggest that findings from previous studies may be generalized to a broader population.

Key words: illness concepts; illness experience; illness behavior; cross-cultural; Icelandic children.

Studies of children’s concepts of illness have typically utilized a Piagetian framework and found systematic differences in the way children conceptualize illness that correspond to cognitive maturity and the development of causal reasoning. Within this framework, children at the preoperational level of cognitive development have been found to conceptualize illness in circular, undifferentiated, and magical terms. Children’s illness concepts at the concrete operational level are more specific and concrete and demonstrate a beginning yet limited understanding of the process of getting sick. Children at the formal operational level are able to conceptualize illness in abstract terms and can grasp generalized principles of the mechanisms in illness (Bibace & Walsh, 1980; Brewster, 1982; Perrin & Gerrity, 1981; Redpath & Rogers, 1984; Simeonsson, Buckley, & Monson, 1979). Functionalist alternatives to this stage approach have recently been proposed (see Eiser, 1989); these deemphasize qualitative structural differences between children and adults and focus instead on learning and experience in explaining children’s concepts of illness.

To date, studies that have examined children’s concepts of illness, whether structural or functional in theoretical framework, have been limited in that most used samples drawn only from Caucasian, middle, or upper class populations in the United States. There has been little attention to sociocultural factors, and the question of whether the results found in American-based studies will generalize to different cultural or national settings remains largely unexplored. Although the developmental progression of illness concepts has been assumed to be universal, the generalizability of previous findings is an empirical question.

The present study examined concepts of illness in Icelandic schoolchildren. Icelandic children are similar in socioeconomic status and race to children who have participated in American studies of concepts of illness, and thus might be expected to have
similar concepts about illness. However, there are some potentially important differences. In Iceland, health care is free and readily and equally accessible to all Icelanders. Further, terms related to health and illness are drawn directly from Icelandic, a language that has remained essentially unchanged for over 1,000 years; they are not primarily Latin-based, as in America. This may make these terms simpler and easier to understand for Icelandic children. In addition, all Icelandic schoolchildren attend public schools and receive a single unified curriculum, so differences in illness understanding resulting from formal educational experiences should be minimized. Finally, the climate in Iceland is often very extreme, characterized by constantly changing weather conditions that include severe storms and extreme cold and by frequent earthquakes and volcanic activity. American studies have found that children commonly make causal attributions for illness to weather (this tendency decreases with age; see, for example, Sigelman, Maddock, Epstein, & Carpenter, 1993); this factor might be expected to play a particularly prominent role in the thinking of Icelandic children.

The central purpose of the present study was to describe Icelandic children's concepts of illness within the context of cognitive development. Cross-cultural studies have shown that in Western cultures cognitive maturation progresses invariably (Ashton, 1975); thus, it was hypothesized that developmental changes in illness concepts of Icelandic children would parallel those described in studies of American children. It was specifically hypothesized that understanding of illness would increase with age and that more mature levels of general cognitive development would be associated with more mature understanding of illness. Also of interest was whether the previously described sociocultural and environmental characteristics of Iceland would influence children's concepts of illness. This analysis was exploratory, since Icelandic children's concepts of illness have not been studied, and the all-Icelandic composition of the sample precluded direct comparison with American children. However, we anticipated that Iceland's accessibility of medical care and use of indigenous medical terminology might result in enhanced sophistication of illness concepts. However, we also anticipated that the central role of weather in the Icelandic lifestyle might influence children toward a greater focus on this causal factor; interestingly, if true this would result in less sophisticated illness concepts. Such findings would suggest the specific influence of Icelandic culture on the development of illness concepts.

In addition to cognitive development and culture, experience with illness may influence children's concepts of illness. Most studies have compared ill/hospitalized to healthy children, with conflicting results. Some have found that healthy children's concepts of illness are more mature, while others have found they are less mature or have found no differences (e.g., Brewster, 1982; Cardanang, Folkins, Hines, & Steward, 1979; Simeonsson, Buckley, & Monson, 1979). Few studies have examined the impact of past illness experiences (e.g., frequency, severity) on currently healthy children. Experiencing illness in the family may also affect illness concepts (e.g., Cardanang et al., 1979). To date, there have been few studies of the influence of children's concepts of the frequency or severity of family illnesses, and most have studied siblings of children with a severe illness. In the present study, we assessed severity and frequency of child and family illness experience and hypothesized that experience with illness would be associated with more mature concepts of illness.

