

Childhood Knowledge of Recovery from Serious and Non-Serious Illness

By

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Abstract

While much is known regarding childhood understanding of illness acquisition, little research has examined what children understand about the recovery process. The present studies seek to explore what behaviors children view as important factors leading to recovery from serious and non-serious illness (cancer and colds). We found that children endorse biological behaviors over sociomoral behaviors for both illnesses. Additionally, while children do understand that mere association with illness does not lead to recovery, they struggle with differentiating between curative and preventive behaviors. Children did differentiate between cold and cancer in some, but not most, instances. The results of these studies have implications for the future of health education, as well as for treatment modalities for children diagnosed with serious illness.

Childhood Knowledge of Recovery from Serious and Non-Serious Illness

Although much research has examined children's understanding of illness, what children understand about the healing process remains relatively unexplored. The present study seeks to understand what children already view as important in regard to recovery from serious and non-serious illness. By understanding what children already know, healthcare professionals will be better equipped to explain treatment and recovery to children. An understanding of this area will also result in better-informed health education programs for healthy children learning about recovery behaviors.

Previous research has demonstrated the importance of providing information to children regarding forthcoming treatment (Hayes, Janniste, & von Baeyer, 2007). In addition to creating realistic expectations for the recovery process, transmitting information to pediatric patients has been shown to have numerous benefits such as decreasing fear and anxiety, increasing belief in self-coping mechanisms, and helping improve treatment outcomes and recovery times (Barnard, Clear, & Walker, 2002). Information becomes even more valuable when paired with constructive advice regarding positive coping strategies and behaviors (Melamed & Ridley-Johnson, 1988). Furthermore, parents of ill children report decreased levels of stress when their children are well-informed about upcoming treatment. Providing children with accurate, age-appropriate information allows parents to offer better support during treatment, feel better about outcome, and spend less time worrying about what to tell their children (Johnston, Kenward, Shirley, & Thompson, 1998).

Findings such as these illuminate the importance of understanding what children know about recovery. By working in the context of what children already know, existing information can be strengthened and new information can be introduced in a familiar fashion. The current studies seek to address the questions surrounding preexisting childhood knowledge of recovery behaviors. In order to contextualize childhood knowledge of recovery, it is important to review

childhood knowledge of illness acquisition and transmission, as well as script-based theories involving illness and medicine.

Biological understanding of illness and recovery among healthy children

Past research has shown that healthy children have a fairly strong understanding of the biological nature of illness. Recent studies have shown that children do endorse biological causes for disease acquisition (e.g., germs; Kalish, 1996), although they often fail to understand the specific mechanisms by which these causes exert their effects. For example, they know little regarding how germs specifically lead to illness (Au, DeWitt & Romo, 1999). Additionally, while children may say that germs cause disease, they may not know that illnesses often take time to develop (Gelman & Raman, 2007). 4- and 5- year- old children also can identify behavioral factors that lead to illness, such as weakness due to poor eating habits (Hatano & Inagaki, 1999). As children age, ideas about illness become more differentiated, and children begin to appreciate differences among illnesses (Myant & Williams, 2005). However, they continue to hold misconceptions, even regarding familiar illnesses. For example, young children seem to understand key factors related to definition, prevention, and recovery from colds, while maintaining that colds come from cold weather as opposed to germs (Myant & Williams, 2005). This highlights the somewhat incomplete biological understanding possessed by young children – although they understand the role of the body in acquiring an illness, their understanding is also influenced by personal experience, such as getting colds in the winter, and parental advice, such as wearing a coat to prevent a cold (Myant & Williams, 2005). Furthermore, even as overall specific understandings increase, children continue to possess different levels of understanding for different illnesses (Myant & Williams, 2005). For example, children appear more familiar with “common” ailments, such as the chicken pox, than with ailments that affect only certain people, such as asthma (Myant & Williams, 2005).

Additionally, young children have a tendency to overextend the notion of contagion, believing that noninfectious diseases can be spread in the same fashion as infectious diseases (Kister & Patterson, 1980; Bares & Gelman, 2008). When healthy children discover that serious illness is not contagious, they appear much more willing to interact with their recovering peers (Benner, 1991). By furthering our understanding of what children know and do not know about recovery, educators and medical professionals can target what is unknown, thus creating better-informed interventions and educational programs for patients and healthy children alike.

Although young children do have some understanding of illness as biologically based (Gelman, Notaro, & Zimmerman, 2002), 5-year-olds also tend to endorse social causes for illness. Past research has shown that young children tend to select sociomoral explanations for illness acquisition, often in an inverse relationship to their endorsement of biomedically conventional explanations (Kister & Patterson, 1980). Even when children choose biological cues over social cues, they still at times endorse immanent justice beliefs, such as the idea that a child who pinches a friend may get sick over a child who does not pinch (Hatano & Inagaki, 1999).

Less research has focused on children's understanding of illness recovery, as opposed to the causes of illness. Available evidence suggests that contracting an illness and recovering from an illness may be understood differently. For example, although preschool children tend to assume that illnesses can be contracted instantaneously, they understand that recovery from illness is not instantaneous and may take several days or longer (Gelman & Raman, 2007). Furthermore, curing an illness may seem harder to a child than acquiring one (Gelman & Raman, 2007). However, while children may understand that there is a longer timeline associated with curing an illness, this is not reflective of any understanding of the factors that impact the healing process. This issue of healing still requires more research.

Schema and scripts

Past research has shown that understanding of illness is not based entirely on age, but rather is shaped by an interaction between normative development and past experience (Crisp, Goodnow, & Ungerer, 1996). In a health context, this suggests the importance of making available information that fits into an already existent framework (Johnson, 1999). Additionally, work by Johnson (1999) has shown that an accurate assessment of a medical situation, taking into consideration the upcoming procedure and one's own coping abilities, is important in children's understandings of health. Accurate assessment also helps minimize differences between expectations and actual experience, which can enable better preparation for medical procedures (Johnson, 1999).

