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How the Cultural Context Shapes Children's Causal Reasoning About Biological Illnesses

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by

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ABSTRACT OF THE DISSERTATION

How the Cultural Context Shapes Children's Causal Reasoning About Biological Illnesses

by

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Dr. Rebekah Richert, Chairperson

The causal explanations provided to young children provide the foundation for causal reasoning throughout life. Yet little research has examined what types of explanations parents provide to young children globally and how these explanations shape the emergence and development of children's own worldviews. A cultural context in which supernatural explanations are more common than scientific explanations (or given alongside scientific explanations) may constrict children's use of scientific causal mechanisms to understand and solve biological problems, such as illness. Such constraints could impede the efficacy of educational materials about how to avoid life-threatening illnesses (AIDS) or how to prevent illnesses (vaccines).

This project uses a multi-method approach (quantitative and qualitative analyses of justifications and cultural beliefs; ethnographic interviews) to study the emergence and endorsement of explanatory systems (folk knowledge, scientific, religious, supernatural) that are used by 4- to 6-year-old Mexican-American Catholic children and parents in the

United States. Children and parents were either interviewed in English or in Spanish and asked about possible causes and treatments of the common cold and cancer.

Results indicated children and adults tend to endorse primarily natural causes (folk, scientific) as the causes of illnesses, but they endorse both natural (folk, scientific) and supernatural (religious, non-religious) causes to treat illnesses – with more supernatural causes endorsed for cancer than the common cold. There were also differences depending on the interview language for what causes children endorsed in the directed prompt task. Third, the majority of parents in both interview languages thought that they themselves should be the primary person to teach children about both illnesses, and on average, children in general should be at least around the age of 3.3-years-old to learn about the common cold, but they should wait until about 8.1-years-old to learn about cancer. Overall, this dissertation highlights the importance of examining the cultural context of children's developing cognition in an under-researched, but steadily growing cultural community within the United States.

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Chapter 1

Literature Review

The causal explanations provided to children at a young age provide the foundation for causal reasoning throughout life. For example, a cultural context in which supernatural explanations are more common than scientific explanations (or given alongside scientific explanations) may constrict children's use of scientific causal mechanisms to solve problems – including problems easily explained by scientific causal mechanisms (e.g., global warming) – as well as children's understanding of educational materials about how to avoid life-threatening illnesses (e.g., AIDS). My dissertation research uses a mixed-method approach (quantitative and qualitative analyses of justifications and cultural beliefs) to study the emergence and endorsement of explanatory systems (natural and supernatural) used in 4- to 6-year-old children and their parents all of whom are Mexican-American Catholics in the United States. The goal of the current study is to address critical questions about how different types of causal explanations emerge and co-exist in an individual mind, and how children and adults coordinate and process different causal explanations for biological illnesses.

The introduction will outline relevant literatures in: causal reasoning and causal explanations, co-existing causal explanations, social-cognitive skills related to causal reasoning, biological knowledge in early childhood, causal reasoning in the biological domain, transmission of explanatory systems, and parental ethnotheories.

Causal Reasoning & Causal Explanations

Causal reasoning may be defined as a form of reasoning that seeks out a cause

and effect. This type of reasoning is used to answer questions asking "why" something occurred as well as "how" something occurred. Previous research has focused on different types of causes that are commonly included in causal reasoning, such as mechanical causes, design causes, and intentional causes (Keil, 2006). *Mechanical causes* include the cause-and-effect relationship between objects and the physical world. That is, the mechanisms that *caused* an event to occur. *Design causes* on the other hand consider the purpose and function of an object or event. For example, previous research with children has shown that they display what Kelemen (2004) calls teleological reasoning, or promiscuous teleology. That is, children think about the purpose of objects when reasoning about why they exist – for both natural objects such as rocks and man-made objects such as chairs. For example, in a study with preschool-aged children, Keleman (2004) found that children claim that there is a purpose for why rocks are pointy – specifically, so dinosaurs do not sit on them. This example demonstrates children giving a design causal explanation for the purpose of rocks being pointy, instead of giving a mechanical explanation of how a combination of water and wind eroded the rocks over time into becoming pointy. Finally, causes may also be *intentional causes*. That is, the beliefs, desires, or intentions of why or how someone performed an act. Using these three different types of causes, causal reasoning can be used for prediction, diagnosis, replication, justification or rationalization, and generalization (Keil, 2006; Lombrozo, 2006).

Along these lines, the three different types of causes (mechanical, design, and intentional) may also be categorized within each by what type of mechanism is the cause:

natural (folk, scientific) or supernatural (Legare et al., 2012; Shtulman, 2017). *Folk causes* exist as naïve theories (i.e., not developed through direct instruction) about causes based on folk knowledge. For example, a mechanical, folk cause might be that *cold weather* causes illness (Sigelman, 2012); in this example, going outside into cold weather (cause) has an effect on the body's immune system, resulting in a cold. *Scientific causes* stem from natural events, or events that are normative, observable, and empirically based that occur in the physical world and adhere to the laws of nature. An example of a mechanical, scientific cause might be that *germs* or *bacteria* cause contagious illnesses; that is, the cause-and-effect relationship between health and a contagious illness is that an individual somehow comes in contact with germs or bacteria in the physical world, and after those enter into the body, they multiply and end up infecting the individual with that sickness. Finally, supernatural causes arise from supernatural events, or violate or do not adhere to the laws of nature, and can be religious (e.g., *demons* cause illness) or non-religious (e.g., *bad luck* cause illness). An example of an intentional, religious supernatural cause might be that *God's wrath* causes contagious illnesses; that is, because God was angry at an individual, God then caused the individual to get sick because God intended it so. An example of a design, non-religious supernatural cause might be that *fate* caused contagious illnesses; that is, the reason that an individual got sick was so that she or he would end up at the hospital at a specific date and time so that a specific event could take place (e.g., they meet their significant other).

A further classification for the type of causes used in causal reasoning is if the causes are *proximal* or *distal* (Al-Shawaf, 2020; Evans-Pritchard, 1973; Legare et al.,

2012; Mayr, 1961; Widlok, 2014). *Proximal causes* may be defined as those that are directly related to the causal events themselves (e.g., the act of germs multiplying and spreading throughout the body, ultimately resulting with the individual becoming sick). *Distal causes*, also sometimes referred to as *ultimate causes*, may be defined as those that are distally related to, or further removed from, the actual causal action itself (e.g., an infected individual leaving germs on a doorknob, later, another individual comes along and touches the infected doorknob and then rubs their eyes, introducing the germs to their own body, and that *then* leads to the act of germs multiplying and spreading throughout the body, ultimately resulting with the individual becoming sick). Distal causes may be more likely to invoke a supernatural cause than proximal causes, as distal causes focus more on WHY that particular action occurred and proximal causes focus on HOW it occurred. Mayr's (1961) seminal paper highlighted this distinction of *how* and *why* within the field of biology, with each one answering a very different question: *how* examines the mechanistic "how does this work?" (e.g., functional biology examining a proximate cause) whereas *why* asks "What for?" (e.g., evolutionary biology examining a distal cause). Mayr (1961) also rightfully points out that the idea of cause itself may not be the same thing when asking *how* and *why* as each get at a different level of causation. Evans-Pritchard's (1973) famous example puts this distinction into practice as the Azande gave multiple reasons for why an event occurred (e.g., a granary collapsing), depending on the proximity of the cause. In this case, an example of a proximal cause would be termites; it explains *how* the granary collapsed (i.e., damaged caused over time from termites). And an example of a distal cause would be witchcraft; it explains *why* the granary collapsed at

THAT moment in time (e.g., intention of killing someone close by). Bender et al. (2017) and Widlock (2014) noted that the extent to which individuals endorse distal or proximal causes is influenced by the cultural context. For example, the types of causal mechanisms or causal agents one assigns causal responsibility to should be a matter of what the common causal mechanisms or causal agents are in a specific culture. Moreover, the amount of effort put into coming up with possible causes for an event might depend on whether or not the act of seeking multiple explanations is emphasized within a certain cultural context.

The Development of Causal Reasoning Through the Lifespan

Traditional theories (e.g., Piaget, Vygotsky) examining how children develop causal reasoning have focused the difference between scientific reasoning and spontaneous reasoning (Vygotsky, 1986). Scientific reasoning may be defined as reasoning that is systematic and develops from instruction (e.g., learning in a formal education environment) and cooperation and may be generalized from one context to another. However, spontaneous reasoning is reasoning that is based a specific instant or context and are not systematic or generalizable like scientific reasoning. Vygotsky (1986) claimed that scientific reasoning develops before spontaneous reasoning and thus scientific reasoning influences and guides the development of spontaneous reasoning. Vygotsky's view was similar to Piaget's approach to spontaneous and scientific reasoning in which Piaget viewed both types of reasoning as appearing around the same age (early childhood) and both types of reasoning influence children's thinking. However, Vygotsky differed from Piaget in that Vygotsky argued that Piaget's model of

reasoning did not allow for the influence of the social environment or for a developmental process of how concepts are changed, resulting in a change of reasoning.

Contemporary theories of the developmental of causal reasoning (e.g., Keil, Gelman, Carey) have moved on to focus on the role of the individual in their own development. Keil (2006) outlines how explanatory skills develop along several dimensions: children's why questions, children's own explanations, children's ability to distinguish "good" explanations from "bad" explanations, and individuals' ability to assess their own explanations and determine if they are able to produce a causal explanation that is complete or if they have gaps in their own knowledge of the cause. Children's "why" questions (as well as other information-seeking questions such as how, what would happen if, etc.) are one indication that children are active in their development and curious about how the world works, and learning is not a solitary act but instead is one that interactions with others (Gelman, 2009). Moreover, children's first attempts at their own explanations emerge around the same time as their first "why" question indicating that as children are asking questions, they are taking the explanations and information they receive and incorporating it into their own explanations. For instance, Keil (2006) highlights that when an individual tries to explain something to someone else, this act will show the individual whether or not they actually have a firm grasp in the content such that if they stumble or are unable to answer questions about the concept they are trying to explain, this indicates to the individual that they do not know the subject matter as well as they thought they did.

Causal Reasoning at Each Stage of the Lifespan

Infancy: Physical Causal Reasoning and Impossibility. The development of causal reasoning begins in infancy, with some evidence suggesting young infants might be able to make accurate predictions on physical causality based on statistical regularities (Baillargeon, 2008; Spelke et al., 1992). For example, Spelke and colleagues (1992) tested whether 2.5- to 4-month-old infants would look longer at an object that violates physical principles of continuity (e.g., if infants would be surprised if an object was able to pass through a physical barrier). Results indicated that infants looked longer at the objects violating the physical laws of nature, and Spelke et al. (1992) interpreted these results of infants' looking time as the infants being surprised by the impossible event in which an object defied their naïve physics. That is, by the age of 2.5-months, infants already had an expectation of physical causal reasoning (i.e., solid objects cannot pass through other solid objects).

Childhood: Question Asking. Causal reasoning continues to develop through childhood and into adolescence. As children gain verbal skills, they are able to begin to explicitly verbalize their causal reasoning. The majority of research examining the development of causal reasoning has focused on children in the preschool years and has found that children in Western, Industrial, Educated, Rich, Democratic (WEIRD) societies are active learners, are curious about why events happen, and sometimes use question asking as a way to learn about causal mechanisms (Callanan & Oakes, 1992; Frazier et al., 2009; Hickling & Wellman, 2001; Jipson & Callanan, 2003; Nolan-Reyes et al., 2016). For example, Callanan & Oakes (1992) examined mothers' reports of

preschool-aged children's questions and found children asked a lot of questions about physical mechanisms (e.g., how do fridges work?), the natural world (e.g., why can we see stars?), and biological phenomena (e.g., how do people die?) (Callanan & Oakes, 1992). Moreover, children's questions take many forms other than just "why," including: *how* (i.e., how something works or how to do something), *what would happen* if (i.e., asking about the causal sequence of events such as what would happen if you go through the car wash with your windows down), *what something is for* (i.e., the function of the object or purpose of something – teleological reasoning), and *where something comes from or where something will go* (i.e., origins or destination of objects or events, indicating transformations or changes in the world) (Callanan & Oakes, 1992).

Some research has also examined causal reasoning in older children and adults (Legare & Gelman, 2008; Shtulman & Herrington, 2016; Subbotsky, 2001; Woolley et al., 2011). For example, in a study examining supernatural causes (specifically, magic) and natural causes (specifically, flipping a switch), Subbotsky (2001) tested whether children and adults would show credulity to supernatural causes and natural causes. In the first experiment, using a between-subject design with natural and supernatural conditions, Subbotsky (2001) showed 6- and 9-year-old children a box and performed an act (natural or supernatural) that made half of a postage stamp disappear. Specifically, participants were shown an empty box and asked to put a stamp in it. The experimenter then flipped a switch on for 3-seconds and then off again (natural condition). Next, participant were asked if the stamp has changed or not from the switch being turned on and remove the stamp from the box. When participants opened the box, they found that half of the stamp

has been destroyed. Finally, participants were asked to explain how this could happen and if they would believe the experimenter if the experimenter told them that the stamp was destroyed by the work of the device. In the natural condition, the experimenter flipped a switch on the box; in the supernatural condition, the experimenter said a magic spell. Subbotsky (2001) found that 9-year-old children showed credulity to both natural and supernatural causes to an equal extent, suggesting that even children as old as 9-years can still hold a strong belief in supernatural causes. In follow-up experiments with adults, Subbotsky (2001) conducted a similar experiment, but this time, asked the adult participants if they would be willing to put their driver's license in the magic box after watching half of the stamp disappear from the same box. He found that adults showed no preference between natural (flipping the switch on the box) and supernatural causes (saying a magic spell) in their actions. That is, adults were just as willing to put their driver's license in the box regardless if they were presented with the natural cause or supernatural cause, did not have any hesitation in doing so, and did not acknowledge having any anxiety over putting the license in the box). However, adults did show a preference for natural causes in their verbal judgments (i.e., they were more likely to acknowledge the driver's license had been destroyed for the natural causes than the supernatural causes). Subbotsky (2001) interpreted these findings as adults were prepared to accept both natural and supernatural causal reasons to an equal extent, and supernatural causal reasons such as magic do not just disappear with age.

Use of Cognitive Skills in Causal Reasoning. Children's cognitive skills (e.g., executive functioning, analytic reasoning) may affect children's own use of causal

reasoning as well as the successful transfer of explanatory systems from parents-to-children.

Executive Functioning. Executive functioning (EF) is the cognitive processes used in regulating attention, control inhibition, working memory, cognitive flexibility, and speed of processing. EF – specifically, inhibition – may be related to children's and adults' endorsement scientific causal explanations (see Shtulman & Young, 2020). For instance, Zaitchik et al. (2014) found that 5- to 7-year-old's performance on EF (working memory, inhibition, and set shifting) predicted a better understanding of three biological domains: life, death, and bodily function – even after controlling for child age and verbal IQ (measured with the Peabody Picture Vocabulary Test).

Another study examining how cognitive aging might affect conceptual reasoning found that older adults' (aged 66- to 90-years) performance on an animism measure (e.g., what things are alive?) was partially mediated by their inhibition skills measured via a Stroop task, but the same pattern of results was not held for younger adults (aged 18- to 25-years) (Tardiff et al., 2017). That is, the older adults who were better at correctly identifying what types of things are alive (e.g., animals) and what types of things are not alive (e.g., rocks) scored higher on the inhibition task, which might mean they were better at inhibiting the incorrect responses in this task. The authors reasoned that the inability to inhibit an incorrect vitalistic response in older age as cognition decline might result in the older individual providing more child-like, intuitive responses that are scientifically incorrect.

Finally, another aspect of EF, working memory, has also been shown to be related

to 4- to 8-year-old children's ability to identify a source of information (Earhart & Roberts, 2014). If children have a better working memory, they may be better at comparing and contrasting the different types of causal mechanisms in order to make an informed decision.