Children's concepts of illness are purported to affect illness-related behaviors. However, a direct association between concepts and behaviors has been difficult to establish (Eiser, 1989; Tinsley, 1992). This association has mainly been explored in relation to medical compliance in chronically ill children (Carraccio, McCormick, & Weeler, 1987; Johnson, 1984; Moffatt & Pless, 1983) and not for healthy children dealing with “everyday” illnesses. In a study examining healthy children's reports of their behavior when ill, Campbell (1978) found that older children and boys were less likely to display emotions when ill and more likely to reject the sick role than younger children and girls. Boys were more likely than girls to report feelings of illness to their parents. Campbell (1978) cautioned that since behavior was assessed via child self-report his results may reflect social desirability rather than actual behavior. This is the only study specifically relating illness concepts to illness behavior in healthy children; further study is clearly needed. The present study examined the relationship between concepts of illness and behavior when ill, with parents instead of children responding to Campbell's (1978) child illness behavior questionnaire in order to ob-
tain a more objective assessment. Although lack of previous research makes this examination exploratory, we hypothesized that more cognitively mature children will be more likely to report illness since they will be better able to recognize it, but will also be more likely to reject the sick role and to display fewer emotions related to illness.

**Methods**

**Participants**

Sixty-eight Icelandic schoolchildren from the capital city of Reykjavik, and their parents, participated in the study. There were three age groups: 6–7 years old (1st grade; 12 boys and 11 girls), 10–11 years old (5th grade; 11 boys and 11 girls), and 14–15 years old (9th grade; 12 boys and 11 girls); these ages were selected to represent Piagetian stages of cognitive development typically found in schoolchildren: (1) preoperational/transition to concrete operational, (2) concrete operational, and (3) transition to formal operational/formal operational. Children were recruited from public schools: one elementary level and one middle school. Eighty-three percent of the children who received study materials to bring to their parents returned them, and of those responding, 84% agreed to participate. Although it would be illuminative to know more about those children whose parents did not respond to the study solicitation or who returned consent forms indicating refusal to participate, without informed consent no information could be collected. The average age of the parent responding was 37.6 years (range 26–49). In most cases (82%), the mother responded to the questionnaire. Family background variables (education, income, and socioeconomic status) were categorized according to a coding scheme developed by the Social Science Institute of the University of Iceland (1991a). Sample characteristics were compared to results from four national surveys conducted by the Social Science Institute (1991b). The income of participating families was comparable to that in the national surveys, but the sample deviated from national norms for education and socioeconomic status because this was an urban sample with no farmers or fishermen. One third (33.6%) of parents had obtained higher education (17 years or more), compared to 10.9% in national surveys. There was also a higher percentage of clerical and service workers (34.4%) and specialists and business owners (32%) in this sample as compared to the national surveys (20.9% and 13.8%, respectively). It is safe to say that this sample is representative of urban Icelanders.

**Measures**

**Cognitive Developmental Level.** Cognitive developmental level was assessed by administering a standard set of tasks based on Piagetian concepts of conservation, the interrelationship among parts, physical causality, and abstract thinking. The questions and coding scheme were adopted from Perrin and colleagues (Perrin & Gerrity, 1981; Perrin, Sayer, & Willett, 1991). Tasks were scored blindly by two independent raters with 85% agreement. Scores for each set of tasks were combined to yield a summary score of cognitive developmental level.

**Understanding of Illness.** Understanding of illness was assessed by four interview questions regarding the causes, symptoms, prevention, and treatment of illness (see Table I). Children responded to these open-ended questions and were then asked to explain how the agent or action mentioned in their response had its effect. Each response was probed to ensure that the child’s understanding was fully explored.