Children have been found to have certain medically specific schema (mental frameworks of related concepts used to organize knowledge) and scripts (more detailed, ordered, and context-specific schema). Schemata shaped by past experience and outside information (such as that obtained from a physician or nurse), can be extremely useful in decreasing anxiety and future stress if they are correct. A correct schema is formed when a child remembers positive aspects of past medical experiences, such as successful coping behaviors (Chen, Craske, & Katz, 1999). The creation of correct, positive schemata is especially important for children experiencing serious illness for the first time, as children with no experience will activate whatever schema is available to them (Hergenrather & Rabinowitz, 1991). For example, a child who has gotten shots at the doctor's office may assume that, upon hospitalization, he will receive many shots. Furthermore, schema can also be shaped by explicit information, such as in books, and implicit information, such as a mother's gasp when given a diagnosis. Providing accurate information can correct wrong ideas about specific hospital visits, shape expectations and coping behaviors, and positively impact temperament and coping behaviors (Hayes, Jaaniste, & von Baeyer, 2007).

Younger children are especially vulnerable to schematic generalizations, but research has shown that even children as young as 4-7 can be taught specific things about particular illnesses and treatment, through interventions such as age-appropriate storybooks or group discussions (Binnie & Williams, 2002). Children as young as 5 are able to generate accurate scripts associated with visiting the doctor, and this ability only increases with age (Eiser, 1989). Preparatory information in relation to specific procedures can increase accuracy of scripts.

Hayes, Jaaniste, and von Baeyer's (2007) information provision model synthesizes schema/scripts with illness experience, introducing an ideology in which past experiences and exposure to information influence health schemata. Accordingly, children with illness experience may have a more sophisticated initial understanding and could potentially benefit from more information than a child with no baseline knowledge (Crisp, Goodnow & Ungerer, 1996; Hayes, Janniste, & von Baeyer, 2007). Research has shown that treatment outcome is thus influenced by a combination of health schema, coping style, and an appraisal of the current situation (Hayes, Janniste, & von Baeyer, 2007).

When dealing with stressful situations, children tend to have multifaceted responses, spanning cognitive, physiological, and developmental realms. For especially young children, preparatory information is most successful if it focuses on concrete, tangible events (Harbeck, Peterson & Weber, 1993). Examples of this include details specifically related to what will happen during the procedure, and sensory information pertaining to what things will look and smell like. Furthermore, neglecting to provide specific details yet offering "blanket" reassurances, such as "it will all be great!" can draw attention to the negative aspects of a medical procedure and increase agitation (Blount, Cohen, & Manimala, 2000).

Current Research

The current studies seek to understand what factors children endorse as effective in terms of recovery from colds and from cancer. Building upon previous research (Bares & Gelman,

2008; Myant & Williams, 2005), the studies will explore whether children select different recovery behaviors for cancer and for colds. Additionally, the studies will help to determine whether children understand the biological processes involved in recovery, or whether they simply activate associative scripts based on previous health-related experience (Au, DeWill & Romo, 1999; Gelman & Raman, 2007; Hergenrather & Rabinowitz, 1991; Kalish, 1996). By better understanding children's baseline knowledge of the recovery process, health educators will be better able to teach children biologically correct information and correct false beliefs. Healthcare professionals will also be better equipped to design age-appropriate treatment modalities. Additionally, healthcare professionals and caregivers will be able to explain particular afflictions to children in a context that they already understand. This is of utmost importance in helping children cope with and comprehend serious illness.

Study 1

The major question of interest is whether children endorse biological behaviors or psychosocial behaviors as important to the recovery process for cancer and colds. I hypothesize that children will endorse biological categories over non-biological categories for both the cancer and the cold vignettes, but will not entirely reject the non-biological categories.

Method

Participants. Thirty-four 5-year-olds were interviewed in a ten-minute session that took place during their library period (17 males, 25 females; $M_{\text{age}} = 5.8$, age range: 5.2 – 6.6 years). Permission letters were sent home to all parents of kindergarteners at a small elementary school; only those whose parents returned consent forms were eligible to participate. The participants were primarily European American and were residents of a small Midwestern suburb.

Materials. Two tasks were created to discover what children understand about recovery from serious and non-serious illness: a yes/no task and a forced-choice task (with the yes/no task presented first). The experimenter began with a short vignette about a child affected with a cold

or with cancer (see Appendix A for vignettes). Following the vignette, children were asked a series of yes/no questions, asking whether the main character should engage in each of 4 activities in order to recover, including 2 medical and 2 social responses. The medical responses consisted of the following: “should Jake (Jessica) stay home from school to nap and eat a lot of fruits and vegetables?” (eating/rest) and “should Jake (Jessica) take all of the medicine that the doctor gave him (her)?” (medical). The social responses consisted of the following: “should Jake (Jessica) give his (her) favorite toy to his (her) friend who is very sad?” (immanent justice) and “should Jake (Jessica) get a lot of hugs from his (her) mommy?” (sociomoral).

This yes/no task was followed by a forced-choice task, in which children were asked a series of 6 questions, each involving a forced choice between two options involved in recovery (see Table 1 for forced-choice questions). Four of these forced-choice questions included a comparison of a medical option with a social option (e.g., taking medicine vs. getting hugs from mom), one was a comparison of two medical options (e.g., taking medicine vs. getting rest and eating fruits and vegetables), and one was a comparison of two social options (e.g., getting hugs from mom vs. giving a toy to a sad friend). Children were asked which option would make the hypothetical character recover more quickly.

Procedure

Participants were presented with the tasks described in the “Materials” section above. Children were matched to vignettes about children of their same gender; within gender, assignment to the cold or cancer vignette was random. To engage students in the session, vignettes were accompanied by cartoon-like images (e.g., an image of a sick child, an image of watermelon and bananas for fruit). The order of questions in both scenarios was counterbalanced to ensure no bias towards medical or social options. Children were interviewed individually during school hours at their elementary school. Upon hearing the entire vignette, children were asked yes/no questions involving various behaviors that could be viewed as important for

recovery. Upon answering “yes” or “no,” children were asked a free response question in which they were asked to explain their selection. After completing the yes/no section, children were asked a series of questions involving a forced-choice between two potential recovery behaviors.