Analytic Reasoning. How an individual thinks about a problem at hand may be split into two types: System 1 (intuitive) and System 2 (analytic) (e.g., see Kahneman, 2011). System 1 uses fast, quick reasoning resulting in intuitive responses, whereas System 2 uses slow, thoughtful, deliberate reasoning and cognitive reflection resulting in more analytical responses. As such, engaging in analytic reasoning may require the individual to take more time and energy to come to a "correct" response that is different than the incorrect, but intuitive and immediately available response. For example, the classic measurement of analytic reasoning is a 3-item cognitive reflection task (CRT) in which there is an intuitive, incorrect response that the majority of people will come to with little effort, whereas the analytic, correct response requires the individual to override this intuitive answer (Frederick, 2005). For example, in the question, "If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?" the intuitive response is 100 minutes since it using a 1:1 mapping of 5 machines : 5 minutes so 100 machines : 100 minutes, however the analytic, correct response is 5 minutes as each of the 100 machines would only take 5 minutes to produce their widget. The ability to reason analytically has been found to predict causal reasoning in adults (Don et al., 2016) and is positively related to scientific reasoning in adults (Gervais, 2015) but is negatively related to religious and supernatural beliefs in adults

(Pennycook et al., 2012). A recent study developed a modified CRT scale for children (CRT-D) and found children's analytic reasoning predicted their understanding of science and math knowledge (Young et al., 2018; Young & Shtulman, 2020; Young & Shtulman, in press). Therefore, analytic reasoning in children and adults may be related to their endorsement of natural and supernatural causal mechanisms, with individuals high in analytic reasoning endorsing more natural causes but fewer supernatural causes.

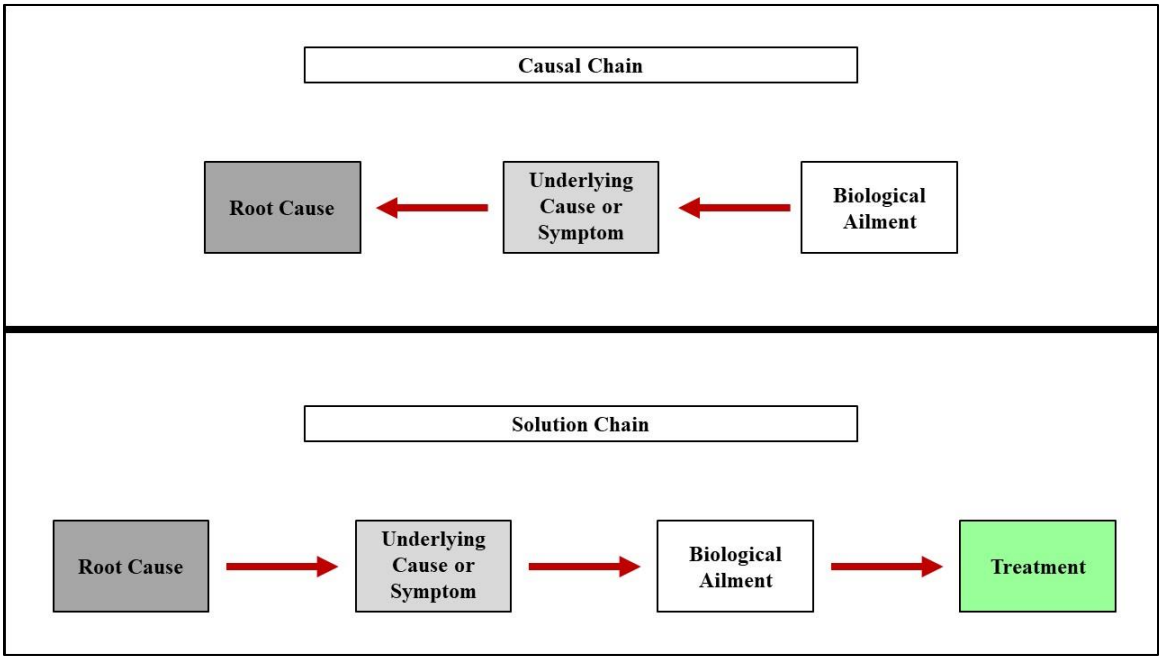
Causal Explanations

Causal reasoning is also used within explanations. Although not every explanation requires a causal explanation or the use of causal reasoning (e.g., explaining the answer to a math problem), Lombrozo (2006) questioned if there are genuine non-causal explanations and noted that the majority of research on reasoning and explanations have focused on the causal reasoning and causal explanations. Lombrozo's more recent work (e.g., Lombrozo & Vasilyeva, 2017) examines causal explanations in terms of their underlying causes: (1) *causal inference* (i.e., making an educated guess based on the surrounding circumstances and evidence given), (2) *causal learning* (i.e., giving explanations to others as a way to guide one's own learning about causality), and (3) *assigning causal responsibility* (i.e., attributing the cause to a specific source). For example, when assigning causal responsibility to a specific outcome, such as an individual getting sick, the causes that might lead to a person getting sick can vary in terms of their scientific accuracy (e.g., if the sicknesses is contagious) and one's ability and willingness to attribute causes that cannot be seen with the naked eye (e.g., germs, invisible agents such as gods).

When assigning causal responsibility, a causal chain and a causal solution can be used (see Figure 1).

Figure 1

Example of Causal Chain and Solution Chain



Causal chain refers to the path from the problem at hand back to the root cause (Belausteguigoitia, 2004). The goal of using a causal chain is to specifically identify the root cause and rule out any other causes. Once the root cause is identified, then an explanation is created for the path leading from the problem at hand back to the root cause. Because the focus is on the root cause itself and not any additional causes along the way, the causal chain can also be used to identify the distal and proximal causes discussed above. In the example given above for distal causes (an infected individual leaving germs on a doorknob, later, another individual comes along and touches the

infected doorknob and then rubs their eyes, introducing the germs to their own body, and that *then* leads to the act of germs multiplying and spreading throughout the body, ultimately resulting with the individual becoming sick), the root cause would be the germs on the doorknob, as would the distal cause. Any other causes along the way, might be considered proximal causes, but they are not the root cause. *Solution Chain* refers to the path from the root cause to possible solution(s) (Belausteguigoitia, 2004). This allows the solution to focus on the original source of the cause and not just treatment of the symptoms of the problem. For example, in the case of illness, if the root cause is identified as a scientific cause (e.g., germs), then a scientific solution might be applied (e.g., medicine). However, if the root cause is identified as a religious supernatural cause (e.g., demons), then a religious supernatural solution might be applied (e.g., prayer). Thus, in this sense, the solution chain relies on correctly identifying the correct root cause. That being said, in practice, individuals may actually mix different types of causes when examining the causal chain and solution chain. For example, an individual could identify a scientific cause (e.g., germs) as the root cause, but then use a religious supernatural solution (e.g., prayer).

Co-Existence of Causes in Causal Explanations

Scientific knowledge does not eradicate or decrease one's use of folk (Shtulman & Herrington, 2016) or supernatural causes (Shtulman, 2017). In fact, recent research indicates early learned intuitive theories across several domains of knowledge (e.g., evolution, thermodynamics) can interfere with and constrain contradictory scientific theories learned later, and this effect persists across the lifespan (Shtulman & Herrington,

2016).

Moreover, supernatural explanations may increase with age in certain domains (Legare et al., 2012; Woolley et al., 2011). For instance, Woolley and colleagues (2011) assessed what type of explanations 8-, 10-, and 12-year-old children and adults spontaneously gave for unexpected events when asked *why* the event occurred (i.e., as open-ended response). Participants were also then asked specifically about moral justice, God, and luck as possible explanations as the researchers were also interested in how family religiosity might affect the type of supernatural explanation given. Results indicated children in all age groups gave more natural explanations than supernatural explanations, yet adults frequently gave both natural and supernatural explanations. Furthermore, all children endorsed more than one type of explanation across the different events, whereas 77% of the adults endorsed multiple explanations. However, the rate of endorsement for multiple explanations varied by the type of story (positive, negative) as well as the type of explanation in the story (God, luck, moral justice). Specifically, children endorsed multiple explanations more for the positive God and positive luck stories when compared with negative God and negative luck stories; children endorsed multiple explanations at a similar rate for positive and negative moral justice. Adults showed a different pattern: they endorsed multiple explanations more for the positive moral justice than negative moral justice stories and gave a similar rate of endorsement in multiple explanations for positive and negative God and luck stories. Overall, this indicates that individuals across the lifespan may not think about specific causes as working in solitary, but instead are willing to entertain the idea of multiple causes as

working together.

Woolley et al. (2011) also found a difference in the type of supernatural explanation given (God, moral justice, luck) depending on level of religiosity. In this study, religiosity was measured as the percentage of religious behaviors participants engaged in which was then median-split into a high religious and low religious group. Results indicated the 12-year-old children and adults who reported *high* religiosity primarily gave God explanations over moral justice and luck. In contrast, 12-year-old children and adults who were *low* in religiosity primarily gave moral justice explanations. Thus, family religiosity may have more of an effect on older than younger children's supernatural explanations (Woolley et al., 2011).

That being said, young Judeo-Christian children still endorse God as a supernatural explanation (Vaden & Woolley, 2011). Vaden and Woolley (2011) told 4- to 6-year-old children short vignettes that contained either impossible religious events (e.g., Moses parting the Red Sea by holding up his staff) or impossible fantastical events (e.g., James was swallowed by a whale and lived – note that the name of "Jonah" from the original Bible story was changed to "James" for the study). The children reported if the protagonists were real or pretend, if they thought each event could happen in real life, and justifications for *why* the events could happen in real life. The justifications were coded as religious (e.g., God), natural (e.g., physical or biological, such as planting seeds), magic (e.g., a magic cane), or uninformative (e.g., Don't Know, no response, illogical/uncodable response). Results showed that 6-year-old children were more likely than 4- and 5-year-olds to report the religious stories as possible in real life and the story

protagonists as real. Moreover, this effect was even higher when considering religious exposure. Specifically, children with high religious exposure were more likely to claim impossible religious events had really happened in real life than children with low religious exposure, and children who received formal religious education either through attending a religiously affiliated school or a religious place of worship more than once a week were more likely to claim religious characters were real and the religious events could potentially happen in real life than children without formal religious education. Finally, regarding children's justifications for the religious and non-religious events, children who were told the religious stories gave more religious justifications, and children who were told non-religious stories gave more natural (i.e., scientific) and magical explanations, and that 6-year-olds gave more natural explanations than 4- or 5-year-olds. These results indicate that religious exposure can affect whether or not children endorse religious supernatural causes such as God.

One thing that could be tested is if children come up with supernatural explanations on their own, or if they tend to only endorse supernatural explanations after they have been provided with one. This can be thought of as a "recall" versus "direct prompt" in reasoning. It could be that the reason some studies have found that supernatural explanations may increase with age is because older children are more likely to provide supernatural explanations on their own – without prompting – (i.e., recalling supernatural explanations) whereas younger children will endorse supernatural explanations if they are explicitly provided with them, but they do not necessarily bring them up without some sort of direct prompting. For example, if a child is asked *why* an

individual gets sick, the types of explanations she provides on her own would be a form of recall. Whereas if she was explicitly asked, "Does X cause illnesses?", this would be a form of direct prompting.

Types of co-existence in causal explanations. Legare et al. (2012) and Legare and Shtulman (2018) outline how natural (folk, scientific) and supernatural causes can co-exist throughout the lifespan within the individual's mind, and how children and adults use both natural and supernatural causes in a complementary fashion and not necessarily in an opposing or exclusive way. Specifically, Legare and Shtulman (2018) suggest three ways in which natural causes may co-exist with supernatural causes: (1) target-dependent, (2) synthetic, or (3) integrative.

In *target-dependent reasoning*, natural and supernatural domains are *alternative* views of the world and explain different phenomenon. That is, natural explanations are given for one domain, but supernatural explanations are given for another domain. For example, when explaining death, supernatural explanations might be given for how a soul can exist after death (e.g., it goes to heaven), but natural explanations might be given for why biological functions stop at death (e.g., why the heart stops beating). In *synthetic reasoning*, natural and supernatural explanations are *combined* into one, single explanation – but the integration can be somewhat 'loose' and without any specific details of *how* the two would actually interact. For example, if explaining how someone came down with a cold, an explanation might be that it was witchcraft and germs. Here, both supernatural (i.e., witchcraft) and natural (i.e., germs) explanations are given, but the explanation does not say which one played a bigger role or if one cause came before the

other cause. Finally, with *integrative reasoning*, natural and supernatural explanations are well integrated into one explanation and provide specific details on the role of each type of cause as well as the order of the causes. For example, an explanation that a spell could put germs in someone's house thus giving them a cold shows the causal order (first supernatural and then natural). Legare and colleagues argue that these three different types of co-existing reasoning indicate how different types causal explanations exist within the individual's mind as well as how the extent of the co-existence may vary, depending on context. For example, as highlighted above, within biology, there might be different co-existing explanations for death than there are for illness.

However, is giving more than one type of explanation enough to consider calling it a "co-existing" explanation? For example, another type of co-existence that should be examined is co-existence *within* a domain. That is, do individuals judge all natural causes as working together and all supernatural causes as working together? Or are there also sub-groups within a given domain? Alternatively, if an individual does not separate out the types of explanations in their mind, should it still be considered "co-existing"? For instance, if an individual believes God as being the ultimate cause behind *everything*, and therefore for that individual, there is no real separation between God and something like medicine – does that still count as "co-existence"? Exactly how individuals view disparate causes as working together (or separately) to lead a to an outcome is not often studied. Instead, many studies examining co-existence do so by providing the participant with a set narrative and asking if the narrative is true or not true without allowing a participant to explain co-existence in their own words (e.g., Legare & Gelman, 2008;

Busch et al., 2016). For instance, in a study examining how individuals in Vanuatu reason about death, illness, and human origins, Busch et al. (2016) asked children and adults if they agreed with biological (i.e., natural causes), supernatural (i.e., local, indigenous supernatural beliefs), theistic (i.e., Christian God), or spontaneous (i.e., it just happened) explanations. For example, for the illness vignette, participants were asked if they agreed with the following biological cause, "David shared a drink with someone whose sick saliva was still on the cup, that is why David got TB. Yes or no?" Results indicated the number of times participants endorsed each of the four types of causes within each type of the three domains. For death, participants endorsed both spontaneous and biological explanations most often, inciting what the researchers deemed as co-existence since participants often endorsed more than one explanation. But for illness, participants endorsed biological explanations most often, and for human origins, participant endorsed theistic explanations most often. While endorsing more than one type of explanation is indeed a form of co-existence, methodologies such as this do not allow researchers to understand the core question of *how* these causal mechanisms co-exist within the individual mind.

More research is needed to investigate how co-existing causal explanations develop, if co-existing explanations vary by age, and if children's co-existing explanations map onto their parents' explanations – indicating that the testimony they receive might shape the form of the co-existence and follow a specific cultural script.

Biological Knowledge, Understanding, and Causal Reasoning in Childhood

Folk Biology in Early Childhood

By the age of 4, children's naïve theories of biology (i.e., *folk biology*) include an understanding of the properties of living things (Inagaki & Hatano, 2002; Marshall & Brenneman, 2016; Wellman & Gelman, 1998). These properties include growth (Hatano & Inagaki, 1994; Inagaki & Hatano, 1996; Hickling & Gelman, 1995; Rosengren et al., 1991), movement (Gelman & Gottfried, 1996), nourishment (Inagaki & Hatano, 2002), reproduction (Keil, 1995), and inheritability (Keil, 1989; Sousa et al., 2002). In a study by Inagaki and Hatano (1996), 5-year-old children accurately differentiated that plants (e.g., flowers) and animals (e.g., chickens) grow, but manmade artifacts (e.g., a teacup) do not.

Children's experiences and interactions with the biological world contribute to their folk understanding of biology (Inagaki, 1990; Tao, 2016). For instance, Inagaki (1990) found that children who owned a pet (in this case, goldfish) had a much better understanding of biology. Specifically, children who owned goldfish had more conceptual knowledge (e.g., how goldfish would react in a novel situation) and factual knowledge (e.g., what to feed a goldfish) of goldfish and were able to make better predictions about the biological nature of a different animal (specifically, a frog) when compared with children who do not own any goldfish. That being said, there was no difference between the two groups in terms of factual knowledge about mammals or predictions for humans. Thus, the added biological knowledge and understanding that comes from owning a pet goldfish does not necessarily extend into other categories of

animals, or even into other categories within the domain of biology (e.g., illness, death).