**Cognitive Complexity.** Coding of responses was done using Perrin & Gerrity’s (1981) coding scheme, which has been shown to be valid (Sayer, Willett, & Perrin, 1993). Two “blind” raters scored each question with 89% overall interrater agreement (range 85% to 95%). Scores range from 1 to 6 and reflect cognitive complexity rather than factual accuracy. A score of 1 was assigned if the child’s response was inappropriate or if the child didn’t have an answer. A score of 2 corresponds to the preoperational stage of cognitive development characterized by responses circular in nature (e.g., responding to “what makes people get sick?” with “they catch a disease”). Scores of 3 and 4 correspond to the concrete operational stage. In the category “external agents” (assigned a score of 3) children cite concrete, external causes for illness, such as “going out without your hat,” but offer no explanation of how the agents interact with the body to result in, prevent, or cure illness. In “internalization” (assigned a score of 4) children’s responses include not only the causal agent of illness but also the notion of some sort of internalization of the agent (“you breathe in sick people’s germs”) demonstrating an initial connection between cause and effect, al-
though explanations are still concrete and fact-based. The two categories corresponding to the formal operational stage are “interaction” (assigned a score of 5) and “mechanisms” (assigned a score of 6). In “interaction,” responses reveal an initial attempt at describing a general principle, whereas in “mechanisms,” responses don’t simply describe general principles but explain them in abstract terms. Each of the four illness questions was scored separately. Then, a summary score of overall illness understanding was computed by averaging the scores of the four illness questions.

Content Coding. Children’s responses to each illness understanding question were categorized by blind raters using a coding scheme based on primary content (Malcarne, 1993). Interrater reliability was .90. The most frequently endorsed content categories for each illness understanding question can be found in Table II.

Child Illness Behavior. Parents were asked to complete the Child Illness Behavior Questionnaire (Campbell, 1978), which consists of 13 questions regarding their child’s behavior when ill. Parents rated, on 4-point Likert-style scales, their child's activity level when sick, how much their child complains or shows pain or distress, how much their child communicates about illness, and how willing their child is to comply with medical prescriptions and procedures. The Child Illness Behavior Questionnaire yields three dimensions: emotionality, rejection of sick role, and communication of sick role identification. Emotionality scores reflect the display of feelings in an illness situation. Rejection refers to continuing normal activities when ill. Communication refers to whether the child, when ill, readily informs his or her parents.

Severity and Frequency of Illness. Parents were asked to list illnesses their child has experienced, as well as illnesses in the family that they perceived as possibly influencing the child’s understanding of illness. The illnesses of both the child and family members were rated according to a seriousness and chronicity in the following manner: (1) not serious, not chronic: illness not necessarily requiring doctors attention (e.g., colds, stomachaches); (2) serious, not chronic: requiring hospitalization, doctor’s attention, or staying in bed for some time (e.g., childhood diseases, broken bones, tonsillectomy, flu); (3) not serious, chronic: recurring problems, not very debilitating or disruptive, easily controlled through medication or lifestyle (e.g., eczema, allergies, hearing problems); (4) serious, chronic: diseases such as hypertension, ulcers, mental problems, asthma, diabetes etc.; (5) life-threatening and terminal: heart attack, stroke, cancer, and death. The coding scheme thus yielded two scores of disease severity, one for child illnesses and the other for family illnesses. In each case, children were assigned to groups based on their highest disease severity score.

Parents also rated the frequency of their child being ill on a 4-point Likert-style scale yielding a score representing frequency of child illness. Frequency of illness in the family was calculated by tallying up the number of illnesses reported by parents.

Background Information. Parents answered questions regarding gender and age of the parent responding, marital status, family size, level of education and current occupation of the respondent (and spouse if applicable), and monthly income of the household.

Translation. All measures were translated into Icelandic by the author, and translated back to English by a bilingual Icelander. The back-translated version was then compared to the original English version to check for differences. No problems were encountered in the translations, and only minor revisions had to be made in the final Icelandic version.