Results

Yes/No Task. We assigned a score of 1 if participants said that the behavior in question would help the hypothetical character recover, and a score of 0 if they said that the behavior would not help (see Table 2 for means). We conducted a series of one-sample t-tests in order to determine whether the selections made by participants were significantly different from chance, test value = .5. The results indicated that children endorsed “stay home from school to nap and rest and eat” as the only behavior that was significantly greater than chance, $M = .91$ out of 1, $SD = .29$, $t(32) = 8.05$, $p < .05$. Interestingly, selection of “take all of the medicine that the doctor gave him/her” was not significantly greater than chance.

We then created summed scores for the four behaviors, collapsing the question categories eating/rest and medicine into a “medical” score, and the question categories immanent justice and sociomoral into a “social” score. Children endorsed the medical choices significantly above chance, $M = 1.52$ out of 2, $SD = .67$, $t(4.44)$, $p < .01$, but did not differ from chance in their endorsement of the social behaviors, $M = 1.06$ out of 2, $SD = .86$, $t(.40)$, $p = .69$.

We also conducted an independent samples test to determine whether participants’ endorsement of medical or social behaviors differed by illness type. Results indicated that participants were more likely to endorse medical behaviors when the hypothetical character had a cold ($M = 1.76$ out of 2, $SD = .44$, $t(31) = 2.37$, $p = .01$), than when the hypothetical character had cancer ($M = 1.25$ out of 2, $SD = .77$, $t(23.38) = 2.33$, $p = .01$).

We conducted a 2 (question type: medical, social) x 2 (story type: cold, cancer) ANOVA, with question type as a within-subjects factor and story type as a between-subjects factor. The results indicated a significant effect of question type, $F(1, 30) = 5.35$, $p < .05$,

indicating that children endorsed the medical cure more than the social cure. Furthermore, there was a trend for a question type x story type interaction, $F(1,30) = 3.87, p = .059$. Post-hoc Bonferroni tests indicated that children significantly more often endorsed medical behaviors when the hypothetical character has a cold than when he/she has cancer.

Forced-Choice Task. Participants were presented with a series of questions asking which of two behaviors would help the hypothetical character get better faster (see Table 3 for means). We assigned a score of 0 to the medical selection and a score of 1 to the social selection. We conducted a series of one-sample t-tests in order to determine whether the selections made by participants were significantly different from chance, test value = .5. Results indicated that children endorsed the following behaviors significantly above chance, $p < .01$: eating/rest over sociomoral ($M = .12$ out of 1, $SD = .33, t(33) = -6.82$), medicine over immanent justice ($M = .15$ out of 1, $SD = .36, t(33) = -5.73$), eating/rest over immanent justice ($M = .10$ out of 1, $SD = .29, t(32) = -8.05$), and medicine over sociomoral ($M = .18$ out of 1, $SD = .39, t(33) = -4.88$). Comparisons within categories (medical vs. medical, social vs. social) were also presented to participants, but were not considered in this analysis because no predictions were made in regard to these comparisons.

We created a summed score variable of “social vs. medical” by collapsing the participants’ responses on the four aforementioned questions comparing social and medical behaviors. Scores ranged from 0 (all medical selections) to 4 (all social selections). We conducted a one-sample t-test in order to determine if participants significantly selected one class of behaviors (medical or social) greater than chance. Recall that a score of zero indicates a complete endorsement of medical behavior. Results indicated that participants significantly selected medical behaviors as more likely to help the hypothetical character “get better faster,” $M = .55$ out of 4, $SD = .75, t(32) = -11.09, p < .01$. An independent samples test indicated no significant difference between behaviors endorsed for cancer and colds.

Discussion

Study 1 examines the behaviors that young children view as important factors in recovery from serious and non-serious illness. While there is a significant body of research regarding the factors important in illness acquisition and transmission, the literature regarding the cure process is fairly sparse. The present study demonstrates that 5-year-old children have a strong preference for medical behaviors in terms of recovery from both cancer and colds. Consistent with previous research (Myant & Williams, 2005), children did not differentiate between behaviors appropriate for cancer and cold, and demonstrated a limited understanding of germ theory as it relates to the transmission of a serious illness such as cancer. Nonetheless, there was a trend in terms of a selection of medical behaviors when the hypothetical character had a cold.

When asked initially what the hypothetical character should do in order to recover, children frequently advised the character to behave in ways strongly grounded in a more medical view of the body, such as taking medicine, washing hands, and eating good food. When asked specifically whether the hypothetical character should “rest and eat fruits and vegetables” in order to get better, free response answers resonated true with these freely generated suggestions; children often explained their affirmative answer with statements such as “[eating fruits and vegetables and resting] will make her feel better” or “because then he’ll be healthy and he won’t be sick that much longer.”

Interestingly, the same did not hold true when children were asked whether the hypothetical character should “take all the medicine that the doctor gave him/her.” An examination of the qualitative explanations for this rejection led us to reason that children feared that taking “all” of the medicine would have a negative impact on the character’s health. Children overwhelmingly expressed concern that too much medicine might lead to negative health impacts: responses ranged from claiming that too many pills “might make him sicker,” or “he might throw up.” Children also informed us that “his pills could make him sick ’cause if he

doesn't take one at a time it won't be the right thing to do," and that the hypothetical character should take "just one, just one every day." Given the fact that children of this age have limited biological knowledge and tend to conceptualize illness in terms of their own personal experiences (Myant & Williams, 2005), these findings are logical. While children have been advised to rest and eat healthily, they have also been given cautionary warnings about taking too much medicine.