Similar to the effects of owning a pet, Tao (2016) found that preschool-age children who spent time outdoors gardening with adults provided more biological justifications for why plants are considered "living." The categories included in the biological justifications were: (1) death (e.g., physically die and cannot come back to life), (2) growth (e.g., plants grow from seeds or buds), (3) having needs (e.g., need soil, water, rain, sunlight, or fertilizer), and (4) internal processes (e.g., make own food). But again, this study focused only on biological knowledge and understanding of plants and not other types of biological entities or problems.

Finally, 5-, 7-, and 9-year-old children in Israel, Japan, and the United States have been shown to be highly accurate (>99%) in correctly judging humans have the following five biological attributes: (1) life status (e.g., be alive), (2) internal anatomical properties or entities (e.g., have a heart), (3) sensory capacities (e.g., pain), (4) attributes true of all living things (e.g., ability to grow), and (5) awareness (e.g., feel lonely) (Hatano et al., 1993). This supports the claim that children have a folk biological understanding by at least 5-years-old.

Causal Reasoning as a Domain Specific Process: The Biological Domain

Studies on causal reasoning indicate that it is a domain specific process in which children and adults give specific types of causal schemata for specific domains (Frazier et al., 2009; Hickling & Wellman, 2001; Wellman et al., 1997). When giving causal explanations for biological events (e.g., why someone gets sick), children typically give biological causes (e.g., referring to biological processes such as growth, health, blood, or

germs). When giving explanations for physical events (e.g., why something falls), children typically give physical causes (e.g., referring to physical forces such as gravity). Finally, when giving explanations for psychological events (e.g., why someone made a mistake), children typically give psychological causes (e.g., a result of mental states such as desires, preferences, beliefs, or emotions).

Hickling and Wellman (2001) also found that in naturalistic conversations between parents and children, children mostly used physical explanations to explain physical objects whereas they used biological, psychological, and physical explanations to explain humans. This indicates that children understand that physical objects do not have biological or psychological characteristics, thus it would be inappropriate to use a causal explanation within the biological and psychological realm to explain them. Children's use of domain-specific reasoning (i.e., biological for biology, psychological for psychology, and physical for physics) was also shown in studies examining children's understanding of the biological causes in the origins of illness (Kalish, 1997), as 3-year-old children have been shown to dismiss non-biological causes (e.g., immanent justice) for illness.

Illness: Knowledge, Understanding, and Causal Reasoning

Children's Understanding of "Illness" and Parental Explanations of Illnesses

Children's experiences within the biological domain do not always supply them with scientific knowledge of the phenomena. For instance, with biological illness, 4- to 5-year-old children are not very good at defining "illness" or "health", despite having been sick before (Myant & Williams, 2005; Sigelman & Glaser, 2019). Moreover, preschool-

age children do not have to understand the specific biological mechanisms behind contagious illnesses to label them as contagious (Myant & Williams, 2005). This may be because of the testimony children receive about contagious illnesses (Toyama, 2016). Toyama (2016) examined how much information preschool teachers and parents provided to children about injuries and biological illnesses (contagious and non-contagious) in several studies. In the first study, Toyama (2016) used an observational method in which she visited two preschools a total of 85 days over a three-year span and later coded the number of times the teachers provided causal explanations to the children about injuries and biological illnesses. Results indicated that the teachers tended to focus on behavioral (e.g., not washing hands leads to getting sick with a cold) or habitual (e.g., eating healthy food prevents illness) aspects in their explanations.

To examine parental explanations, Toyama (2016) next presented mothers with a list of several injuries and illnesses (e.g., cold, chicken pox, asthma, dental pain, broken bone, and burns) and asked the mothers to explain the following as if she was explaining it to her own child: (1) what the illness or injury was, (2) why people get it, and (3) what causes it. Results indicated a similar pattern for mothers, with a focus on behavioral or habitual aspects in their explanations.

Finally, Toyama (2016) examined 5- to 11-year-old children's understanding of causality in injury and illness by providing them with short vignettes in which the story protagonist was sick or injured (same illnesses and injuries presented to the mothers in Study 2) and several causes (contagion, heredity, cold weather, immanent justice, eating, and sleeping) to explain how it happened. Results indicated children in all groups did not

strongly endorse immanent justice, supporting findings from other research indicating immanent justice is a not necessarily a common cause children endorse for causes of illness (e.g., Raman & Winer, 2004). Five- and 8-year-olds endorsed cold weather and contagion as a cause for contagious illnesses and contagion was also a cause for non-contagious illnesses. Eleven-year-olds correctly identified contagion as a cause for contagious illness and heredity as a potential cause for non-contagious illnesses. These findings supporting other research indicating 5-year-old children view non-contagious illnesses (e.g., cancer) as contagious but 7- and 10-year-olds do not (Bares & Gelman, 2008) and that 4- and 5-year-old children know that some biological ailments are contagious (e.g., colds) while others are not (e.g., toothaches) (Siegal et al., 1990).

It should also be noted that prior research has not found gender differences in children's understanding of a variety of illnesses and across a wide range of ages. Specifically, males and females in 1st, 3rd, and 5th grade have been shown to have a similar understanding of AIDS, the common cold, and obesity (Johnson et al., 1994), 8- to 13-year-old males and females have a similar understanding of the causes of the flu (Sigelman & Glaser, 2019), males and females in 2nd, 4th, and 6th graders have a similar knowledge understanding of upper respiratory tract infection (McCann-Sanford et al., 1982), and 7- to 14-year-old males and females have a similar understanding the common cold and asthma (Paterson et al., 1999).

Germs. One construct that is at the core of research on children's understanding of biological illness is germs. There are mixed findings on how well children understand germs and endorse germs as causes of illness (Au & Romo, 1996; Kalish, 1997; Keil,

1994; Solomon & Cassimatis, 1999). Keil (1994) found that preschoolers indicated they understood germs are living and contagious and different from other causes of biological illness, such as poison, whereas Solomon and Cassimatis (1999) found that children younger than 7-years-old did not differentiate between germs and poison as causes of biological illness and preschoolers did not judge germs as living things. In Solomon and Cassimatis' (1999) study, 4- to 11-year-old children were presented with vignettes in which the story protagonist became sick (e.g., stomachache, cough, runny nose, or skin rash) as a result of germs, poison, or their own behaviors (e.g., ate too much candy). Results showed only 11-year-old children accurately labeled contagious (cough, runny nose, or skin rash) and non-contagious (stomachache) illnesses and judged germs as the cause of the contagious illnesses (as opposed to poison and behaviors). The 4-year-old children were at chance for judging germs or poison as causes of contagious illnesses. Solomon and Cassimatis (1999) interpreted these findings as preschoolers do not necessarily understand the causal relationship between germs and contagious illnesses, as also evidenced by Kalish (1997) and Au and Romo (1996).

More recently, McIntosh and colleagues (2012) focused on how preschool-aged children understand and learn about causes of illness within the family context. In-depth interviews were done with five 4-year-old children and their families (parents, siblings, aunt/uncle, and grandparents) on the possible causes of illness or injuries (e.g., sore ears, cough, death, cut neck, broken hand, and bleeding). Children were presented with each of the illnesses/injuries in a short storybook and asked *how* the story protagonist got sick. Results showed that children gave behavioral actions (e.g., "he went outside in the cold")

and health symptoms (e.g., "he got hot") in their responses, and none of the children reported germs as the cause of the illnesses. Because it was an open-ended question and children were not provided with any causal mechanisms, it is not known if the children would have endorsed germs as a cause of the illnesses or not (i.e., as a "direct prompt" type of task). However, because, children did not report germs as the cause of illnesses on their own (i.e., did not recall germs), it might be that this is because preschool-aged children do not understand the causal relationship between germs and illnesses, as noted above (Solomon & Cassimatis, 1999).

Finally, as noted by Coley (2000), children may not be the only ones that struggle to explain the causes and treatments of illnesses. Adults may also have a difficult time coming up with causal explanations – especially for complex diseases such as cancer (e.g., Au & Romo, 1999). In fact, Coley (2000) argues that in order to understand children's conceptions of illness, one must also examine adults' conceptions as well, to assess if adults actually hold a more "scientific" – or even more nuanced – view than children. That is, in order to understand what mechanisms lead to children's conceptual development of illness, researchers need to know what the "end-state" is. For adults and children alike, the cultural context the individual is a part of will influence what types of explanations either age group provides. One question that could also be examined is if adults' understanding and explanations of a concept such as illness are indeed what Coley (2000) calls an "end-state" or a sort of "pinnacle" in one's concept development, and how experiences, such as having children who ask questions, affects adults' reasoning about these matters.

Understanding of Specific Illnesses. Because the current study explores children's and adults' understanding of the common cold and cancer, prior research on these two specific illnesses is discussed below.

The Common Cold. Children endorse some natural causes of the common cold, but not all. For instance, in a study examining children's factual knowledge about the causes of AIDS and the causes of the common cold, children were asked about a variety of possible scientific and folk causes for each – ranging from inadequate clothing for the weather and causal contact with others to sexual transmission, blood transmission, and drugs (e.g., smoking or drinking) (Johnson et al., 1994). Children were in 1st grade (6- to 8-years-old), 3rd grade (8- to 10-years-old), or 5th grade (10- to 13-years-old). Children in all age groups were selective in their responses for each illness – even in the younger age group. Seventy-two percent of 1st graders endorsed inadequate clothing as a cause of the cold, and 32% of 1st graders endorsed causal contact as a cause of the cold – but no 1st graders endorsed other causes such as drugs being able to cause the common cold. Across the full sample, 82% of children endorsed inadequate clothing or exposure to cold weather as the cause of a cold, indicating these specific causal mechanisms may be prevalent in children's explanations for this particular illness, as is also indicated in other prior studies (e.g., Toyama, 2016).

Previous research examining how four different groups of Latino adults view the causes and treatments of the common cold has found some similarities and some differences across the cultural groups (Baer et al., 1999). Baer and colleagues (1999) conducted ethnographic surveys with adults from Guatemala and Mexico as well as

Mexican-Americans in the US (Texas) and Puerto Ricans in the US (Connecticut); there was also middle-income, non-Hispanic group of Americans (from Florida) for comparison. The goals of their study were to assess if there was high consensus across all four Latino groups for what causes and treats the common cold, and if folk causes are also common in the middle-class American group like they tend to be for Latinos. Results showed participants across all five cultures tended to say that the following could cause a common cold: (1) lack of vitamins, (2) low resistance, (3) exposure to drafts/wind/air, (3) change in weather, (4) contagion (being around someone who is sick with a cold), and (5) improper outerwear for cold weather. Additionally, in all four Latino cultures participants also endorsed: (1) walking around on a cold floor without shoes on, (2) getting wet when sweating, and (3) exposure to cold weather. The Mexican-Americans, Mexican, and Guatemalan groups also endorsed that eating or drinking cold foods could cause a cold. Finally, the Mexican, Guatemalan, and Puerto Rican samples also endorsed dirty air or pollution could cause a cold. All five groups did not endorse witchcraft or *mal de ojo* (evil eye) as causes of a cold.

Regarding the treatment or prevention of a cold, Baer et al. (1999) found participants in all five samples endorsed the following: (1) drinking liquids, (2) medicine from a doctor, (3) teas (specifically orange or lemon tea), (4) vitamins, and (5) Vicks (VapoRub or *Vaporu*). Religious treatments such as burning prayer candles or putting water on the body in the shape of a cross were not seen as effective. Thus, findings from this study indicate Latino adults are more likely to endorse natural causes over supernatural causes. However, Baer et al. (1999) did not consider the role of religious

group, religiosity or religious exposure in their study. More research is needed to examine the specific role of religion and how religious Latinos navigate the co-existence of the natural and supernatural causes and treatments of the common cold.

Cancer. Whereas much research has been done on children's understanding of contagious illnesses such as the cold, less work has examined their reasoning about the causes of a more serious, non-contagious illnesses such as cancer. Because less is known about how children think about cancer, the use of more open-ended methodologies to assess the wide range of beliefs that children might hold about this illness are an appropriate first-step to assessing understanding without children simply endorsing causes they are presented with but might not fully understand (Chin et al., 1998). For instance, Chin et al. (1998) asked children in kindergarten through 6th grade about *how* someone gets sick with cancer using semi-structured interviews. Children's answers were coded for both conceptual understanding (i.e., the wide range of responses children provided whether or not they are scientifically accurate) and factual understanding (i.e., whether the responses were scientifically accurate or not). Children's explanations were coded into 13 broad categories, ranging from contagion to bad weather or improper clothing. Only one child out of the 784 mentioned a supernatural cause of cancer – specifically God. This suggests supernatural causes may not be prevalent in children's reasoning about serious illnesses such as cancer. However, 28% of children brought up drugs as a cause of cancer, 22% said casual contact, 17% said heredity, 11% said germs, 10% said unhealthy lifestyles, and 6% said bad weather or improper outerwear. Additionally, only 24% of children gave factually accurate responses, suggesting children

in this age range might not know a lot about cancer.

That said, children are not alone in not knowing much about cancer. One study conducted a qualitative meta-analysis on 25 other studies to examine what healthy adults (i.e., those who do not have cancer) think are the causes of cancer (Balmer et al., 2013). They found that adults often listed hereditary/genetics, age (i.e., being older), lifestyle (e.g., smoking), environment (e.g., pollution), physical and emotional trauma, and infections as the causes of cancer. Other studies have found adults give both natural (heredity, diet, stress) and supernatural (e.g., God's will, chance, fate or destiny) (Taylor, 1995). That said, across these studies, participants often reported doubt in their understanding of the causes of cancer, suggesting children are not the only ones who struggle to explain this complex illness.

Children's Understanding of The Common Cold vs. Cancer. As previously highlighted, there are differences between 5- to 10-year-old children in how they understand contagious illnesses versus non-contagious illnesses – specifically when examining children's understand of the common cold and cancer (e.g., Bares & Gelman, 2008; Chin et al., 1998). Bares and Gelman (2008) were interested in examining six aspects of children's understanding and knowledge of the common cold and cancer: prognosis (e.g., if illness goes away on its own), internality (e.g., being a part of the blood system), course (e.g., if illness typically requires hospitalization), contamination (e.g., being caused by germs), contagion (e.g., being contagious), and unknown cause (e.g., if we always know why someone becomes sick with the illness). Children from three age groups (5-, 7-, and 10-years-old) and adults were presented with vignettes in which a

character was sick with the illness (cold or cancer) and asked a series of yes/no questions from one of the six dimensions. Answers were coded for being scientifically accurate or not (e.g., saying "yes" to the contamination question for cancer was marked as being incorrect, but saying "yes" for cold would be marked as correct). Results showed that the 5-year-olds viewed cancer similarly to the common cold (e.g., both are caused by contamination), but by the age 7-years, children began to distinguish between the common cold and cancer within the dimensions of prognosis and contamination. That said, 7-year-olds still viewed both the cold and cancer as being contagious illnesses. Additionally, even though the authors used a within-subjects design and asked all participants about both the common cold and cancer, the focus was more on if children had the correct scientific knowledge about each illness in an evaluative manner, and not on the role of the cultural context in how children's knowledge of each illness is formed. Moreover, Bares and Gelman (2008) did not address what range of causes children and adults might endorse as the causes of each illness, or if children in their study even knew what cancer was.