Procedure
Children were contacted in school and given written descriptions of the study along with questionnaires and a consent form to be taken home to parents. Parents were asked to sign the consent form and complete the Child Illness Behavior and Background Information questionnaires, then return these to the school. Private interviews were then scheduled with individual children. In each school, the same vacant classroom was used as the setting for all interviews conducted at that school. Each interview lasted approximately 40 minutes and was audiotaped. Interviews began with the cognitive-developmental tasks; then children were asked the illness questions. All interviews were conducted by the first author, who is female.

Results
Illness Understanding
The hypotheses that more mature levels of cognitive development and increasing age are associated
with more mature illness understanding were supported. Illness understanding was significantly correlated with both cognitive developmental level (r = .73, N = 68, p < .001) and age (r = .71, N = 68, p < .001).

Comparisons between the three age groups, using one-way analysis of variance (ANOVA), revealed significant differences in overall mean illness understanding scores, F(2,65) = 32.96, p < .001. Scheffé analysis showed that differences between each group were significant (p < .05) with illness understanding scores increasing from the youngest to the oldest age group, supporting a systematic progression in the understanding of illness. The overall mean score for 6–7-year-olds was 3.3 (SD = .62, n = 23), indicating that children in this group have reached the beginning stages of concrete operations in their explanations of illness. For the 10–11-year-olds the overall mean score was 4.1 (SD = .51, n = 22), indicating that children in this group are well into the concrete operational stage, being able to offer explanations of illness that are characterized by internalization. The overall mean score for 14–15-year-olds was 4.6 (SD = .53, n = 23), indicating that children’s responses are in a transitional stage between concrete operational and formal operational stages.

The effects of gender and socioeconomic status (i.e., income, level of education, and social class) on illness understanding were analyzed and found to be nonsignificant. In addition, cognitive developmental level was not found to be affected by gender and socioeconomic status.

When the mean scores for individual questions are compared some interesting differences emerge (see Table I). Children's responses to the questions “What makes you sick?” and “How do you know when you are sick?” were consistently scored higher than their responses to the other two questions regarding prevention and treatment of illness. Paired t tests showed that children's scores on understanding of illness causation were significantly higher than their scores for treatment, t(67) = 5.86, p < .001, and prevention, t(67) = 7.07, p < .001. Similar effects were observed for children's scores on understanding of illness symptoms, which were significantly higher than scores for understanding of treatment, t(67) = 4.84, p < .001, and prevention, t(67) = 6.45, p < .001. This suggests that prevention and treatment of illness were more poorly understood than the causes and symptoms of illness for all age groups.

Developmental trends were also seen in the content of the responses, as described below.

**Illness Causality.** The 6–7-year-old children were most likely to cite cold weather and not dressing appropriately as causes of illness, while those 10–11 and 14–15 years old placed more emphasis on germs and not taking care of oneself (see Table II). These two categories, germs (χ² [2, N = 68] = 13.72, p < .001) and not taking care of oneself (χ² [2, N = 68] = 7.74, p < .05) were cited significantly more often by the two older age groups. There was a shift away from citing cold weather as a cause of illness in the oldest age group, with this group citing this category significantly less often than the two younger age groups (χ² [2, N = 68] = 6.14, p < .05). In addition, among the 14–15-year-olds other factors were mentioned as the causes of illness, such as the immune system, emotions, heredity, and other environmental factors.

**Symptoms of Illness.** The youngest children were more likely to depend on objective, externally visible signs of illness as cues, while the older children gave answers pertaining to more abstract somatic feelings and relative differences in feeling states (χ² [2, N = 68] = 7.53, p < .05) (see Table II). The same trend was found for specific feeling states, with a marked increase in citing specific feeling states between the age groups (χ² [2, N = 68] = 18.14, p < .001). Only the oldest group mentioned that psychological factors could indicate sickness.