When asked about the effectiveness of socioemotional and immanent justice behaviors in terms of assisting the recovery process, children overwhelmingly cited germs as the reason to reject hugs from mommy and to refuse to share a toy with a sick friend. In both instances, many children generated responses indicating that touching a person who is sick would cause "[the other person] to get [a cold/cancer] too." This finding is consistent with past literature indicating that young children tend to overextend the concept of contagion for infectious and noninfectious diseases (Kister & Patterson, 1980). This finding held up for the summed scores as well – children rejected the social score and strongly endorsed the medical score.

Results did indicate a trend for greater selection of medical behaviors when the hypothetical character had a cold as opposed to cancer. This could be explained by the aforementioned tendency of children to reflect upon their own experiences when deciding how to act most appropriately in an illness situation. Young children are capable of constructing medically accurate schemata, which can be called upon when determining how to act in a given situation (Chen, Craske, & Katz, 1999). Most, if not all, five-year-olds in a healthy kindergarten sample have had a cold, and are able to recall actions that they took in order to recover. Cancer, on the other hand, is not a concept that a five-year-old would necessarily be familiar with; therefore, selecting recovery behaviors could be quite difficult. Children may have also deduced the serious nature of a cancer diagnosis from the cancer vignette, and therefore decided that eating well and taking medicine would not be enough to cure cancer.

This endorsement of medical causes was reinforced during the forced-choice portion of session one. Although we initially predicted some endorsement of sociomoral behaviors, children consistently rejected the “sociomoral” and “immanent justice” categories when compared to the “eating/rest” and “medicine” categories.

There were several limitations that were evident upon the completion of Study 1. As mentioned earlier, we believe that the term “all medicine” may have caused children to reject the “medicine” behavior as a means to recovery. Additionally, some phrases in the cold and cancer vignettes may have biased participants towards the “more medical” answers by linking Jake/Jessica’s positive outcome with doctors, nurses, medicine, and hospitals. There is also the possibility that good performance on Study 1 could have reflected the dominance of certain medical scripts; children may have selected medical behaviors because of their own experiences with illness and recovery, as opposed to a firm understanding of the biological processes involved in recovery.

Study 1 did reveal several factors that children view as important in the discovery process, namely that they endorse medical behaviors consistently as opposed to a more balanced endorsement of social and medical behaviors. Additionally, free response answers in regard to what the hypothetical child should do to recover indicated that children believe that several behaviors associated with illness, but not actually linked to recovery, may have curative properties. For example, children suggested that the hypothetical child should “go to the doctor’s,” “wash his hands,” and “take his temperature.” This led us to design Study 2, and explore in further depth the specific mechanisms that children view as important in terms of recovery.

Study 2

Study 2 was designed to address some limitations of Study 1. One primary concern was that the vignettes in Study 1 contained phrases that may have implied that “getting better” was

associated with doctors, nurses, and medicine, and could therefore bias participants towards the medical/biological answers. Participants may have also rejected the medical choices in the yes/no section because the phrase “all of the medicine” could imply an overdose. Additionally, the phrase “stay home from school to nap and eat fruit and vegetables” included two behaviors, which made it difficult to determine which part of the question participants were responding to. Additionally, good performance in Study 1 could have indicated a firm understanding of the biological processes involved in recovery, but also could have reflected a mere association between medical behaviors (e.g., taking medicine) and illness. To correct for these limitations, Study 2 included medical behaviors that do positively affect recovery (e.g., taking medicine), as well as behaviors that are associated with illness but have no curative value (e.g., getting a vaccination). Study 2 also presented revised versions of the vignettes that eliminated any language implying that getting better involves medical treatment. Finally, Study 2 addressed the specific concerns regarding the wording of the “medicine” and “fruit/vegetable” questions. Based upon the findings in Study 1, we predicted that children would endorse non-curative behaviors associated with illness, such as preventive behaviors, as important to the recovery process. We also predicted that children would differentiate between cancer and colds in some, but not all, recovery behaviors.

Method

Participants. Thirty-eight children participated in Study 2. 28 of the same children who participated in Study 2 were participants from Study 1; any additional participants were children from the same elementary school who returned consent forms in the interim period between Study 1 and Study 2. The mean age was 5.9 (14 males, 24 females; age range = 5.3 – 6.7 years).

Materials. As in Study 1, two tasks were created to discover what children understand about recovery from serious and non-serious illness: a yes/no task and a forced-choice task (with the yes/no task presented first). The experimenter began with a short vignette about a child

affected with a cold or with cancer (see Appendix B for vignettes). Following the vignette, children were asked a series of yes/no questions, asking whether the main character should engage in each of 8 activities in order to recover (see Table 4). These activities included 2 curative responses (e.g., taking medicine), 2 social responses (e.g., getting a hug from mommy), 2 preventive responses (e.g., getting a vaccination), and 2 responses associated with, but ultimately unrelated to, the recovery process (e.g., taking temperature). This yes/no task was followed by a forced-choice task, in which children were asked a series of 15 questions, each involving a forced choice between two options involved in recovery (see Table 5). Four of these forced-choice questions included a comparison of a curative option with a preventive option (e.g., taking medicine vs. washing hands), four included a comparison of a curative option with an associated option (e.g., taking medicine vs. taking temperature), four included a comparison of a preventive option with an associated option (e.g., washing hands vs. taking temperature), and three were classified as other (e.g., two options from the same category type). The social options were not included in the forced-choice comparisons, because of concerns about length of the task and the overwhelming rejection of these options in Study 1. In all of the forced-choice questions, children were asked which option would make the hypothetical character better.

Procedure. Study 2 took place one month after Study 1 was completed. The procedure of Study 2 was the same as in Study 1, except that there were no free-response follow-up questions in Study 2.

Results

Yes/No Task. We assigned a score of 1 if participants said that the behavior in question would help the hypothetical character recover, and a score of 0 if they said the behavior would not help. We conducted a one-sample t-test in order to determine whether the selections made by participants were significantly different from chance, test value = .5 (see table 1 for means). Results indicated that participants significantly endorsed eating fruits and vegetables ($M = .89$

out of 1, $SD = .31$, $t(37) = 7.82$, $p < .01$), getting a vaccination ($M = .89$ out of 1, $SD = .31$, $t(37) = 7.82$, $p < .01$), and taking temperature ($M = .97$ out of 1, $SD = .16$, $t(37) = 18.00$, $p < .01$).