Causal Mechanisms of Illness: Folk, Scientific, and Supernatural Causes Used in Causal Explanations of Illness

As previously outlined, causal mechanisms may be categorized by what type of mechanism is the cause: natural (folk, scientific) or supernatural (Legare et al., 2012; Shtulman, 2017). Regarding the causes and treatments of biological illness, this categorization may also be used. In fact, recent studies have begun to show that children as young as 3-years-old in several cultures (US, India, China, Japan) do in fact endorse

different types of explanations for why people get sick: folk explanations and scientific explanations (Bares & Gelman, 2008; Raman & Gelman, 2004; Raman & Winer, 2002; Toyama, 2016; Zhu et al., 2009). For example, in a study examining Chinese 3- to 5-year-old children's and young adults' explanations for the causes of illness, Zhu et al. (2009) found differences by age and by SES. Specifically, adults tended to give biological causes (e.g., decreased immune system) and psychogenic factors (e.g., emotional events or states), whereas older children gave a mixture of biological causes, behavioral causes (e.g., not washing hands), and symptomatic causes (any symptoms of an illness; e.g., because of a fever) and younger children tended to give more behavioral and symptomatic causes. However, there were also differences by SES, with children from a higher SES reporting more biological causes overall than children from a lower SES. This indicates the effects of parents' education, income, (and perhaps as a result, better schooling for children) on children's understanding of biological illnesses and their causes. It may be that parents in the higher SES group were more likely to give more frequent, and even higher quality, instruction to their children about biological illnesses. This study was also similar to others (Notaro et al., 2001) that found preschool-age children do not give emotional, or psychological, causes for illness.

Folk Causal Mechanisms

Folk causal mechanisms may be given for both causes and treatments of illness. For instance, the idea of *cold weather* causing illness is a common folk cause given for why individuals get sick with a cold or flu, in both children and adults (Myant & Williams, 2005; Raman & Winer, 2002; Sigelman, 2012; Sigelman & Glaser, 2019). In

one study examining the cold weather theory, results indicated differences by ethnic groups within the US (Sigelman, 2012): Mexican American children were more likely than European American children to endorse the folk explanation of cold weather. Sigelman (2012) proposed that this was because of sociocultural differences, potentially as a result of parental education and parental belief systems, though neither of those aspects were measured.

Scientific Causal Mechanisms

As covered above (see Toyama, 2016; Zhu et al., 2009), scientific causal mechanisms for causes of contagious illness include germs, viruses, bacteria, and contagion (broadly). For non-contagious illnesses, genetics or heredity and lifestyle (e.g., diet, exercise) may be causes an illness.

Supernatural Causal Mechanisms

Finally, supernatural causal mechanisms, such as witchcraft, may also be given to explain biological illnesses (e.g., Legare & Gelman, 2008). Gray and Wegner (2010) highlight another supernatural cause individuals might give when explaining harm: God. God is often viewed as a moral agent who is high in agency (i.e., ability to do things and act on the world) but low in experience (i.e., ability to think or feel). Because of this, Gray and Wegner (2010) propose that God may be viewed as not just *a* moral agent, but the *ultimate* moral agent in which individuals both accuse for their problems but also praise for their successes. However, it is not known if this is true across ages and across different types of problems (e.g., illness, injury, economic, etc.). Moreover, God is just one of many religious agents within the Abrahamic religions. Do individuals also blame

and praise other religious agents (e.g., saints, angels, demons, the devil)?

Another supernatural process-like mechanism (as opposed to agents) that may also be endorsed as a cause of illness is immanent justice, or the idea that bad things will happen to bad people because of retribution or punishment (Callan et al., 2014; Raman & Winer, 2004). For instance, Raman and Winer (2004) found that immanent justice explanations were more frequently endorsed by adults than children – in line with other research that found supernatural explanations increase with age (e.g., Woolley et al., 2011). Moreover, the rate of endorsement of immanent justice explanations may also be related to religiosity, as the Abrahamic religions often teach "an eye for an eye" lessons in the Bible (Callan et al., 2014; Harvey & Callan, 2014). Harvey and Callan (2014) examined the link between level of religiosity (defined as frequency of church attendance and importance of religious beliefs) and belief in immanent justice in Christian and Non-Affiliated adults. Parents read a short vignette in which a character was either described as being a thief (i.e., bad behavior) or a volunteer (i.e., good behavior) and then was involved in an accident in which a tree came crashing down. Overall, adults judged the volunteer as being less deserving of this incident than the thief, but how much the thief deserved this to happen to him depended on the level of religiosity of the participant. Adults high in religiosity judged the thief as more deserving of this incident than adults low in religiosity.

Co-Existence of Causes in Causal Explanations Regarding Biological Illness

Folk, scientific, and supernatural explanations co-exist in individuals and their cultural systems and are sometimes even given to explain the same event (Legare &

Gelman, 2008; Legare et al., 2012; Legare & Shtulman, 2018; Shtulman, 2017). For example, in a study examining the illness and disease transmission of AIDS in a cultural context that warrants both scientific (e.g., Western medicine) and supernatural (e.g., witchcraft) explanations (South Africa), Legare and Gelman (2008) examined which causal explanations children between the ages of 5- and 15-years-old and adults would endorse most frequently. Across two studies, children and adults were either presented vignettes describing an individual who was sick the flu or with AIDS, and then asked if a few different causes led to the character becoming sick: scientific (e.g., playing with someone who is sick), moral (e.g., lying), supernatural (e.g., bewitchment), and irrelevant – to be used as a control (e.g., drawing a picture). The results indicated children endorsed scientific explanations most frequently for both the flu and AIDS. Adults on the other hand highly endorsed both natural and supernatural explanations as causes of the flu and AIDS, indicating the co-existence of natural and supernatural explanations may increase with age. That said, children in these communities were being taught in school that supernatural causes like witchcraft do *not* cause AIDS, so the lower endorsement of supernatural explanations in this child sample may be a result of their schooling.

Other research in the US and India has also found young children (preschool through fifth-grade) and young adults endorsed multiple causes for the origins of illness: biological (germs, contamination), moral (e.g., being punished by God for bad behavior), psychological (e.g., feeling guilty), or irrelevant (Raman & Gelman, 2004). There was also a developmental shift in the number of co-existing causal explanations children endorsed by age group. Specifically, preschoolers in the US gave more co-existing

explanations than preschoolers in India, but fifth-graders in India gave more co-existing explanations than fifth-graders in the US. However, overall, children endorsed culturally relevant biological causes most frequently (India: contamination; US: germs), and it was only the adults who frequently endorsed moral causes.

Co-existence in explanations can also occur between the folk and scientific domains, without necessarily involving the supernatural. For instance, Sigelman and Glaser (2019) analyzed data collected in 1992 and found that 8- to 13-year-old Latino (primarily Mexican-American) and other minority children often endorsed both cold weather and germs or viruses as causes of the flu. That is, just because a child endorsed cold weather, that does not mean they then did not endorse germs or viruses as well.

Together, these studies suggest individuals do not necessarily forgo supernatural or folk explanations after obtaining scientific knowledge of the causes and symptoms of an illness (Legare & Gelman, 2008; Sigelman & Glaser, 2019). Thus, scientific explanations may not necessarily increase with age and education, but instead co-exist alongside folk and supernatural explanations. Moreover, the specific type of co-existing explanations may vary by the cultural relevance of each cause.

Transmission of Explanatory Systems

The specific causal mechanism an individual uses to explain a given event (whether it be witchcraft, God, or magic) *should* be a function of cultural values and the specific contexts in which the mechanism is first introduced (Gauvain, 2001; Gauvain & Nicolaides, 2015; Legare & Shtulman, 2018). This is because cognition does not occur within a vacuum; it is shaped and influenced by the surrounding cultural context

(Gauvain & Perez, 2014). For example, in one study in the US, researchers found that 4- to 6-year-old religious children use *religious* explanations to justify the possibility of *religious* events, in contrast to *scientific* explanations for *scientific* events (Vaden & Woolley, 2011). How did these children decide what the "correct" explanation was, given the topic? Would these children also be just as likely to endorse witchcraft as a supernatural explanation, even though it is not commonly practiced within their culture?

One way to answer these questions is to look at the different ways in which children are introduced or exposed to these different types of explanatory systems, as supernatural causal explanations are shaped by cultural input that must be taught. Specifically, how are these explanatory systems being taught to children? If these explanations are transmitted through verbal or written testimony, what is the roll of language in shaping concept formation? And who are the social partners transmitting this information to children? Children are not "born believers"; that is, they are not born believing that supernatural causes, such as God's wrath, cause illness, so how do some children, but not all, raised in a religious environment come to believe that God may have a causal effect on the on physical and biological world?

The Effect of Language on Concept Formation in Childhood

The first step to examining these questions is to examine the role of language on concept development as many times explanations may be transmitted through verbal or written testimony. Linguistic input, including testimony, shapes children's understanding of concepts. Concepts are mental representations of abstract and non-abstract ideas or beliefs and these concepts are shared across generations and across cultures. According to

Vygotsky (1986), thought development is determined by language. He argues that one cannot teach a concept because a concept is unique to the individual. He highlights Tolstoy's argument that:

> "'It is quite impossible to explain the meaning of a word … When you explain any word, the word 'impression,' for instance, you put in its place another equally incomprehensible word, or a series of words, with the connection between them as incomprehensible as the word itself'" (Tolstoy, 1903, p. 143 as cited in Vygotsky, 1986, p. 150).

That is, even when parents, or other social-partners, explain concepts to children, the parents will not be able to explain all of the different experiences and history that have shaped their *own* concept.

> "'It is not a word, that is difficult to comprehend, but the concept denoted by this word, which the child does not understand. The word is almost always at hand when the concept is ready. Also, the relation of the word to thought, and the formation of new concepts, is such a delicate, complex and mysterious process that any interference results in awkwardness that hinders the process of development'" (Tolstoy, 1903, p. 143 as cited in Vygotsky, 1986, p. 151).

This is also related to the idea that the testimony children receive through conversations with others reflect cultural values, allowing for cultural information to be transmitted (e.g., see Miller et al., 1997).

Along these lines, Nelson and Kessler-Shaw (2002) highlight how language is a cultural system that affects concept formation. They emphasize the importance of taking a child-oriented view to examine language development because this allows for a broader consideration of the social and cognitive influences on language development. Nelson and Kessler-Shaw (2002) propose a Socially Shared Symbolic System (SSSS) in which the child is within a social environment and is in constant communication with others. The child is also part of a shared environment in which they may share attention with

others as well as share a similar meaning of a concept with others. For example, early on, infants are able to use skills such as joint-attention to learn about objects. The symbolic system is shown when words are used as symbols to represent a concept. For example, words may be used to represent an object or entity that is not necessarily physically present. However, just because a child learns the symbolic use of a word does not mean that the child has a conceptual knowledge or understanding of the word. For instance, a child might learn the word "plane," but this does not mean that the child knows the mechanical setup of the plane that allows for the plane to operate in the sky.

Nelson and Kessler-Shaw (2002) claim that words also stabilize, generalize, and allow the learner to enter the social world since they will be able to communicate about concepts that are globally held by others. They also argue that the relationship between a word and object is moderated by what the child's concept of the object is. However, this word-concept relation must be related to another speaker's word-concept relation. The symbolic nature of an object (i.e., the word of the object) might initially start when a mother introduces the object to the child and expresses the word of the object, thus showing her concept of the object. For example, if the mother and child see a dog, the mother might tell the child, "Look, that is a dog," thus showing the child what her concept of the dog looks like. In this instance, the word "dog" serves to means sharing the meaning of the concept of dog. If the child learns the categorization of dog (e.g., has 4 legs, fur, wags its tail, pants a lot), the child can then can make generalizations of the categorization of this concept for future objects that might be similar (i.e., to other animals that have 4 legs, fur, wags its tail, pants a lot). This is similar to Piaget's idea of

schemas and Vygotsky's idea of pseudoconcepts. For example, a two individual's concepts of a dog might be similar in that they are both accurate, concepts of a dog (e.g., both think of a small, furry animal with 4 legs), but the exact characteristics of the dog might differ (e.g., when asked to think of a dog, one person might think of a small, black dog whereas another person might think of a big, fluffy white dog). Thus, experience and the context in which the concept is introduced also shapes concept formation. However, as also highlighted by Piaget, children's schemas are not always correct (e.g., the child might see a cow and call it a dog), and so children's concepts must be accommodated or assimilated as the child has more experience with the concept. Vygotsky also argued that concepts undergo transformations, and inner speech is a tool children can use to change the concept.

In this conceptual framework, Nelson and Kessler-Shaw (2002) focused on objects and concepts, but I would argue that this framework (i.e., the relationship between word and entity is moderated by concepts) can also be applied to abstract, invisible or intangible concepts, such as supernatural beings or concepts of afterlife. Children's concepts of God could correspond to their parents' concepts of God (e.g. omniscience or limitations), and the child could extend those concepts into explanations if they learn that a concept being related to an explanation. For example, if parents use God as a causal reason of why the child did well on the spelling test, the child might later say God is the reason why they scored a goal when playing soccer. That is, the child is taking the concept of "God does good things" and using it as an explanation for whenever anything good happens. Moreover, Nelson and Kessler-Shaw (2002) talk about this SSSS

framework in terms of learning a concept of an object when the object is present and then extending that concept that was created to be able to be present for when the object is not present. Therefore, with intangible concepts (i.e., concepts that are not visible to the human eye), the child might learn about the abstract concept in one context, and then have the ability to apply that abstract concept in another context. One way that this could be done is with causal explanations.

Testimony

Requirement of Testimony for Unobservable Entities

Furthermore, children rely on testimony (verbal or written) for shaping their understanding of invisible, non-observable concepts that cannot be seen or experienced first-hand, such as supernatural concepts (Harris & Koenig, 2006; Harris et al., 2006). For instance, Harris et al. (2006) examined how 4- to 8-year-old children use testimony to inform their understanding of a variety of ontological entities including: real entities observable by everyone (e.g., trees), typically unobservable scientific entities (e.g., oxygen), endorsed beings typically endorsed as real (e.g., Santa Claus), equivocal beings typically endorsed as not existing (e.g., monsters), and impossible entities no one endorses or believes in (e.g., flying pigs). Results indicated children were more confident in the existence of scientific entities (e.g., germs) than endorsed beings (e.g., Santa Claus). Nonetheless, it is evidence for children believing in entities they themselves cannot see but are told about from others.

The type of concept (scientific versus religious) may also affect the type of testimony that is given to children. Children use testimony for learning simple, natural

concepts, such as the name of body parts that are not visible to the human eye (e.g., the brain or the heart) as well as other natural concepts such as the shape of the earth and the life cycle. For example, by the age of 5- or 6-years-old, children understand the use of the brain and by 7-years-old, children understand that one cannot do a brain transplant (Harris & Koenig, 2006). In regard to other natural concepts, such as the shape of the earth, children are slower to understanding that the earth is indeed round and not flat as it perceived. Because it is not possible for children to see the earth is actually round and not flat (unless they were looking down on it from space), children must rely on testimony from others. This is also demonstrated by the historical accounts of the shape of the earth in that when it was suggested that the earth is indeed round, these ideas were not widely accepted at first because they conflicted with what people were able to see. Children's understanding of the life cycle (specifically death), also demonstrate the influence of testimony. For instance, children must learn from others that biological processes that are not normally able to be seen (e.g. brain functioning or a hear beating) stop functioning at death. Thus, children accept claims that they cannot verify for themselves, and they take these claims and rework and assimilate them into their current concepts.

Lane and Harris (2014) also highlight how children also use testimony to acquire concepts that are counterintuitive, such as evolutionary change. Counterintuitive concepts may be defined as concepts or events that conflict with intuitions or expectations of how the world functions. Lane and Harris (2014) argue that counterintuitive concepts often instigate how and why causal questions because they conflict with intuitions or expectations. For example, when explaining how the earth is actually round instead of

flat, this idea might be counterintuitive for children precisely because they are not able to perceive the earth as being round. This might lead children to become skeptical of some testimony since it defies their first-hand perception as well as their existing concept about the shape of the earth.

Factors Affecting the Endorsement of Testimony

Credibility and Accuracy of the Informer. Whether or not children endorse the testimony they receive (either immediately after receiving the testimony or at a later point) is affected by several factors, including if the informer has a credible, accurate history (Corriveau & Kurkul, 2014; Harris & Koenig, 2006; Pasquini et al., 2007; Sabbagh & Baldwin, 2001). For example, in a study by Pasquini et al. (2007), researchers examined how children decide which informants to trust. Results indicated 3-year-olds used an inaccuracy strategy, meaning they trusted individuals who had not made an inaccurate claim before. However, 4-year-olds used a statistical monitoring strategy in which they concluded which informants were accurate or inaccurate by keeping track of how many times an informant made an error, and they trusted the informant who made the fewest errors.