**Treatment.** Children of all ages and developmental levels cited medical intervention most fre-
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Table 2. Percentage Naming Most Common Response Category

<table>
<thead>
<tr>
<th>Category</th>
<th>Total sample</th>
<th>6-7 yrs</th>
<th>10-11 yrs</th>
<th>14-15 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Caution</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germs</td>
<td>64.7</td>
<td>39.1</td>
<td>63.6</td>
<td>91.3*</td>
</tr>
<tr>
<td>Not taking care of self (poor health habits, overindulgence)</td>
<td>35.3</td>
<td>13.0</td>
<td>50.0</td>
<td>43.5*</td>
</tr>
<tr>
<td>Cold weather (inappropriate clothing, getting too cold)</td>
<td>33.8</td>
<td>47.8</td>
<td>40.9</td>
<td>13.0*</td>
</tr>
<tr>
<td>Environment, other than cold (being outside too long)</td>
<td>22.1</td>
<td>17.4</td>
<td>18.2</td>
<td>30.4</td>
</tr>
<tr>
<td><strong>Symptoms</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General feeling state (feel ill)</td>
<td>69.1</td>
<td>47.8</td>
<td>77.3</td>
<td>82.6*</td>
</tr>
<tr>
<td>Objective signs (cough, hot forehead)</td>
<td>58.8</td>
<td>52.2</td>
<td>68.2</td>
<td>56.5</td>
</tr>
<tr>
<td>Localized feeling (stomach aches, head throbs)</td>
<td>44.1</td>
<td>34.8</td>
<td>54.5</td>
<td>43.5</td>
</tr>
<tr>
<td>Specific feeling (feel pain, dizzy)</td>
<td>42.6</td>
<td>8.7</td>
<td>50.0</td>
<td>69.6**</td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical (doctor, medicine)</td>
<td>70.6</td>
<td>69.7</td>
<td>59.1</td>
<td>82.6</td>
</tr>
<tr>
<td>Stay inside</td>
<td>39.7</td>
<td>34.8</td>
<td>45.5</td>
<td>39.1</td>
</tr>
<tr>
<td>Stay in bed (under covers)</td>
<td>36.8</td>
<td>43.5</td>
<td>45.5</td>
<td>21.7</td>
</tr>
<tr>
<td>Take care of yourself (rest, no strain)</td>
<td>32.4</td>
<td>4.3</td>
<td>36.4</td>
<td>56.5**</td>
</tr>
<tr>
<td><strong>Prevention</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment/weather (avoiding cold, bad weather)</td>
<td>75.0</td>
<td>87.0</td>
<td>86.4</td>
<td>52.2*</td>
</tr>
<tr>
<td>Nutritional (eat healthy, avoid junk food)</td>
<td>29.4</td>
<td>4.3</td>
<td>41.0</td>
<td>43.5**</td>
</tr>
<tr>
<td>Avoid contamination (avoid sick people, wash hands)</td>
<td>26.5</td>
<td>0.0</td>
<td>36.4</td>
<td>34.8</td>
</tr>
<tr>
<td>Take care of yourself (lead a healthy lifestyle)</td>
<td>22.1</td>
<td>8.7</td>
<td>22.7</td>
<td>43.5**</td>
</tr>
</tbody>
</table>

*Chi-square analysis significant at .05 level.
**Chi-square analysis significant at .001 level.

quently (see Table II). However, self-care was cited more often by older children. There was a significant difference between age groups in the frequency of citing this category ($\chi^2 [2, N = 68] = 14.54, p < .001$), and of the frequency of citing nutrition as a treatment ($\chi^2 [2, N = 68] = 6.47, p < .05$). In general there was a shift from describing specific treatments to describing treatment in more general terms (e.g., staying in bed as opposed to getting rest).

**Prevention.** Younger children gave specific and rigid rules about preventing illness, such as wearing clothing to stay warm and avoiding poor weather conditions (see Table II). While environment/weather was also the most common response in the two older age groups, it was cited significantly less often in the oldest age group ($\chi^2 [2, N = 68] = 9.66, p < .01$). Older children were more likely to emphasize the general idea of keeping warm, as well as maintaining good nutrition and avoiding contamination. The 6–7-year-olds rigidly listed specific articles of clothing you should wear, whereas the 10–11-year-olds were more prone to simply state that wearing warm clothes and staying inside would keep you from getting sick. The 14–15-year-olds usually emphasized staying warm and dressing according to the weather. There was a shift with age from mentioning concrete rules to more abstract responses that described general health practices.