Participants selected “give a favorite toy to a friend who is very sad” significantly below chance, $M = .32$ out of 1, $SD = .47$, $t(37) = -2.41$, $p < .05$. Taking medicine and washing hands had no standard deviation because they were endorsed by all participants; therefore, assuming a binomial distribution taking medicine and washing hands were also selected by participants significantly above chance.

Sum scores were created based upon classification of behaviors. “Take the medicine that the doctor gave him/her” and “eat fruits and vegetables” were summed into the category of “cure” behaviors, “wash his/her hands” and “get a vaccination” were summed into the category of “prevention” behaviors, “take his/her temperature” and “put on a band-aid” were summed into the category of “associated behaviors,” and “get a lot of hugs from his/her mommy” and “give his/her favorite toy to his/her friend who is very sad” were summed into the category of “other.” The “other” behaviors were not included in this analysis because no predictions were made regarding their endorsement by participants. When sums were computed for “cure” behaviors and “preventive” behaviors were selected significantly above chance (test value = 1), $M = 1.89$ out of 2, $SD = .31$, $t(37) = 17.73$, $p < .01$. “Association” behaviors were also selected significantly above chance (test value = 1), $M = 1.36$ out of 2, $SD = .54$, $t(35) = 3.99$, $p < .01$.

We also conducted an independent sample t-test to determine whether participants’ endorsement of certain summed behavioral categories varied by illness type. Results indicated that children significantly more often endorsed prevention behaviors when the hypothetical character had cancer than when he/she had a cold, $M = 2.00$, $SD = .47$, $t(36) = -2.19$, $p < .01$. We conducted a 3 (question type: cures, preventions, associations) x 2 (story type: cold, cancer) ANOVA on the summed behavior scores within each question type, with question type as a within-subjects variable and story type as a between-subjects variable. The results indicated a

significant difference among question types, $F(2,68) = 20.26, p < .001$. Post-hoc Bonferroni tests indicated that children endorsed cures and preventions significantly more often than associations, and cures and preventions were endorsed at equal rates. Results indicated no significant effect of story type or interaction between question type and story type.

Forced-Choice Task. Similar to the design of Study 1, we assigned a score of 0 to the more medical selection (“cure” > “prevention” > “association”) and a score of 1 to the less medical selection (“association” > “prevention” > “cure”). We conducted a one-sample test to determine whether participants were selecting the more medical behavior at rates significantly different from chance (test value = .5; see Table 6 for means). When cures were compared to associations, children consistently preferred the cures: “take the medicine that the doctor gave him/her” was preferred over “take his/her temperature,” $M = .13, SD = .34, t(37) = -6.63, p < .01$, “eat fruit and vegetables” was preferred over “put on a band-aid,” $M = .08, SD = .27, t(37) = -9.50, p < .01$ and “take the medicine that the doctor gave him/her” was preferred over “put on a band-aid,” $M = .03, SD = .16, t(37) = -18.00, p < .01$. When preventions were compared to associations, children consistently preferred the preventions: “wash his/her hands” was preferred over “put on a band-aid,” $M = .08, SD = .27, t(37) = -9.50, p < .01$ “get a vaccination” was preferred over “take his/her temperature,” $M = .18, SD = .39, t(37) = -4.95, p < .01$ and “get a vaccination” was preferred over “put on a band-aid,” $M = .08, SD = .27, t(37) = -9.50, p < .01$. Interestingly, when cures were compared to preventions, children showed inconsistent preferences: “wash his/her hands” and “get a vaccination” were preferred over “eat fruit and vegetables” ($M = .72, SD = .45, t(35) = 2.94, p < .01$; $M = .71, SD = .46, t(37) = 2.82, p < .01$), yet “take the medicine that the doctor gave him/her” was preferred over “wash his/her hands” ($M = .32, SD = .47, t(36) = -2.25, p < .05$).

We created sum scores for the aforementioned comparison types: “sum cure vs. prevention,” “sum cure vs. association,” and “sum prevention vs. association.” Scores ranged

from 0 (all “more medical”) to 4 (all “less medical”). Using these summed scores, we conducted a 3 (comparison type: cure vs. prevention, cure vs. association, and prevention vs. association) x 2 (illness type: cold, cancer) ANOVA, with comparison-type as a within-subjects variable and story type as a between-subjects variable. We found a significant difference among comparison types, $F(2,66), p < .01$, indicating that children do endorse certain behaviors when compared to other behaviors. Post hoc Bonferroni tests indicated that participants more often selected the “more medical” response for cure vs. association and prevention vs. association as compared to cure vs. prevention. However, we found no significant difference between story types, indicating that children do not differentiate between behaviors for cancer and behaviors for cold.

Discussion

Study 2 built upon the findings from Study 1 by further examining what specific behaviors children view as important in terms of the recovery process. Recall that Study 2 was designed to address some limitations of Study 1. These limitations included a potential bias towards the medical behaviors, confusing wording in several questions, and an inability to determine if good performance came from a firm understanding of the biological processes involved in recovery or a mere association between medical behaviors (e.g., taking medicine) and illness. Study 2 eliminated any biased or confusing language, and included medical behaviors that do positively affect recovery (e.g., taking medicine), as well as behaviors that are associated with illness but have no curative value (e.g., getting a vaccination).

Results indicated that children do endorse behaviors that are merely associated with illness or injury, such as putting on a band-aid, when asked whether these behaviors would independently aid the recovery process. However, children endorse these behaviors less often than cures, such as taking medicine, and preventions, such as washing hands. This indicates that, while children can differentiate between cures, preventions, and associations, their endorsements are not always medically accurate. When pitted against one another, children seem to understand

that cures are better. However, this endorsement does not hold true in all cases and has a lot to do with the particular cure and particular association being compared.