Circular vs. Non-Circular Explanations. The endorsement of testimony is also impacted by whether or not the explanation provides any new information (i.e., non-circular explanation) or just repeats the question (i.e., circular explanation) (Corriveau & Kurkul, 2014), whether or not the explanation is coherent and makes sense (Harris & Koenig, 2006; Keil, 2006; Lane & Harris, 2014), whether the explanation provided is actually an explanation (Nolan-Reyes et al., 2016), and the form of testimony the

explanation is given – such as demonstration versus verbal (Canfield & Ganea, 2014; Luce et al., 2013).

Parental Encouragement of Beliefs in a Concept. . The success of testimony is also dependent on parental encouragement of beliefs in the concept (Canfield & Ganea, 2014; Luce et al., 2013; Tenenbaum & Hohenstein, 2016). For instance, whether or not children endorse belief in supernatural entities such as Santa Claus, angels, the Tooth Fairy, or God might be dependent on whether not their parents encourage the child to believe in the entity in the first place or whether the child is encouraged to think critically about the existence of the entity (Canfield & Ganea, 2014).

Discourse Cues. One final factor that may affect the endorsement of testimony is several different types of discourse, including: speaker confidence or hesitation (Harris & Koenig, 2006; Jaswal & Malone, 2007), content of speech (Canfield & Ganea, 2014; Luce et al., 2013; Nolan-Reyes et al., 2016), and discourse cues in general (Harris et al., 2006). For example, in a study examining the effect of speaker confidence on children learning the label of an object, the results showed that children were less likely to endorse the speaker when the speaker showed signs of hesitation (e.g., saying "I think" or showing non-verbal cues, such as furrowing their eyebrows) than when the speaker showed certainty (Jaswal & Malone, 2007).

Specific Language and Dialect Used. Related to discourse cues, the actual language spoken might also affect children's concept development, particularly when the language uses common phrases that invoke a certain type of causality. For example, in Spanish, phrases such as *si Dios quiere* (English translation: if it is God's will) are

commonly said (Guarnaccia et al., 1992), regardless of whether or not the speaker actually endorses the meaning of the phrase. This phrase (*si Dios quiere*) invokes a supernatural cause because it is suggesting that whether or not the event or action happens is literally up to God and what God wants. However, there is no commonly-said English equivalent. There are also numerous other examples in the Spanish languages. *A la mano de Dios* (at the hand of God) is often said in contexts of starting something new or having uncertainty about something – once again implying that it is up to God. Another phrase, *La Virgen te acompañé* (may the Virgen [Mary the Mother of Jesus] be with you) – often said in the context of wishing someone safe travels or when saying goodbye or good night to someone. *Gracias a Dios* (thanks be to God) – said for just about everything, even if the speaker does not actually think God is the reason behind whatever is being thanked (e.g., saying, "I am going to graduate this year, *gracias a Dios*"). *Mi Dios le pague* is said in the context of saying thank you, but this time, it is inferring that God will repay the person who is being thanked. For example, instead of saying, "Thanks, I owe you!", it is common to say, "*¡Gracias! ¡Mi Dios le pague!*", meaning "I hope that God repays you for what you just did for me." *Primero Dios se puede curar* literally means "God is the only one who determines if an individual recovers from a sickness", but it is also said in the broader context of saying goodbye to an individual; that is, it is up to God if you live another day or if we will be reunited again. When an individual is dying or in a grave situation in which there is not a lot of hope for survival (e.g., medical treatments have failed or there is no other option), the phrase *ponerse en las manos de Dios* (placing oneself in the hands of God) is often said.

Research has yet to examine the possible differences in the frequency of endorsement of supernatural causes (e.g., God) between Spanish-speakers and English-speakers or for bilingual speakers in each language.

Social Partners for Testimony and Explanations in Childhood: An Ecological-Systems Theory Approach

Ecological-systems theory posits an individual's development is influenced by a variety of interacting, nested systems: microsystems (e.g., home, school, religious community), mesosystems (e.g., family-peer link), exosystems (e.g., parent work experience), macrosystems (e.g., cultural belief systems, customs), and chronosystems (e.g., historical time context) (Bronfenbrenner, 1988; 1994). Each system interacts with and is influenced by the other surrounding systems, and an individual could have more that one of each subsystem. For instance, the microsystem consists of the people and/or objects in an individual's immediate environment, thus a child could have a microsystem for home (e.g., parents and siblings), another for school (e.g., teachers and peers) and another microsystem for their religious community (e.g., religious leader). Moreover, an individual is actively involved in shaping their social environment, thus influencing the microsystems and mesosystems (Bronfenbrenner, 1994). For instance, the social exchanges between individuals can vary depending on a number factors including how well the individuals know each other, the individuals' temperament, or the formality of the situation.

Parents, siblings, peers, teachers, medical providers, and religious leaders are all potential social partners who might provide testimony during everyday life experiences

that in turn shapes children's causal reasoning and explanations in early childhood. Each of these individuals are part of the child's microsystem, or immediate surrounding community, according to ecological systems theory. However, it is not known how much children talk about illnesses with others, and if parents believe that siblings, peers, teachers, medical providers, and religious leaders make suitable social partners to teach a child about illness (i.e., macrosystem beliefs).

Siblings. Older siblings have also been shown to play an important role in teaching children about pertinent cultural information through their involvement in everyday tasks (e.g., cooking, cleaning) (e.g., see Maynard, 2002). Previous research has also documented that children use siblings as social partners to guide their concept development (Dunn, 2015; Canfield & Ganea, 2014; Wellman et al., 1997). Therefore, parents might view siblings as being appropriate social partners for teaching children about illnesses. Indeed, prior research has found that having older siblings can shape children's cognition – ranging from helping the child to develop Theory of Mind skills earlier (e.g., Wellman et al., 1997) to potentially helping the development of critical reasoning skills. For example, in a study by Canfield and Ganea (2014), 3- to 6-year-old children and an older sibling between the ages of 6- to 10-years-old were asked to discuss several different topics, including scientific (e.g., brain, germs and viruses, electricity, and magnetism), historical characters (e.g., Christopher Columbus, Rosa Parks, George Washington, Betsy Ross), endorsed entities (e.g., God, Santa Claus, Easter Bunny, and Tooth Fairy), and non-endorsed entities (e.g., unicorns, mermaids, dragons, and witches). Children were given a story book containing each of these topics and older siblings were

instructed to teach their younger sibling about each topic. The sibling-child conversations were coded for the endorsement of each entity (i.e., whether or not the sibling said each entity was real) as well as the type of discourse cues the sibling used when explaining the different entities (e.g., demonstration, physical features of the entity, location of the entity, lack of expertise about the entity, lack of consensus about the entity). Results showed that children rarely talked about whether or not the entity was real (i.e., the reality status of the entity). However, an examination of the discourse cues of older siblings showed they used a lack of consensus when talking about endorsed entities more so than when talking about historical entities or scientific entities. That is, they indicated that some individuals think one thing about the entity whereas some individuals think a different thing. Thus, older siblings indicated to younger siblings that not everyone agrees about endorsed entities (i.e., fantastical entities that receive a lot of social support). Canfield and Ganea (2014) interpreted these findings to mean that these types of discourse cues might lead children to think critically about the entity or even show uncertainty themselves, indicating that testimony from others does in fact affect children's developing concepts.

Peers. Much research in developmental psychology has examined how peer interactions shape a child's social, emotional, and cognitive development (e.g., Chen 2011; Edwards et al., 2006). Indeed, peers, and the friendships they provide, may have positive, lasting effects on a child as peers may provide social support during times of stress (Hartup, 1996), they may promote a sense of belonging and security (Rubin et al., 2006), and peers may help buffer the negative emotional effects of living with a chronic

illness (Reiter-Purtill, & Noll, 2003). Thus, there is the possibility that parents might view peers as being appropriate social partners for teaching children about illnesses.

Teachers, Medical Professionals, and Religious Leaders. When it comes to teaching children about health-related concepts such as illnesses, there are several adults in the community who may be involved in teaching children about illness: the educational community (e.g., schools, teachers), the medical community (e.g., hospital, doctors, nurses), and/or the religious community (e.g., church, priest, religious text). This is because these communities are often places where some type of teaching + learning occurs.

Parents. Much of the research on testimony and the development of children's causal understanding has mostly focused on parents' explanations to their children's questions. Specifically, with parent-child conversations, research indicates that parental explanations can guide children's concept development (Callanan & Oakes, 1992; Canfield & Ganea, 2014; Chouinard, 2007; Frazier et al., 2009; Gelman, 2009; Harris & Koenig, 2006; Jipson & Callanan, 2003; Luce et al., 2013; Nelson & Kessler-Shaw, 2002; Nolan-Reyes et al., 2016; Rosengren & Hickling, 2000; Tenenbaum & Hohenstein, 2016; Vygotsky, 1986; Wellman et al., 1997). Within this line of reasoning is the assumption that children's "why" questions (i.e., asking for a causal explanation) indicate that children are active in their development and curious about how the world works and learning is not a solitary act but instead is one that interactions with others (Gelman, 2009). Moreover, as highlighted earlier, children's initial attempts at their own explanations emerge at around the same time as their first "why" question (around 3-

years-old). This might indicate that when children are asking these "why" questions, they are taking the explanations and information they receive and incorporating it into their own explanations – either through assimilation (i.e., incorporating new information into pre-existing schemas) or through accommodation (i.e., incorporating new information into a pre-existing schema) (Piaget, 1970/2006). And, in fact, research shows that prompting children to provide explanations may actually incite causal reasoning (e.g., Legare et al., 2009) and also help them develop other social-cognitive skills such as Theory of Mind – specifically, false belief – sooner (Amsterlaw & Wellman, 2006; Wellman, 2011).

One studying examining how parental explanations can guide children's concept development examined it within the context of children's understanding of possibility (Nolan-Reyes et al., 2015). Children and parents read short vignettes with either improbable (e.g., owning a lion for a pet) and impossible (e.g., going back in time) events. Parents and children were asked to discuss if each could happen in real life and provide an explanation for why or why not. Afterwards, children were also asked about additional possible, improbable, and impossible events in another storybook by a researcher. Nolan-Reyes et al. (2015) found that children whose parents provided explanations for why the impossible events could not occur judged fewer improbable events to be possible on the subsequent task. However, children whose parents provided explanations for why the improbable events could occur provided more causal justifications (i.e., mechanism, prior cause, consequence, or conditional explanations) in the follow-up storybook task with the researcher. These results indicate parents'

explanations can shape children's understanding of possibility and their own explanations for how events could or could not occur.

Additionally, the type of explanation parents give may vary by the child's gender. For example, one study found parents explained scientific concepts in a science museum more frequently to boys than girls (Crowley et al., 2001). However, it remains an open question if this is true in other contexts, such as the home or school, and if this is true for parents' explanations across disparate domain topics.

One problem that has emerged within the research on child questioning behavior and parental explanations is the assumption that children are consistently asking their parents questions about everything in their surrounding world (Gauvain et al., 2013; Gauvain & Munroe, 2020). But what if children are *not* asking their parents questions about causal mechanisms? For example, in a study by Gauvain et al. (2013), children between the ages of 3- and 5-years from four different cultures (Garifuna in Belize, Logoli in Kenya, Newars in Nepal, and Samoans in America Samoa) were examined in a naturalistic setting (front yard) for how frequently children asked "why" (i.e., asked a causal question). The results indicated that although children in these four cultures asked a lot of questions, they asked very few "why" questions, indicating that there is cultural variation in the types of questions children ask and the types of information that children seek. This study also showed the danger in assuming behavioral actions, such as children asking parents questions, are highly influenced by the surrounding socio-cultural context and researchers should use caution in generalizing behaviors and their meaning across cultures. For instance, in Gauvain et al. (2013), the children in all four cultures were still

very active in their development (defined as playing a role in their own development), but the explanation-seeking behavior that is often seen in Western cultures was not seen in these cultures, thus challenging the claim of the universality of explanation-seeking behavior.

Parental Ethnotheories

The explanations parents provide are a part of their parental ethnotheories (Harkness & Super, 1996). Parental ethnotheories can be defined as parents' cultural belief system, or their understanding of the development of children, their interpretation and meaning making of children's actions and behaviors, and their approach to parenting, including their beliefs about what their role is as a parent. Parental ethnotheories are developed within the historical, cultural context, and are a part of the developmental niche (Super & Harkness, 1986).

The developmental niche is a theoretical framework that connects child development to culture and consists of three subsystems (Super & Harkness, 1986). The first subsystem is the physical and social settings in which the child lives. This subsystem includes the contexts of development, such as sleep arrangements, children's play, or hygiene/cleaning practices. The second subsystem is the customs of child-care and child rearing. This includes the tools, routines, and behaviors used for child-care and child-rearing that are a part of everyday life and is dependent on the specific cultural setting (e.g., specific tools or practices of cooking food). The third subsystem is the psychology of the caretakers. This subsystem includes parental ethnotheories of child behavior and development, as highlighted above. Each of these three subsystems work together

throughout development, thus tying the development of the child in with the broader cultural system. In fact, Super and Harkness (1986) argue that using the framework of the developmental niche allows researchers to identify the specific mechanisms and processes that underlie large-scale, cross-cultural findings because it marries development and culture.

Moreover, studying parental ethnotheories, specifically, allows researchers to (1) examine the process of cultural transmission across generations (i.e., parents to children) and cultural change (e.g., change across and within generations), (2) assess the parents' role (i.e., primary, secondary) as the source of transmission of cultural information in combination with other sources (e.g., siblings, teachers, religious leaders), (3) have a richer understanding of the motivations, goals, and thought-processes behind parental behavior (e.g., parents' time allocation for their children has been shown to vary across cultures, such as how much time is set aside for school, play, or meals; see Harkness et al., 2011), and (4) evaluate parents' beliefs about the age appropriateness for certain topics (e.g., when do parents think children should know about germs?).

This dissertation examines three specific components of parental ethnotheories: (1) parental developmental expectations of children learning about illness, (2) parental views on the acceptability of different social partners or communities as information sources to children in the domain of illness, and (3) parental developmental expectations of child age in relation to these information sources. Moreover, the current study is *not* focused on when the parent views the child as *capable* of learning about illness (e.g., how old the child is when they can fully understand germ theory). Instead, the aim of this

study is to examine parents' views on when other social partners or communities should be a part of the child's intellectual learning about the domain of illness (if at all), and if so, how old the child should be. Additionally, the first component (parental developmental expectations of children learning about illness) includes parents' beliefs about what their own role is a source of transmission of information about the causes of illnesses (i.e., primary, secondary).

Research has not yet fully examined the role of parental ethnotheories on causal reasoning and biological illness. For example, regarding the age at which parents think it is appropriate to teach their children about different causal mechanisms and/or biological illness might vary across cultures, as indicated by the type of testimony parents provide their children depending on how old the child is (Callanan & Oakes, 1992; Luce et al., 2013). In a study by Luce et al. (2013), researchers examined what types of information (e.g., scientific evidence) parents focus on when answering their children's (4- to 8-years) questions about scientific concepts (e.g., causes of climate change) and if children then, in turn, also used similar types of explanations. Results indicated parents provided different types of epistemological information (e.g., providing fixed facts vs. multiple opinions) depending on the age and gender of the child and the topic of the question. Specifically, parents provided more absolutist talk to girls than boys when talking about moral issues, but the opposite was true when talking about scientific issues such as global warming. The authors interpreted this as a possible result of the broader cultural context emphasizing moral behavior for females and more science knowledge and education for males.

Callanan and Oakes (1992) found age differences in the types of explanations that parents provide to children. Specifically, for 3-year-olds, parents tended to focus on prior cause explanations (i.e., a single event or state that occurred prior to the event and thus caused the event), whereas parents of 4-year-olds focused on mechanism explanations (i.e., how something works), and parents of 5-year-olds provided both prior cause and mechanism explanations at about the same rate. However, Callanan and Oakes (1992) used a diary method in which parents recorded the child explanations and the parent responses, so these results should also be interpreted with caution because they might be biased in what the parent chose to write down or what the parent remembered to write down. For example, Frazier et al. (2009) found that when assessing naturalistic conversations (using the CHILDES database), parents only provided a response to children's questions about 36.7% of the time, and this amount decreased with age.