**Illness Experience**

**Children.** Children's illnesses were coded according to their severity and children were assigned to groups based on their highest severity score. Sixty-six percent of the children were reported to have experienced serious but not chronic illness and 18% had experienced illnesses that were neither serious nor chronic. Very few children had experienced serious and chronic, or chronic but not serious illnesses, and only one child had experienced a life-threatening disease. Due to the small number of children in these latter groups, only children in the groups "serious but not chronic" and "neither serious nor chronic" were compared on overall illness understanding. An ANOVA comparing these two groups was not significant, $F(1,56) = .322, p > .05$.

With regard to frequency of illnesses experienced by children, the mean number reported by parents for their children was 3 ($SD = 1.7, N = 68$; range: 1–8). Most (84%) parents reported their child "rarely" becomes sick and 13% estimated their child...
becomes sick “sometimes.” Only one child was reported to become sick “often,” and one child was reported to be sick “all the time.” Frequency of illness did not correlate significantly with illness understanding scores (r = .12, p > .05).

**Family.** Sixty-six percent of parents reported family illnesses that they believed would have an impact on their child’s understanding of illness. The reported illnesses were mainly life-threatening (66%), and serious/chronic (26%). Since so few families reported illnesses meeting the other three classifications, only children whose families had experienced life-threatening or serious/chronic illnesses were compared on overall illness understanding. An ANOVA comparing these two groups was not significant, F(1,34) = .013, p > .05. The mean number of family illnesses reported was 2.2 (SD = 1.2, n = 38; range: 1–7). Frequency of family illness did not correlate significantly with overall illness understanding (r = -.25, p > .05).

In sum, the hypothesis that illness experience (frequency and severity of illnesses experienced by child and family) would be associated with more mature illness concepts was not supported.

**Child Illness Behavior**

The association between illness understanding and child illness behavior was explored by examining how the three dimensions of child illness behavior (emotionality, rejection, and communication) related to illness understanding (overall and four individual question scores). Of 15 relationships tested, one was significant. Children’s responses to the question regarding how someone knows when they are sick were significantly correlated with their scores on the communication dimension of child illness behavior (r = .32, p < .01). This suggests that children with a more mature understanding of the symptoms of illness report the onset of illness to their parents more promptly than children with a less mature understanding of the symptoms of illness.

Analysis of variance showed that the three dimensions of child illness behavior did not differ significantly for age groups or by gender. In addition, the effects of socioeconomic status on the three dimensions of child illness behavior were analyzed and found to be nonsignificant. Further analysis examined the relationship between the three dimensions of child illness behavior and age, cognitive development, and illness experience. Emotionality was found to be significantly negatively correlated with age and cognitive developmental level. Younger children scored higher on emotionality (r = -.29, p < .05) as did less cognitively mature children (r = -.35, p < .01). No significant relationship was found between the three dimensions of child illness behavior and illness frequency.

**Discussion**

This study demonstrates a systematic progression in Icelandic children’s understanding of illness consistent with Piaget’s theory of cognitive development. The correlation between general cognitive developmental level and illness understanding for Icelandic children was comparable to the correlation found in Perrin and Gerrity’s (1981) methodologically similar study of healthy American children. Similarly, Icelandic children’s scores for illness understanding, while appearing slightly higher, were clearly within the same range of scores obtained by American children of similar ages in Perrin and Gerrity’s study. Also consistent with Perrin and Gerrity’s results was the present finding that prevention and treatment of illness were more poorly understood than the causes and symptoms of illness; this was true for all age groups. These findings support the generalizability to other national or cultural settings of their findings regarding the development of healthy children’s illness concepts, or at least support the generalizability of their findings to settings with similar socioeconomic characteristics—the Icelandic sample was similar to previously studied American samples in race, income, and education levels of the participating families. It is perhaps important to note that our results are intended to be descriptive rather than prescriptive; responsiveness to education was not measured in the present study, and some recent findings have suggested that children may not be as limited in their ability to develop more sophisticated understanding of illness as traditional stage conceptualizations would suggest (see, for example, Sigelman et al., 1996).