Based upon the findings from Study 1, we predicted that children might view “medical” behaviors with no curative value as important to the recovery process, due to strong associations between these behaviors and their own illness experiences. This held true, as children did select preventive behaviors associated with health, such as “wash hands,” when compared to behaviors such as “put on a band aid.” Interestingly, children had a difficult time differentiating between curative behaviors and preventive behaviors, which may be indicative of the heavy emphasis put on prevention in the classroom and home environment.

When asked whether the hypothetical character should engage in an array of behaviors in order to recover, children consistently endorsed behaviors that were familiar elements of their own experiences with illness and recovery. Children believed that the hypothetical character should eat fruits and vegetables, take medicine, wash hands, get a vaccination, and take his/her temperature in order to get better. Although some of these behaviors will not actually affect the cure process, they are all familiar elements related to being sick, or preventing sickness, to young children. This trend builds upon previous findings that young children are able to form and activate detailed medical scripts (Chen, Craske, & Katz, 1999; Eiser, 1989).

Recall that children consistently avoided the immanent justice and sociomoral categories in Study 1 because of germs and fear of spreading sickness. This overextension of contagion also emerged in Study 2 as children consistently said that the hypothetical character should not give a toy to a very sad friend. Children significantly endorsed “cure,” “association,” and “preventive” behaviors, but did not endorse the “other” category. Because of this consistent rejection, as well as concerns about attention span and length of the task, we decided to omit the sociomoral and immanent justice behaviors, which created the “other” category, from the forced-

choice section of the task. When the “other” category was eliminated, children endorsed cure and prevention behaviors more than associations.

Interestingly, children consistently selected prevention type behaviors for cancer. While this could be because of a lack of familiarity with the disease, another possible explanation is that prevention is a difficult concept to grasp. The very idea that something can be good for one’s health without having any visible effects is something that emerges as difficult in adulthood as well (e.g., a persistent problem in patient care is that individuals often stop taking antibiotics when they feel better, rather than continuing to take the full dose). Children did not merely endorse any behavior associated with sickness and the body in regard to cancer. Participants did not believe that taking one’s temperature, for instance, would cause the hypothetical character to recover. Additionally, children consistently endorsed the idea that the character in question should wash his/her hands in order to get better from both a cold and from cancer, but endorsed the idea that the character should get a vaccination for cancer at a higher rate than for colds. This fits well within a schema-based view of childhood illness – most children have had colds, and know that a vaccination is not a part of their typical recovery process. However, cancer is an unfamiliar illness, described as more severe. Furthermore, vaccinations are associated with medical contexts. Following this logic, it is sensible that children selected vaccinations as a behavior to promote healing in the cancer vignettes. This serves as an example of the mixture of sophistication and naiveness that characterizes young children’s beliefs regarding illness recovery.

When presented with the forced-choice task, children significantly selected “cure” and “prevention” behaviors as compared to “associative” behaviors. Once again, we turn to a schema-based explanation; children of this age have had enough experience with illness to know that medicine is more likely than a band-aid to help cure a cold. Additional support for this idea comes from Crisp, Goodnow, and Ungerer (1996), who found that understanding of an illness is

based on an interaction between normative development and past experience. The concept of familiarity also helps explain why children endorsed associative behaviors during the yes/no tasks. While they may know that taking temperature won't cure when compared to taking medicine, it is still part of a typical medical script. A thermometer's association with an illness that eventually went away may be enough of a reason to endorse its usage.

However, while the concept of familiarity can explain some of the selections made by children, this explanation does not hold true in all cases. Children seem to have flexible hierarchies that they utilize when endorsing recovery behaviors, which demonstrates an ability to think about the comparative benefits of certain behaviors. For example, children select "take the medicine that the doctor gave him/her" over "wash his/her hands," but select "wash his/her hands" over "eat fruits and vegetables." This indicates the presence of a critical thought process as children select recovery behaviors. Although the reasoning may not result in a medically correct selection, it does cast doubt on a purely schema-based explanation for recovery behavior selections. If children were merely absorbing information and applying it to all future illness experiences, their selections would be unlikely to change on a case-by-case basis. This also supports the aforementioned idea that selections had to do with the specific behaviors in question, in addition to the broader behavioral classifications (cure, prevention, and association).

Some limitations of Study 2 include the fact that, for many subjects, the yes/no questions were presented in an identical order. This could have led to a selection bias; for example, children could have answered "yes" to the first few questions, and began to answer "no" as their attention drifted. Additionally, it is possible that the altered vignettes did not stress the serious nature of a cancer diagnosis; by eliminating the phrases that could provide a medical bias, we also ran the risk of minimizing the severity of the diagnosis.

Study 2 suggests that an important issue for future research is to investigate the reasons why children of this age seem to struggle with the notion of prevention vs. cure. While this

study gives further support to the notion that children have some level of understanding in regard to the biological processes underlying disease transmission and recovery, it also illustrates the importance of providing children with accurate knowledge in terms of their own health, and the health of others.

General Discussion

Studies 1 and 2 contribute to the limited body of knowledge explaining what children know about the recovery process by illuminating several key concepts. First, children consistently select biological behaviors as important to the recovery process, and do not endorse sociomoral behaviors. Although research has demonstrated that young children do select sociomoral causes for contracting an illness (Kister & Patterson, 1980), the present studies suggest that this reasoning does not extend to the recovery process. Past research has demonstrated that, although detailed biological mechanisms may be unfamiliar to children, 4- and 5-year-olds often possess sophisticated ideas about germs (Au, DeWitt, & Romo, 1990). This concern with germs, paired with a lack of knowledge about cancer and the overextension of contagion that is characteristic of this age group (Kister & Patterson, 1980), seems to account for the overwhelming rejection of sociomoral behaviors.