In order to use verbal testimony to assess the transmission of explanatory systems, there is an assumption that children are engaged in the types of conversations with their parents that would provide opportunities for a discussion on causality. Specifically, a lot of the research using verbal testimony and causal explanations has looked for instances where children *request* this information from their parents by asking questions like "why" or "how." But as Gauvain et al. (2013) found, children across cultures do not necessarily ask their parents these types of questions. Therefore, it is important to consider the role of testimony in shaping causal reasoning through a sociocultural lens and consider not just the actions and behaviors of the testimony but instead, the worldviews and cultural values that are being emphasized in the testimony.

Summary

Overall, studies indicate that young children do understand some of the causes of illness, and adults (e.g., teachers, parents) do provide causal explanations for the causes of illness and injury in everyday life. However, previous research has not examined if children and adults endorse folk, scientific, and supernatural causes equally. Moreover, although recent work has begun to examine how natural and supernatural explanations can co-exist within the individual's mind (e.g., Legare & Gelman, 2008), little research has examined perceived religious supernatural causes of illness, outside of just "God" (Gray & Wegner, 2010) or "witchcraft" (Legare & Gelman, 2008). More research is needed to examine if individuals believe other types of religious agents (e.g., Jesus, saints, angels, demons) are also viewed as able to act on the physical world and can cause or treat illness, or if God is the only capable religious agent. Similarly, it is not clear *how* individuals believe religious agents act on the physical world – do the agents do it themselves or do they "inspire" human agents (e.g., God inspired the doctor to perform the successful life-saving surgery, but God did not touch the patient). Moreover, are there perceived limitations for scientific, religious, and non-religious supernatural causes? For example, since there is no cure for cancer, will individuals still rank scientific treatments over religious or non-religious supernatural? Legare and Shtulman (2018) highlight the somewhat common view in the Western world that science and religion have opposing or conflicting belief systems, though data from the Pew Research Center (2014a) indicates 45% of Hispanic Catholics in the US think that, in general, science and religion are often in conflict whereas 50% of Hispanic Catholics in the US see science and religion and

mostly compatible. Additionally, 62% of Hispanic Catholics in the US think science does *not* conflict with their own religious beliefs. To illustrate this view of compatibility between science and religion, millions of religious individuals in the Western world *do* use both scientific (e.g., medicine) and religious (e.g., prayer) treatments for biological problems on a regular basis. Is this view of conflict between science and religion reserved for events in the physical world, such as the understanding of origins (creationism vs. evolution)? Do children and adults see scientific causes or treatments of biological illnesses as those that "oppose" religious ones?

In thinking about the transmission of explanatory systems, research indicates children do endorse testimony of intangible, unobservable entities (e.g., God, germs), and children frequently receive testimony from others (e.g., parents, siblings, peers, teachers) in general. And there are several factors that affect the endorsement of testimony, including the credibility of the informer, if the explanation provides new information, and verbal cues (confidence/hesitation, content of speech, discourse cues), and the type of testimony children receive might vary by language (e.g., informally embedded causal language in Spanish). However, previous research has not examined the extent to which these factors affect the transmission of causal reasoning from parents to children, and if causal reasoning varies, depending on the language spoken. Finally, there is an assumption in previous research that children are asking their parents questions about causal mechanisms on a regular basis. But, that is not true across cultures. What are the other ways in which children are learning about causal reasoning? What do parents think their role is in helping children develop causal reasoning? What do parents think other

individuals' (e.g., siblings, teachers, religious leaders) roles are in helping children develop causal reasoning? At what age do parents think children should know about the different explanatory systems?

Research Questions and Hypotheses

The main research questions of this dissertation pertain to understanding developments in how, when, and why people assign causal responsibility to biological illnesses. Specifically, what causes do children and their parents attribute to the development and treatment of biological illnesses and what are their reasons for endorsing those causes? How do parents approach teaching their children about the causes of illness? The primary theoretical perspective of the study is to examine the developmental niche of children's causal reasoning.

The current study, conducted with bilingual (Spanish-English), Catholic, Mexican-American 4- to 6-year-old children and parents in the US, answered these questions using surveys with parents and children, a story completion task and social-cognitive tests for children, as well an in-depth, open-ended interview with parents.

Endorsement of causal mechanisms

There were three main aims of the current study regarding children's and parents' explanatory systems of biological illnesses.

Aim 1: Proximity of Cause: How vs. Why

One goal of the current study was to examine if children and adults differentiate between *how* and *why* when reasoning causally about the causes and treatments of illnesses. That is, do individuals in this cultural group tend to provide distal and

supernatural causes when asked *why* (e.g., why me??), but more proximal and natural causes when asked *how* (e.g., more mechanistic explanations)? This will be examined via salience scores of explanations in a free-list recall task.

Research Question 1. What specific causes do Catholic, Mexican-American children and adults attribute to the development and treatment of biological illnesses?

Hypothesis 1. It was hypothesized distal causes (e.g., supernatural or religious) would be more salient in explanations for *why* people get sick or get better, whereas proximal causes (e.g., scientific or folk) would be more salient for *how* people get sick or get better.

Aim 2: Co-Existence in Causal Reasoning

The second aim was to evaluate what types of explanatory systems children and adults use.

Research Question 2. Do Catholic, Mexican-American children and adults judge both natural (folk, scientific) and supernatural (religious, non-religious) causes and treatments of illnesses?

The hypotheses in this aim will be tested using three different types of analysis: (1) the types of categories of explanations via a free-list recall task [*Hypothesis 2a, 2c*], (2) cultural consensus on a set of natural and supernatural causal mechanisms [*Hypotheses 2b, 2c*], and (3) cluster analysis to examine patterns of endorsement and the existence of co-existing endorsement (natural + supernatural) [*Hypothesis 2d*].

Hypothesis 2a. Similar to Hypothesis 1, it was hypothesized that there would be both natural and supernatural explanations present at the group level in children's and

parents' justifications for how and why someone gets sick or gets better – indicating co-existence of natural + supernatural. That is, instead of calculating the co-occurrence of natural and supernatural explanations within the individual's explanation, across the entire sample of participants, there would a combination of natural and supernatural justifications present.

Hypothesis 2b. In the direct prompt task, it was expected children and adults will endorse both natural and supernatural causes for the causes and treatments of illnesses, thus indicating co-existence in their causal reasoning. However, the number and type of specific causes will vary by the severity of the illness, with children and adults endorsing more supernatural causes for the more severe illness (cancer) than the less severe illness (cold).

Hypothesis 2c. Additionally, it was hypothesized the type of specific causes children and adults endorse will also depend on the task: recall (coming up with their own list of causes freely) vs. direct prompt (being asked yes/no directly for each cause). Specifically, natural explanations (including folk and scientific) will be more prominent in the recall task than supernatural explanations (religious and non-religious), but endorsement of supernatural explanations will increase for the direct prompt task.

Hypothesis 2d. Fourth, it was hypothesized that children and adults would each cluster into three disparate categories: (1) high endorsement of natural causes, but low endorsement of supernatural causes, (2) low endorsement of natural causes, but high endorsement of supernatural causes, and (3) high endorsement of natural causes, and high endorsement of supernatural causes.

It was also expected that children who fall into Cluster 1 [high natural, low supernatural] and Cluster 3 [high natural, high supernatural] would have higher biological understanding than children in Cluster 2 [low natural, high supernatural]. Next, children in Cluster 2 and Cluster 3 would have higher religious engagement than children in Cluster 1. Finally, children in Cluster 3 will have higher executive function skills and higher analytic reasoning skills than children in Cluster 1 and Cluster 2.

Similarly, for adults, it was expected that adults in Cluster 2 and Cluster 3 would have higher religious engagement than adults in Cluster 1. Additionally, adults in Cluster 3 will have higher analytic reasoning skills than adults in Cluster 1 and Cluster 2.

Hypothesis 2e. Fifth, it was expected that a child's responses would at least partially match their own parent's responses, supporting the argument that parents play a role of transmitting culturally relevant information to their child. However, given that the current study assessed parents and children in separate interviews and the actual process of parent-child transmission was not observed, it is not known how strong of a correspondence between a parent-child dyad would be, or if other variables, such as child age or cognitive skills (e.g., executive functioning) would be related to a stronger correspondence between parents and their children. Therefore, all parent-child analyses were exploratory in nature.

Aim 3: Effects of Language

Broadly, the current study aimed to examine if bilingual children and adults reason about causality and causal explanatory systems differently in different languages: Spanish and English. This is because phrases such as *si Dios quiere* are common in

Spanish, and, subsequently, if children hear supernatural causal mechanisms more frequently in Spanish (e.g., *si Dios quiere*) than English, they may be more likely to use that type of causal mechanism in that language. Thus, all analyses examining the endorsement of causal mechanisms will examine if there are different patterns of results for families interviewed in Spanish and families interviewed in English.

Research Question 3. Do bilingual, Mexican-American children and adults give and endorse different explanations for the causes and treatments of illness depending on the language they are interviewed in?

***Hypothesis 3a*.** It was expected children and adults interviewed in Spanish would provide more supernatural causal mechanisms when listing how and why someone gets sick from or better from an illness than children and adults interviewed in English.

***Hypothesis 3b*.** It was expected bilingual children and adults who are presented the causal mechanisms in Spanish would endorse more religious supernatural causal mechanisms than the children presented with the causal mechanism in English.

Parental Ethnotheories of Explanatory Systems

Aim 4: Parental Ethnotheories

The final aim of the current study was to measure parents' ethnotheories of explanatory systems for different illnesses. Regarding parental developmental expectations: do parents think that they should be the primary person to talk to children about illnesses? Have parents already spoken with their children about these particular illnesses? Regarding the acceptability of different ages as information sources: what communities or social partners do parents believe children should be learning about these

illnesses from? Finally, regarding the child age in relation to these potential information sources: what ages do parents believe children should be to learn about these illnesses – both generally and with specific social partners or communities?

Research Question 4. What are parents' ethnotheories of explanatory systems for different illnesses?

***Hypothesis 4a – I. Developmental Expectations*.** It was expected parents will be more likely to have already talked to their child about the common cold than cancer.

***Hypothesis 4b – III. Child Age – Generally*.** It was expected parents will be more likely to say children should learn about the causes of cold at an earlier age than the causes of cancer. However, the specific ages are not yet known therefore those analyses are exploratory in nature.

The remaining portions examined within parental ethnotheories was all exploratory, as previous research has not yet examined these variables. Specifically,

1. ***I. Developmental Expectations:*** Should parents be the primary individuals to teach children about each illness?
2. ***I. Developmental Expectations:*** If parents say they had talked to their child about the particular illness before, who brought it up in conversation – the parent or the child?
3. ***I. Developmental Expectations:*** How old was the child when the parent or child first brought up each illness (if applicable)?
4. ***II. Appropriate Information Sources:*** Should children learn about each illness from each of the five communities:

a. Older siblings or older cousins

b. Friends

c. Educational community

d. Medical community

e. Religious community

5. ***III. Child Age – Information Sources:*** How old should children be to learn about each illness from each of the five communities (if applicable)?

Chapter 2

Methodology

The main research questions of the dissertation pertained to understanding developments in how, when, and why people assign causal responsibility to biological illnesses. Specifically, what do parents and children claim the development and treatment of biological illnesses? The primary goal of this study was to investigate cultural variation (e.g., language systems) in the explanatory systems parents and children use to explain illness. A secondary goal was to examine which explanatory systems are used specifically as causes of, and treatments for, biological illnesses that vary in severity.

This study answered these questions by assessing children's and parents' endorsements of folk, scientific, religious supernatural, and non-religious supernatural causal mechanisms as possible causes and treatments of illnesses, as well as parental ethnotheories of explanatory systems of illness. This study was conducted with Catholic, Mexican, bilingual (Spanish, English) 4- to 6-year-old children and parents in the United States. To examine the potential impact of differences in cultural exposure, half of the participants were interviewed in Spanish and half in English.

Study Design

The current study assessed children's and parents' endorsement of different causal mechanisms for two biological illnesses (common cold and cancer) at two time-points in a causal sequence (when getting sick and when getting better) using a mixed-methods design. As minimal prior research has documented the nature of cultural inputs children received about biological illness, the current study incorporated a mixed-methods design

to explore the rich nature of this cultural input as well as to examine the mechanisms through which these inputs are transmitted to children. As outlined in the Introduction, one hypothesized mechanism of cultural difference is the language by which parents communicate about illnesses to their children. As such, language (Spanish, English) was a between-subjects variable in the current study. Biological illnesses, causal mechanisms, and causal sequence (sick, better) were within-subjects variables. All measures were independently translated from English to Spanish by two translators, compared, and then back-translated to English to ensure validity (Erkut, 2010; see the following Appendices for the English and Spanish versions: Appendix A for the Child Survey, Appendix B for the Parent Survey, and Appendix C for the Parent Interview).

Biological Illnesses

Children and parents were asked questions about two illnesses that varied by severity and type: (1) contagious, low-severity – a common cold (*un resfriado*), and (2) non-contagious, high-severity – cancer (*cancer*; see Appendix D for drawings that accompanied the vignettes in the child interview). Prior studies have found the terms used for cold and flu (*catarro*, *resfriado*, *gripe* or *gripa*) vary across different Latino cultures. For instance, Guatemalans tend to use the term *gripe* for both the common cold and flu (Weller, 1984), whereas Mexican-Americans tend to use *resfriado* for the common cold and gripe for flu (Schreiber & Homiak, 1981). As the sample for the current study was Mexican-American, the term *resfriado* was chosen for the current study.

The reasons that the common cold and cancer were chosen as the biological illnesses for the current study were (a) their variation in severity and contagion, as well as

(b) because of the prevalence of each type of illness for the population of interest. Adults tend get sick with the common cold an average of 2 to 6 times per year, and that number increases for children to 6 to 8 times per year, making the common cold an illness that affects most individuals every year (Centers for Disease Control and Prevention, 2020a; Worrall, 2011).

Although cancer as a whole is less prevalent in the population, it is the second leading cause of death in the United States, with the first being heart disease (Centers for Disease Control and Prevention, 2020b). One in 4 deaths in the US is because of cancer. This rate holds true for Hispanics in the US as well. For Hispanics in California, female breast cancer is the most common type of cancer (rate of 93.9 people per 100,000 people), followed by prostate (rate of 78.4 people per 100,000 people), and colon and rectum (rate of 31.9 people per 100,000 people). Thus, cancer is a serious but prevalent illness that may affect the lives of many parents and children, either through their own diagnosis or the diagnosis of someone that they know. Because there are many different types of cancer, each with different probabilities of occurring and potentially very specific causes (e.g., smoking might lead to lung cancer but not pancreas cancer), participants in the current study were asked about cancer generally and not a specific type of cancer as the aim was to understand how individuals explain the causes and treatments of this serious illness as a whole.

Causal Mechanisms

Children and parents were asked about 4 types of causal mechanisms: folk, scientific, religious supernatural, non-religious supernatural (see Appendix E for the

drawings used to depict each causal mechanism). The specific causal mechanisms used depended on if the participant was being asked what caused the sickness or what treated the sickness (see Table 1).

Table 1

A List of the Causes Used When Asking What Caused the Illness and What Treated the Illness

Cause of Illness		**Treatment of Illness**	
Natural: Folk + Scientific	*Supernatural: Religious + Non-Religious*	*Natural: Folk + Scientific*	*Supernatural: Religious + Non-Religious*
Going Outside with Wet Hair	*God	*Herbal Remedies	*God
Improper Outerwear	*Jesus	Eating Healthy	*Jesus
Cold Weather	*Angel	*Medicine	*Angel
Eating Cold Foods	*Saints	*Doctor	*Saints
Playing with Sick Friends [a]	*Priest		*Priest
Bad Air or Pollution	*Devil		*Miracles
Eating Unhealthy	*Demon		*Prayer [*orar*]
*Germs	Not Praying [*No orar o rezar*]		*Praying the Rosary [*rezar*]
Genetics or Heredity	Not Attending Church		Attending Church
	*Evil Eye		*Luck
	*Luck		*Destiny or Fate
	*Destiny or Fate		*Karma
	*Karma		*Magic
	*Magic		*Ghosts or Spirits
	*Ghosts or Spirits		*Witchcraft
	*Witchcraft		Positive Immanent Justice [c]
	Negative Immanent Justice [b]		

Note. There are two different verbs in Spanish for prayer: *orar* and *rezar. Orar* is often used to describe more spontaneous prayer, or talking to God, making requests, etc. whereas *rezar* is typically used in conjunction with praying the rosary [*rezar el rosario*]. Because of this, both *orar* and *rezar* were asked about in the participant interviews.