Content of responses was examined both to provide descriptive information on Icelandic children’s concepts and to allow investigation of whether concepts might be culturally influenced. Of particular interest was whether the harsh conditions characterizing the Icelandic physical environment would be reflected prominently in children’s concepts. Certainly the major themes evident in Icelandic children’s responses about the causes, treatment,
child and the family were taken into account. The severity and chronicity of illness in both the healthy children in an attempt to approach understanding, with conflicting results. This study supported. Previous studies have mainly examined the relation between illness experience and illness hospitalization or chronic illness children in regard to this issue from a different angle, and factors such as protecting the effect on understanding of illness was not included. A hypothesis that illness experience would have a facilitating effect on understanding of illness was not included. A direct comparison between Icelandic children and those from other countries with more temperate physical environments would directly test whether Icelandic children place greater emphasis on environmental concerns; this was beyond the scope of the present study. While our results suggest a similar pattern of findings to those obtained by studies conducted in other Western countries, it would be interesting for future research to investigate the weather- and environment-related content of the illness concepts of children who are raised in very mild and consistent climates where concerns about the physical environment play a less important role in everyday lifestyle. It is also interesting to consider how difficult or futile efforts to prevent illness may seem to younger Icelandic children who believe such prevention depends on protection from weather. It may be particularly important for children in harsher physical environments to be provided with education in alternative means of illness prevention.

No relation was found between experience with illness and understanding of illness; thus, the hypothesis that illness experience would have a facilitating effect on understanding of illness was not supported. Previous studies have mainly examined hospitalized or chronically ill children in regard to the relation between illness experience and illness understanding, with conflicting results. This study utilized healthy children in an attempt to approach this issue from a different angle, and factors such as the severity and chronicity of illness in both the child and the family were taken into account. The results suggest that experience with illness does not affect the illness concepts of healthy children, having neither a beneficial nor detrimental effect on the sophistication of illness understanding. These results could be due to the limited range of experience represented in the sample; the majority of children in this sample had not experienced serious and chronic illnesses. "Everyday" illnesses, such as colds and flu, may be such common experiences for children that any influence they have on children's concepts of illness is universal. Frequency of illness experience was also unrelated to illness concepts; again, since most children had only experienced mild illnesses, it is likely that there is a ceiling effect to the learning about illness that results from experiencing cold or flu. This learning is not likely to be significantly enhanced by repeated experiences that are highly similar.

The present study also examined how concepts of illness manifest in actual behavior of children when sick, as described by their parents. Overall, child illness behaviors were not related to illness understanding; this finding is generally consistent with previous studies that have failed to find a direct relationship between illness understanding and behavior. However, a direct relationship was found between level of understanding of illness symptoms and children's communication, suggesting that children with more mature understanding of symptoms of illness report the onset of illness to their parents more promptly than do children with less mature understanding. This finding optimistically suggests that efforts to enhance children's conceptual understanding of illness might be related to positive behavioral change. However, the overall pattern of nonsignificant relationships between concepts and behavior found in the present study underscores the need to look beyond direct relationships and toward potentially important mediating and moderating variables, such as motivation (Eiser, 1990).

This study has several limitations. The sample size was relatively small. The youngest age group was at a transitional stage between preoperational and concrete operations; thus, no comment can be made on the concepts of preoperational children who have not yet reached school age. All participants lived in urban settings and were middle to upper middle class (although, in fairness, this is generally representative of the population of Iceland). The data are cross-sectional; longitudinal data would allow an examination of the develop-
ment of illness concepts and behavior in children. Finally, since no children from another culture or country were included, no direct comparisons could be made. However, despite these limitations the study provides important descriptive data on the illness beliefs and behavior of children in another nation and evidence for the general applicability of results previously found in American-based studies to another cultural setting.

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