The present study also suggests that, although children endorse cure behaviors, they also select preventive behaviors as important to the recovery process. A schema-based approach seems to provide an explanation for this inability to differentiate. Young children can activate medically accurate scripts based upon past experience. While children know that taking medicine helps them “get better,” they are also told that certain preventive behaviors, such as washing hands, are essential to good health. This leads to a somewhat imperfect understanding of recovery behaviors; children know that some behaviors are more effective than others, but do not have a fully developed biological understanding of the recovery process. Similar logic could explain the endorsement of associative behaviors above chance in the yes/no tasks. While

children may know that certain associative behaviors, such as taking temperature, will not be more effective than curative behaviors, such as eating healthily, they do still think these behaviors have some value. Herein lies potential for future interventions. Past research has shown that even children as young as 4-7 can be taught specific things about particular illnesses and treatment, through interventions such as age-appropriate storybooks or group discussions (Binnie & Williams, 2002). It would be beneficial to teach young children accurate information about the differences between cures, associations, and preventions so they can accurately assess their own illness situations and adjust their behaviors accordingly.

In addition to supporting a schema-based approach to illness experiences, the current studies also support the notion that children are capable of critical thought when selecting recovery behaviors. While children always endorsed the choice involving taking medicine, their endorsements of other behaviors were more fluid, and shifted depending on the particular comparison in question. This seems to indicate that children were thinking about the causal processes involved in recovery during the forced-choice tasks, and selected behavior that made the most sense to them given the alternative option. The forced-choice tasks did not allow for any explanation of choices, so this claim remains speculative and provides an opportunity for future research.

This study suggests several additional directions for future research. In order to understand children's inability to differentiate between curative, preventive, and associative behaviors, future research could examine potential origins of this confusion. For example, researchers could look closely at the health education system that is active in elementary schools, and recommend ways to improve it.

Relatedly, it would be interesting to examine the beliefs of children who have experienced a serious illness. Beliefs held by children with illness experience could inform improvements to the health education system by highlighting what knowledge healthy children

lack. For example, if ill children have a more sophisticated understanding of the mechanisms underlying recovery, it would indicate that accurate knowledge is a byproduct of experience, not health education. Additionally, exploring the preexisting beliefs of seriously ill children could allow for improvements in their care as well. If healthcare providers gain information about what these children already know, they can adapt explanations of illnesses and treatment plans accordingly.

This study also has important implications for the explanation of the differences between serious and non-serious illness. Past research has shown that, when children learn accurate information about serious illness, including the fact that it is not contagious, they are much more willing to interact with peers recovering from such illnesses (Benner & Marlow, 1991). Given the increasing likelihood that children diagnosed with cancer will reenter society as survivors, it is important that they and their peers have accurate information in order to ensure a smooth reintegration.

An understanding of what children understand about illness also has important implications for the health education programs designed for children of this age group. While a focus on prevention is important, the system is flawed in the sense that children are not learning to differentiate between behaviors that prevent and behaviors that heal. Future generations of health educators could benefit immensely from studies that illustrate what children know and, relatedly, what should be added and/or removed from current curricula.

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Table 1

Forced-choice questions for Study 1

Comparison Type	Question
Eating/rest vs. Sociomoral	What will make Jake better faster? Staying home from school to nap and eat a lot of fruit and vegetables or getting a lot of hugs from his mommy?
Eating/rest vs. Medical	What will make Jake better faster? Staying home from school to nap and eat a lot of fruit and vegetables, or taking some medicine?
Eating/rest vs. Imminent Justice	What will make Jake better faster? Staying home from school to nap and eat a lot of fruit and vegetables, or giving his favorite toy to his very sad friend?
Medicine vs. Imminent Justice	What will make Jake better faster? Taking some medicine, or giving his favorite toy to his very sad friend?
Medicine vs. Sociomoral	What will make Jake better faster? Taking some medicine, or getting a lot of hugs from his mommy?
Imminent Justice vs. Sociomoral	What will make Jake better faster? Giving his favorite toy to his very sad friend, or getting a lot of hugs from his mommy?

Table 2

Mean number of “yes” responses (out of 1) for recovery behaviors in Study 1 and Study 2

Recovery Behavior	Study 1	Study 2
Cures		
Take medicine	.62 (.49)	1.00 (0.00)
Eat fruits and vegetables ^a	.91 (.29)	.89 (.31)
Sociomoral		
Get a hug from mom	.59 (.50)	.51 (.51)
Immanent justice		
Give a toy to a sad friend	.48 (.51)	.32 (.47)
Preventions		
Put on a band aid ^b	-	.39 (.49)
Get a vaccination ^b	-	.89 (.31)
Associations		
Take temperature ^b	-	.97 (.16)
Wash hands ^b	-	1.00 (0.00)

^a In study 1, this behavior also included “stay home from school and get rest”

^b These behaviors were only presented in Study 1

Table 3

Mean number of “medical” forced-choice selections (0 out of 1) for Study 1

Comparison Type	Means
Rest/eat vs. medical	.21 (.41)
Immanent justice vs. sociomoral	.27 (.45)
Rest/eat vs. sociomoral	.12 (.33)
Medical vs. immanent justice	.15 (.36)
Rest/eat vs. immanent justice	.09 (.29)
Medical vs. sociomoral	.18 (.39)

Table 4

Yes/no questions for Study 2

Question Category	Question
Cures	Should Jake (Jessica) take the medicine that the doctor gave him (her) to get better? Should Jake (Jessica) eat fruits and vegetables to get better?
Associations	Should Jake (Jessica) put on a band-aid to get better? Should Jake (Jessica) take his (her) temperature to get better?
Preventions	Should Jake (Jessica) wash his (her) hands to get better? Should Jake (Jessica) get a vaccination to get better?
Other (socioemotional)	Should Jake (Jessica) give her favorite toy to her friend who is very sad to get better? Should Jake (Jessica) get a lot of hugs from her mommy to get better?