* = Causal Mechanisms that were included in the reality status task.

[a] = Playing with sick friends was used to represent contagion as 4- to 6-year-old children may not know the specific word, but still understand the concept.

[b] = Negative immanent justice here refers to bad behavior is used to represent bad, moral actions that may then lead to a revenge or punishment type of immanent justice. The specific example used for children and parents was, “Doing something bad to someone else, such as hitting someone.”

[c] = Positive immanent justice here refers to represent good, moral behavior that may then result in a positive form of immanent justice. The specific example used for children and parents was, “Doing something good to someone else, such as helping someone.”

Causal Sequence

Children and parents were questioned about causes that lead to a biological illness (causal chain) and about solutions to the biological illness (solution chain; see Figure 1 in Chapter 1).

Cultural Context

Riverside, CA, United States. Bilingual (Spanish-English), Mexican or Mexican-American, Roman Catholic children and their parents were recruited from Southern California – including Riverside, Moreno Valley, Perris, and San Bernardino. More specific information about participants in the current study is below in the *Participants* section. Riverside is a large, diverse, metropolitan city close to Los Angeles, with about 325,000 inhabitants (see Appendix F for demographics for Riverside County, Riverside, CA (city), and for the sample from the current study).

Why bilingual, Catholic Mexican-American 4- to 6-year-old children and parents in Southern California. The reason for choosing bilingual (Spanish-English) children and their parents is to test a between-subjects comparison for the potential effects of language. Specifically, if there are differences in causal reasoning based on the informal, embedded phrases within a specific language (e.g., *si Dios quiere – Lord willing*), having different participants interviewed in English and Spanish will allow control for some individual variation by testing the frequency of how often parents and children use supernatural causal phrases in each language in their explanations.

The reason for choosing Roman Catholic as the religious affiliation is because the most predominate religious affiliation among Hispanics in the US is Catholicism (see

Appendix G for a breakdown of frequency of religious affiliation, religious practices and exposure, and religious beliefs for Roman Catholics in the United States as well as for the sample from the current study). Additionally, the current study aims to explore how the co-existence of natural and religious explanatory systems emerge in children raised in a religious home.

The reason for choosing Mexican-American children and parents is because prior research has documented the existence of wide range in explanatory systems within this culture – including both natural (folk, scientific) and supernatural (religious, non-religious) explanations (e.g., Baer et al., 1999; Pew Research Center, 2014a,b,c; also see Appendix F and H). However, it is not yet known how these explanatory systems emerge in early childhood, and the extent to which both children and adults endorse natural and supernatural causes and treatments of illnesses.

Finally, the reason for choosing this age range (4- to 6-years) is because children's conceptions of illness change dramatically during these ages, including an understanding of contagion (e.g., Siegal et al., 1990) and of germs more specifically (e.g., Au & Romo, 1999). These changes are outlined in the Introduction. Importantly for designing the methodology, although there are mixed findings on how well children understand germs and endorse germs as causes of illness between the ages of 4- and 6-years-old (e.g., Kalish, 1997), some research has found children generally understand the causal relationship between germs and illness by the age of 6 years (Au & Romo, 1999). Additionally, religious children in the 4- to 6-year age range have been shown to use religious explanations to justify the possibility of religious events, in contrast to scientific

explanations for scientific events (e.g., Vaden & Woolley, 2011); but it is not known how children raised in a religious environment, and within a broader cultural context in which religious and supernatural causal explanations are sometimes given, view the causes and treatments of illness and incorporate these co-existing explanatory systems into their own explanations in this domain (if at all).

Participants

A total of 122 children between the ages of 3.617 to 6.960 (M = 5.285, SD = .844) and a parent/guardian participated in this study between September 2018 and February 2020. Data collection was stopped at the beginning of March 2020 due to the COVID-19 pandemic, thus the initial total sample size goal of 72 participants per language (N = 144) was not achieved.

Families were recruited from Southern California through local preschools and daycares (n = 42), local Catholic churches (n = 33), the UC Riverside Child Studies Database, which recruits families from local community events (n = 24), social media and Craigslist advertisements (n = 14), referrals (n = 8), and local Swap Meets (n = 1). Only 1 child per family participated, even if the family had multiple children within the 4- to 6-year-old age range.

Inclusion and Exclusion Criteria

Because one of the goals of the current study was to examine the development of specific cultural beliefs in children, inclusion criteria for participation included the following: parent + child identifying as Mexican or Mexican-American, parent + child identifying as Catholic, child must be between the ages of 4- and 6-years-old, and child

must be bilingual (Spanish, English); parents themselves did not have to be bilingual. Parents self-selected which language they and the child were interviewed in, and the language always matched for the parent-child dyad (i.e., if the parent were interviewed in Spanish, the child were also interviewed in Spanish). Since the interview language itself did not use a random assignment methodology, any differences between these two groups may be related to the lack of random assignment and these factors are considered in analyses of the findings and in hypothesis testing. Prior to beginning data collection, all parents reported that their child was bilingual, even if they themselves were not. Because of this, although bilingualism was measured during the study using a variety of methods, no child was excluded from analyses based on their performance on the bilingualism measures.

Parent-child dyads were excluded from data analysis if the parent did not self-identify as Mexican or Mexican American (n = 6; 2 Guatemalan, 2 Salvadorian, 1 Colombian, 1 Honduran). Thus, the total parent sample was 116. An additional 11 children were excluded from data analysis for the following reasons: if they did not provide verbal assent to participate in the study (n = 6), or they did not answer any questions (n = 5). Thus, the total child sample was 105.

Final Sample

Approximately half of the participants were interviewed in Spanish (*Child-n* = 56; *Parent-n* = 64), and the remaining half were interviewed in English (*Child-n* = 49; *Parent-n* = 52). A breakdown of child participants by age and gender is available in Table 2, and information about the parent participants as well as the family is available in Table

3.

Parents also reported the race and ethnicity for the child and themselves, confirming they were all Mexican-American or Mexican-heritage; all parents also confirmed that they identified as Catholic. Additionally, 97.4% of the sample reported that they were the mother, 1.7% were the father, and .9% were the grandmother (but legal guardian). Information on how demographic variables of interest for the current sample (e.g., level of education, income, and number of persons in the home) compare to Hispanics in the US and Hispanics in Southern California specifically can be found in Appendix F and Appendix G.

Table 2

Demographic Information for Child Participants from the Current Study

	Full Child Sample (*N* = 105)	**Children Interviewed in English (*n* = 49)**	**Children Interviewed in Spanish (*n* = 56)**
Child Age – *M (SD)*	5.338 (0.833)	5.241 (0.844)	5.423 (0.821)
Age Range	4.044 to 6.960	4.164 to 6.946	4.044 to 6.960
Child Gender – % Female	56.2%	55.1%	57.1%
Child Age Groups:			
4.00- to 4.99-years	*n* = 42	*n* = 23	*n* = 19
Age – *M (SD)*	4.531 (0.261)	4.508 (0.209)	4.559 (0.316)
Age Range	4.044 to 4.994	4.164 to 4.843	4.044 to 4.994
Child Gender – % Female	54.8%	52.2%	57.9%
5.00- to 5.99-years	*n* = 36	*n* = 16	*n* = 20
Age – *M (SD)*	5.430 (0.316)	5.466 (0.310)	5.402 (0.327)
Age Range	5.029 to 5.952	5.057 to 5.933	5.029 to 5.952
Child Gender – % Female	50.0%	50.0%	50.0%
6.00- to 6.99-years	*n* = 27	*n* = 10	*n* = 17
Age – *M (SD)*	6.470 (0.371)	6.567 (0.346)	6.413 (0.384)
Age Range	6.000 to 6.960	6.051 to 6.946	6.000 to 6.960
Child Gender – % Female	66.7%	70.0%	64.7%
Child Highest Level of Formal Schooling			
No Prior Formal Schooling	12.4%	14.3%	10.7%
Currently Receiving Formal Schooling	87.6%	85.7%	89.3%

	Full Child Sample (*N* = 105)	Children Interviewed in English (*n* = 49)	Children Interviewed in Spanish (*n* = 56)
Type of Formal Schooling for Children in School:			
Headstart	13.0%	14.3%	12.0%
Preschool	30.4%	35.7%	26.0%
TK (Transitional Kindergarten)	9.8%	11.9%	8.0%
Kindergarten	30.4%	21.4%	38.0%
First Grade	16.3%	16.7%	16.0%
Mean % of time child uses each language at school: [a]			
English	75.8%	83.9%	69.2%
Spanish	29.9%	22.7%	35.8%

[a] = Parents were asked to report the % of time their child used each language for these items on a scale of 0% to 100% in two separate questions, so the % of each language may not add up to 100%.

Table 3

Demographic Information for Parent Participants from the Current Study

	Full Parent Sample (*N* = 116)	**Parents Interviewed in English (*n* = 52)**	**Parents Interviewed in Spanish (*n* = 64)**
Age of Parent – *M (SD)*	35.829 (7.041)	32.918 (6.862)	38.149 (6.326)
Age Range	21.283 to 52.978	21.283 to 47.450	23.503 to 52.978
Age of Child Interviewed– *M (SD)*	5.280 (0.844)	5.180 (0.858)	5.358 (0.831)
Age Range	3.617 to 6.960	3.951 to 6.946	3.617 to 6.960
Parent or Legal Guardian Relationship to Child			
% Mother	97.4%	98.1%	96.8%
% Father	1.7%	1.9%	1.6%
% Grandmother [a]	.9%	-	1.6%
Gender – Child – % Female	55.2%	55.8%	54.7%
Parent Highest Level of Educational Attainment			
Middle School (8th Grade) or Less	9.6%	-	17.2%
Some High School	15.8%	10.0%	20.3%
High School Graduate or GED	28.9%	32.0%	26.6%
Some College, No Degree	13.2%	20.0%	7.8%
Associate's Degree (A.A., A. S.)	9.6%	10.0%	9.4%
Bachelor's Degree (B.A., B.S.)	15.8%	23.0%	6.3%
Post-Graduate Degree (M.A., PhD, JD)	7.0%	-	12.5%

	Full Sample (*N* = 116)	Interviewed in English (*n* = 52)	Interviewed in Spanish (*n* = 64)
Child Highest Level of Formal Schooling			
No Prior Formal Schooling	11.2%	13.5%	9.4%
Currently Receiving Formal Schooling	88.8%	86.5%	90.6%
Type of Formal Schooling:			
Headstart	13.6%	15.6%	12.1%
Preschool	32.0%	37.8%	27.6%
TK (Transitional Kindergarten)	11.7%	11.1%	12.1%
Kindergarten	28.2%	20.0%	34.5%
First Grade	14.6%	15.6%	13.8%
% of time child uses each language at school: [b]			
English – *M*	77.2%	84.8%	71.4%
Spanish – *M*	29.5%	22.0%	35.2%
Parent Employment [c]			
Full-Time Work	27.0%	42.3%	14.2%
Part-Time Work	12.2%	11.5%	12.7%
Student	7.0%	5.8%	7.9%
Homemaker	49.6%	26.9%	69.8%
Not Employed	12.2%	19.2%	6.3%
Parent Immigration Generation [d]			
First Generation	63.5%	36.5%	85.7%
Age of Immigration to US – M (SD)	17.243 (9.227)	7.566 (7.947)	20.648 (6.988)
Second Generation	35.7%	61.5%	14.3%
Third Generation	.9%	1.9%	-

	Full Sample (*N* = 116)	Interviewed in English (*n* = 52)	Interviewed in Spanish (*n* = 64)
Persons per Household – *M* (*SD*)	5.543 (1.644)	5.577 (1.775)	5.516 (1.543)
Family Income			
Household Income – *M* (*SD*)	$41,151 ($29,234)	$47,796 ($30,737)	$36,194 ($27,261)
Range in income	$5,000 - $192,000	$14,400 - $180,000	$5,000 - $192,000
Status of Home Ownership [e]			
Own Home	42.2%	59.6%	28.1%
Rent Home	57.8%	40.4%	71.9%
Material Security: [e]			
Certainty in ability to buy or produce enough food in next… [*Scale of -2 to 2*]			
1-Month – *M* (*SD*)	1.672 (.811)	1.827 (0.513)	1.547 (0.975)
6-Months – *M* (*SD*)	1.452 (.976)	1.692 (0.755)	1.254 (1.092)
1-Year – *M* (*SD*)	1.304 (1.053)	1.615 (0.796)	1.048 (1.170)
5-years – *M* (*SD*)	1.087 (1.081)	1.327 (1.004)	0.889 (1.109)
Health [f]			
Rating of Health Overall – <u>Parent</u>:			
Excellent – No Problems	23.3%	28.8%	18.8%
Great – Very Few Problems	53.4%	48.1%	57.8%
Sometimes Good, Sometimes Bad	20.7%	23.1%	18.8%
Bad – Several Problems	2.6%	-	4.7%
Very Poor – Lots of Problems	-	-	-
Rating of Health Overall – <u>Child</u>:			
Excellent – No Problems	44.0%	46.2%	42.2%
Great – Very Few Problems	46.5%	42.3%	50.0%
Sometimes Good, Sometimes Bad	9.5%	11.5%	7.8%

Note. All parent and child data reported in this table reflect those of the full sample (116 parent-child dyads), even if the child did not complete the study due to no verbal assent or not wanting to answer any questions.

[a] = The one grandparent who completed the study was the legal guardian of the child, so her data was included in all of the parent analyses.

[b] = Parents were asked to report the % of time their child used each language at school on a scale of 0% to 100% in two separate questions, so the % of each language may not add up to 100%.

[c] = Parents were able to mark all that applied for employment status, so the % of each type of employment may not add up to 100%.

[d] = Parents were asked to describe their immigration generation, but a special note was added that we were ***not*** asking about legal immigration status or the circumstances of how they immigrated to the US if they were a first-generation immigrant. This purpose of this question was solely for the purposes of better understanding the cultural identity of the parent. As such, *First Generation* was defined as, "You came to live in the United States from another country.", *Second Generation* was defined as, "You are a U.S. native with at least one first-generation parent.", and *Third Generation* was defined as, "You are a U.S. native whose parents are also U.S. natives."

[e] = Two additional sets of questions to measure family SES were added to the parent survey: (1) if the family owned or rented their home, and (2) material security in the form of how certain the parent felt that they would be able to buy or produce

enough food in next (a) month, (b) 6-months, (c) 1-year, and (d) 5-years. The material security questions were on a range of [-2] *Very Uncertain* to [+2] *Very Certain*.

[f] = Because one of main constructs of the current study was children's and parents' assessments on the causes and treatments of illnesses, parents were also asked to self-report the rating of health for themselves and for their child.

Child Interview

See the Child Interview in Appendix A for a full list of questions and detailed procedure.

Real/Not Real Sorting Task for Causal Mechanisms

Children were first asked to participate in a sorting task assessing whether each scientific, religious, and supernatural cause was real or not real (N = 21 items see; Table 4 for list of causes).

Table 4

Items Included in the Real/Not Real Sorting Task for Children and Parents

Causal Mechanism	
Natural: *Folk + Scientific*	*Supernatural:* *Religious + Non-Religious*
Germs	God
Medicine	Jesus
Herbal Remedies	Angels
A Doctor	Saints
	A Priest
	The Devil
	Demons
	Prayer [*orar*]
	Praying the Rosary [*rezar el rosario*]
	Miracles
	The Evil Eye
	Luck
	Destiny or Fate
	Karma
	Magic
	Ghosts or Spirits
	Witchcraft

Note. Children we asked to sort these items in a one-on-one interview. Parents were

asked to indicate if these items were real or not real in the online parent survey.