Table 5

Forced-choice questions for Study 2

Comparison Type	Question
Cure vs. Association	Which will make Jake (Jessica) better? Putting on a band-aid or eating fruits and vegetables?
	Which will make Jake (Jessica) better? Eating fruits and vegetables, or taking his (her) temperature?
	Which will make Jake (Jessica) better? Putting on a band-aid, or taking some medicine?
	Which will make Jake (Jessica) better? Taking some medicine, or taking his (her) temperature?
Cure vs. Prevention	Which will make Jake (Jessica) better? Washing his (her) hands or eating fruits and vegetables?
	Which will make Jake (Jessica) better? Eating fruits and vegetables or getting a vaccination?
	Which will make Jake (Jessica) better? Washing his (her) hands, or taking some medicine?
	Which will make Jake (Jessica) better? Taking some medicine, or getting a vaccination?
Prevention vs. Association	Which will make Jake (Jessica) better? Taking his (her) temperature, or getting a vaccination?
	Which will make Jake (Jessica) better? Putting on a band-aid, or washing his (her) hands?
	Which will make Jake (Jessica) better? Getting a vaccination, or putting on a band-aid?
	Which will make Jake (Jessica) better? Taking his (her) temperature, or washing her hands?
Other	Which will make Jake (Jessica) better? Eating fruits and vegetables, or taking some medicine?
	Which will make Jake (Jessica) better? Putting on a band-aid, or taking her temperature?
	Which will make Jake (Jessica) better? Washing his (her) hands, or getting a vaccination?

Table 6

Mean number of “medical” forced-choice selections (0 out of 1) for Study 2

Comparison Type	Results
Cure vs. Prevention	.54 (.25)
Medicine vs. vaccination	.38 (.49)
Medicine vs. wash hands	.32 (.47)
Eat fruits and vegetables vs. wash hands	.72 (.45)
Eat fruits and vegetables vs. vaccination	.71 (.46)
Cure vs. Association	.18 (.16)
Medicine vs. take temperature	.13 (.34)
Medicine vs. band aid	.03 (.16)
Eat vs. take temperature	.47 (.51)
Eat vs. band aid	.08 (.27)
Prevention vs. Association	.18 (.25)
Wash hands vs. band aid	.08 (.27)
Wash hands vs. take temperature	.39 (.49)
Get vaccination vs. band aid	.08 (.27)
Get vaccination vs. take temperature	.18 (.39)
Other	.23 (.24)
Eat vs. medicine	.16 (.37)
Temp vs. vaccine	.18 (.39)
Vaccine vs. wash	.50 (.51)
Temp vs. band aid	.05 (.23)

Appendix A

Vignettes used for Study 1

Boy with cold

This is Jake. Jake stayed home from school today because he didn't feel well. His mommy took him to the doctor, who said that Jake feels sick because he has a cold. The doctor told Jake that he will not need to go to the hospital, but that he should stay home from school until his runny nose and sore throat go away. The doctor also gave Jake some pills to take that will help him feel better. When Jake feels better, his cold will be all gone. The doctor tells Jake not to worry, because he will get better soon. When Jake feels better, he can go back to school. Jake will look the same. He won't need to go back to the doctor to see if his cold is all gone.

Boy with cancer

Jake stayed home from school today because he didn't feel well. His mommy took him to the doctor, who said that Jake feels sick because he has cancer. The doctor told Jake that he will need to go to the hospital for chemotherapy, a kind of medicine that will go right into his blood with a needle. The chemotherapy might make Jake feel really yucky. The doctor tells Jake not to worry, because the doctors and nurses in the hospital are there to help him get better. Jake might need chemotherapy for a long time, and he might need to sleep in the hospital. When Jake leaves the hospital, he still takes some medicine and needs to be extra careful around germs. He looks a little bit different. Sometimes he goes back to the doctor to make sure that his cancer is all gone.

Girl with cold

Jessica stayed home from school today because she didn't feel well. Her mommy took her to the doctor, who said that Jessica feels sick because she has a cold. The doctor told Jessica that she

will not need to go to the hospital, but that she should stay home from school until her runny nose and sore throat go away. The doctor also gave Jessica some pills to take that will help her feel better. When Jessica feels better, her cold will be all gone. The doctor tells Jessica not to worry, because she will get better soon. When Jessica feels better, she can go back to school. Jessica will look the same. She won't need to go back to the doctor to see if her cold is all gone.

Girl with cancer

Jessica stayed home from school today because she didn't feel well. Her mommy took her to the doctor, who said that Jessica feels sick because she has cancer. The doctor told Jessica that she will need to go to the hospital for chemotherapy, a kind of medicine that will go right into her blood with a needle. The chemotherapy might make Jessica feel very yucky. The doctor tells Jessica not to worry, because the doctors and nurses in the hospital are there to help her get better. Jessica might need chemotherapy for a long time, and she might need to sleep in the hospital. When Jessica leaves the hospital, she still takes some medicine and needs to be extra careful around germs. She looks a little bit different. Sometimes she goes back to the doctor to make sure that her cancer is all gone.

Appendix B

Vignettes used for Study 2

Boy with cold

Jake stayed home from school yesterday because he didn't feel well. His mommy took him to the doctor, who said that Jake felt sick because he had a cold. The doctor told Jake that he would not need to go to the hospital, but that he might be sick with a cold for a few days. The doctor told Jake not to worry, because he would get better soon.

Boy with cancer

Jake stayed home from school yesterday because he didn't feel well. His mommy took him to the doctor, who said that Jake felt sick because he had cancer. The doctor told Jake that he would need to go to the hospital, and that he might have cancer for a long time. The doctor told Jake not to worry, because the doctors and nurses in the hospital were there to help him.

Girl with cold

Jessica stayed home from school yesterday because she didn't feel well. Her mommy took her to the doctor, who said that Jessica felt sick because she had a cold. The doctor told Jessica that she would not need to go to the hospital, but that she might be sick with a cold for a few days. The doctor told Jessica not to worry, because she would get better soon.

Girl with cancer

Jessica stayed home from school today because she didn't feel well. Her mommy took her to the doctor, who said that Jessica felt sick because she had cancer. The doctor told Jessica that she would need to go to the hospital and that she might have cancer for a long time. The doctor told Jessica not to worry, because the doctors and nurses in the hospital were there to help her.