Children were presented with a card depicting the causal mechanism (see Appendix E for all drawings), one-at-a-time, and asked if it was "real" or "not real." Cards that were designated as "real" were placed on a blue sheet of paper in front of the child and brought out again later on during the interview; cards that were designated as "not real" were placed on a red sheet of paper in front of the child and not used again for the remainder of the interview. The order of the cards were randomized prior to the interview. Answers were dichotomously coded as *Real* [1] or *Not Real* [0].

Causal Mechanisms & Inference Type

Children did a story completion task with the researcher (method based off of Corriveau & Harris, in-prep and Richert et al., 2016). The story completion task was done twice: once to assess causal mechanisms in terms of the *causal chain* (i.e., how someone got sick) and once to assess causal mechanisms for the *solution chain* (i.e., how someone got better). All children completed this task in the following order: (1) Cold - Sick, (2) Cold - Better, (3) Cancer - Sick, (4) Cancer - Better. In order to prevent functional fixedness or cognitive fatigue from similar tasks, measures of general cognitive and social-cognitive development were completed between questions about cold and cancer (see below for details). For the story completion tasks, two types of methodologies were used: a free-list task to assess what types of explanations children *recall* on their own, and a direct prompt task to assess which of the 26 possible causal mechanisms children *endorse when explicitly asked* about them. As outlined in the Results section, salience

scores were calculated for free-list tasks and cultural consensus was calculated for the direct prompt task (see Appendix I for a more thorough explanation of each).

Causal Chain. The first story completion task assessed children's belief in the types of causes that *lead to* the illness. Children were read a short vignette with accompanying pictures in which a person was sick with one of the two biological illnesses: a cold or cancer (see Appendix D attachment for list of vignettes). All characters in the vignettes were gender-matched to the child, such that females were asked about Clara for a cold and Violeta for cancer, and males were asked about Martin for a cold and Javier for cancer.

Free-List Recall Task: How vs. why. Children were first asked how and why the character in the story got sick with the illness, allowing children to provide any cause, unprompted. The order of "how" and "why" was randomized on an iPad survey so half of the children were asked about "how" first, and the other half were asked about "why" first. For how, children were asked the following prompt until they said "no": "*Is there any other <u>way</u> in which [Character Name] could have gotten sick with [name of illness]*?" For why, children were asked the following prompt until they said "no": "*Is there any other <u>reason</u> [Character Name] could have gotten sick with [name of illness]*?"

If the child listed a cause from the list of 26 causes chosen when designing the study (see Table 1), the researcher brought out the card depicting that cause and confirmed it with the child. For instance, if the child said, "Because she didn't use her jacket," for why Clara got sick with a cold, the researcher brought out the card showing a character outside not wearing a jacket and asked the child, "Not wearing a jacket like

this?" for confirmation. However, if the child listed any other cause not on the pre-determined list, the researcher drew the new cause on a blank card and placed it on the table next to the vignette drawing.

Two independent coders coded children's responses based on the content of the response; all coding was done in the original language of the interviews (i.e., Spanish transcriptions were not translated to English prior to coding). A third coder reviewed all discrepancies with the initial two independent coders to finalize the data set.

Overall, children provided 488 explanations for *how* and *why* Martin/Clara could get sick with the common cold. Of those 488, there were 113 instances of repeated responses within child (e.g., a child repeating the same response over and over for how). Repeated responses were dropped from subsequent analyses to avoid over-inflation of a category; thus, the total number of unique explanations children provided for *how* and *why* Martin/Clara could get sick with the cold was 375. Children's 375 responses were categorized into 31 disparate categories (91.8% match between two coders for the initial total of 488 explanations that included repeats; see Appendix J, Table 1J for all child coding categories and example quotes).

Similarly, for how a person could get sick with cancer, children provided 388 explanations for *how* and *why* Javier/Violeta could get sick with cancer. Of those 388, there were 58 instances of repeated responses within child (e.g., a child repeating the same response over and over for how), dropping the total number of unique explanations children provided for *how* and *why* Javier/Violeta could get sick with cancer to 330. For cancer - sick, children's 330 responses were categorized into 37 disparate categories

(88.8% match between two coders for the initial total of 388 explanations that including repeats; see Appendix J, Table 2J for all child coding categories and example quotes).

If children's explanations included multiple categories, they were split up into the corresponding category. For example, the following response, "*Because it was cold, and his, um, and then he- he put ice in his mouth, and he got a cold*" was split into two separate categories: coldness in general and eating cold food. Finally, an item had to be listed at least twice to be its own category – excluding within-child repeats (e.g., a child saying the same response over and over) and excluding a categories that were a part of the direct prompt task later on (e.g., only one child listed genetics as a cause of cancer, but the category of genetics was kept for salience scores in the results section since genetics was one of the pre-determined causes used in the direct prompt task).

The remaining explanations that were only given once were grouped into "other" (for both *how* and *why*: $n_{cold\text{-}sick} = 16$; $n_{cancer\text{-}sick} = 13$). The "irrelevant" category consisted of child responses that did not provide an explanation that says *how* or *why* the character got sick (for both *how* and *why*: $n_{cold\text{-}sick} = 44$; $n_{cancer\text{-}sick} = 45$). The "don't know" category consisted of the child indicating they did not know *how* or *why* the character got sick (for both *how* and *why*: $n_{cold\text{-}sick} = 31$; $n_{cancer\text{-}sick} = 60$).

Direct Prompt: Pre-determined list of 26 causal mechanisms. After children finished giving explanations for the open-ended how and why questions, they were then shown the picture cards representing each of the 26 causes chosen for the current study, one at a time, in a random sequence (8 folk [e.g., cold weather], 2 scientific [e.g., germs], 9 religious supernatural [e.g., God], 7 non-religious supernatural [e.g., luck]). Only the

religious, supernatural, and scientific causes that the child had previously endorsed as "real" were used, whereas all folk causes were used. Therefore, the number of causes each child was asked about varied depending on their initial endorsement of real or not real. Children were prompted with the pictures to indicate if the cause could have caused the illness (cold/cancer). Answers were dichotomously coded as *Yes* [1] or *No* [0]. All yes cards were placed on the table in front of the child, and all no cards were placed off to the side.

Each story completion task ended with the researcher listing and pointing out each of the causes the child endorsed as the cause of the illness, and children were asked to tell a story about how the causes together would cause the character to get sick with the illness and if the causes worked together or separately.

Solution Chain. The second story completion activity (solution chain) followed the same procedure. The initial picture of the sick character and all of the causes the child endorsed for what caused the character to get sick remained on the table in front of the child. Children were first reminded that the character was sick, and then the researcher brought out the new picture and told the child that now the character was all better. The researcher then set the new picture down in front of the child such that the picture containing the sick character remained on the left, and the picture in which the character is now healthy, on the right, leaving space in between each picture.

Free-List Recall Task: How vs. why. Once again, children were first asked how and why the character in the story got better from the illness, allowing children to provide any cause, unprompted. The order of "how" and "why" was randomized on the iPad

survey so half of the children were asked about "how" first, and the other half were first asked about "why". For how, children were asked the following prompt until they said "no": "*Is there any other <u>way</u> in which [Character Name] could have gotten better from [name of illness]*?" For why, children were asked the following prompt until they said "no": "*Is there any other <u>reason</u> in which [Character Name] could have gotten better from [name of illness]*?"

If the child listed a cause from the list of 20 treatment causes chosen when designing the study (see Table 1), the researcher brought out the card depicting that cause and confirmed it with the child. For instance, if the child said, "Because she ate healthy food," for why Clara got better from a cold, the researcher brought out the card depicting healthy food and asked the child, "Eating healthy food like this?" for confirmation. However, if the child listed any other cause not on the pre-determined list, the researcher drew out the new cause on a blank card and placed it on the table next to the vignette drawing.

Two independent coders coded children's responses based on the content of the response; all coding was done in the original language of the interviews (i.e., Spanish transcriptions were not translated to English prior to coding). A third coder reviewed all discrepancies with the initial two independent coders to finalize the data set.

Overall, children provided 564 explanations for *how* and *why* Martin/Clara could get better from the common cold. Of those 564, there were 94 instances of repeated responses within child (e.g., a child repeating the same response over and over for how). Repeated responses were dropped from subsequent analyses to avoid over-inflation of a

category; thus, the total number of unique explanations children provided for *how* and *why* Martin/Clara could get better from the cold was 470. Children's 470 unique responses were categorized into 42 disparate categories (79.2% match between two coders for the initial total of 564 explanations that included repeats; see Appendix J, Table 3J for all child coding categories and example quotes).

For cancer better, children provided 449 explanations for *how* and *why* Javier/Violeta could get better from cancer. Of those 449, there were 59 instances of repeated responses within child (e.g., a child repeating the same response over and over for how), dropping the total number of unique explanations children provided for *how* and *why* Javier/Violeta could get better from cancer to 375. Children's 375 unique responses were categorized into 43 disparate categories (87.7% match between two coders for the initial total of 449 explanations that included repeats; see Appendix J, Table 4J for all child coding categories and example quotes).

If children's explanations included multiple categories, they were divided and assigned into the corresponding category. For example, the following response, "*En la medicina, y los ángeles, y rezar, y Dios*," (in medicine, and angels, and praying, and God) was split into four separate categories. Finally, something had to be listed at least twice to be its own category – excluding within-child repeats (e.g., a child saying the same response over and over) and excluding a categories that were a part of the direct prompt task later on (e.g., only one child listed luck as a treatment of a cold, but the category of luck was kept for salience scores in the results section since luck was one of the pre-determined causes used in the direct prompt task).

The remaining explanations that were only given once were grouped into "other" (for both *how* and *why*: $n_{cold\text{-}better} = 25$; $n_{cancer\text{-}better} = 18$). The "irrelevant" category consisted of child responses that did not provide an explanation that says *how* or *why* the character got better (for both *how* and *why*: $n_{cold\text{-}better} = 35$; $n_{cancer\text{-}better} = 34$). The "don't know" category consisted of child indicating they did not know *how* or *why* the character got better (for both *how* and *why*: $n_{cold\text{-}sick} = 20$; $n_{cancer\text{-}sick} = 38$).

Direct Prompt: Pre-determined list of 20 causal mechanism. Similarly to the *causal chain*, after children finished giving explanations for the open-ended how and why questions, they were then shown the picture cards representing each of the 20 causes chosen for the current study, one at a time, in a random sequence (3 folk [e.g., herbal remedies], 2 scientific [e.g., medicine], 9 religious supernatural [e.g., God], 6 non-religious supernatural [e.g., luck]). Only the religious, supernatural, and scientific causes that the child had previously endorsed as "real" were used, whereas all folk causes were used. Therefore, the number of causes each child was asked about varied depending on their initial endorsement of real or not real. Answers were dichotomously coded as *Yes* [1] or *No* [0]. All yes cards were placed on the table in front of the child, and all no cards were placed off to the side.

Each solution-chain story completion task ended with the researcher listing and pointing out each of the causes the child endorsed as the treatment of the illness, and children were asked to tell a story about how the causes would cause the character to get better from the illness and if they worked together or separately.

Measures of General Cognitive and Social-Cognitive Development

Executive Functioning (EF). Children completed a Flanker task in the NIH Toolbox on an iPad to measure inhibitory control and attention (Gerson et al., 2013). The task involves a screen with 5 fish in the middle, and children indicated which direction the middle fish was swimming for 20 trials. If they scored ≥ 90% on the fish stimuli, they did 20 more trials with arrows instead of fish. Children between 3- and 6-years-old always start off with the swimming fish version, whereas children 7-years+ and adults begin with the arrow trials. Scoring was based on a combination of accuracy and reaction time [Possible Range: *0* to *10*]. Computed scores for children in the current study ranged from 0 to 8.120 (M = 3.835, SD = 2.111).

Analytic Reasoning (CRT-D). Children were asked seven brain-teaser questions to measure their analytic and intuitive reasoning (Young et al., 2018; Young & Shtulman, 2020; in press). The questions were designed in a way to trigger an intuitive, but incorrect response. For instance, the question, "What do cows drink?" has an intuitive/incorrect response of "milk" whereas the analytic/correct response is "water." Answers were coded as *Correct/Analytic* [1] and *Incorrect/Intuitive* [0]. Children also often gave "Don't Know" and "other" responses (e.g., saying "my sister" in response to what cows drink). There were three questions in which "other" responses were given more frequently than intuitive responses (race, sheep, butterfly; see Appendix L for more details). Thus, only four questions were included in the calculation of proportion scores correct (Cows, Apples, Weight, Christmas; Overall Cronbach's α = .167; English α = .345; Spanish α = -.116). Scores for the full sample ranged from 0 to .75 (M = .085, SD = .147). However,

due to the low reliability and mean for the child sample, this measure was not included in any analyses.

Understanding of Biology. Five aspects of children's biological knowledge of humans were measured as they may influence the types of causes children endorse: (1) life status (e.g., alive, a living thing), (2) internal anatomical properties or entities (e.g., have a heart, bones, and brain), (3) sensory capacities (e.g., feel that it is cold, feel pain), (4) attributes true of all living things (e.g., ability to grow, breath, and die), and (5) awareness (e.g., feel lonely, feel bored) (based off of Hatano et al., 1993 and Inagaki & Hatano, 2006). Each of the questions had a dichotomous answer of *Yes* [1] or *No* [0], and the proportion correct out of 12 was calculated for a composite *Understanding Biology* score (Overall Cronbach's $\alpha = .820$; English $\alpha = .709$; Spanish $\alpha = .860$). Scores for the full sample ranged from 0 to 1 ($M = .679$, $SD = .260$).

Because the answer to every question in the *Understanding Biology* was yes, an additional measure of understanding of humans in terms of impossibility was also added to the child survey. Children were asked if humans were able to do four different impossible actions that were either biological or physical in nature: turn into a cat, become invisible, fly, or lift up house. Each of the questions had a dichotomous answer of *Yes* [1] or *No* [0], and all four items were reverse coded. The proportion correct out of 4 was calculated for a composite *Human (Im)possibility* score (Overall Cronbach's $\alpha = .694$; English $\alpha = .708$; Spanish $\alpha = .679$). Scores for the full sample ranged from 0 to 1 ($M = .766$, $SD = .310$).

Measures of Child Bilingualism

Because all parents reported their child as being bilingual in Spanish and English, two different methodologies were used to measure children's proficiency in each language. One was a parent-report of their child's understanding of each language, how often the child uses each language in different settings, and how old the child was when they began learning each language. The other was a standardized vocabulary assessment in the NIH Toolbox that the child completed.

NIH Toolbox Picture Vocabulary Test (TPVT). Children completed a vocabulary assessment in the NIH Toolbox on an iPad to measure their understanding of each language (Gerson et al., 2013). For children interviewed in English, they completed the English vocabulary assessment about halfway through the interview and the Spanish vocabulary assessment at the very end. For children interviewed in Spanish, they completed the Spanish vocabulary assessment about halfway through the interview and the English vocabulary assessment at the very end.

The task involves a screen with four pictures, an audio voice says a word, and children must match the word that was said to the picture that most closely represents the meaning of that word. The task is also adaptive such that each question depends on the child's previous response and becomes progressively harder the better the child does. The age-adjusted scores represent how the child does for their age level. A score of 100 means the child is average for their age level whereas a score of 115 means above average, a score of 130+ means superior ability, a score of 85 means below average, and a score of 70 or below means significant impairment in language ability. Age-adjusted

computed scores of English vocabulary for children in the current study ranged from 54 to 128 (M = 88.702, SD = 16.725). Age-adjusted computed scores of Spanish vocabulary for children in the current study ranged from 54 to 131 (M = 100.608, SD = 14.952).

Parent Survey

See the Parent Survey in Appendix B for a full list of questions and detailed procedure.

Demographics

Using an online Qualtrics survey, parents completed a 35-minute computer survey containing demographic information for both the child and parent (e.g., age, gender, ethnicity, SES, frequency of seeing a doctor and taking medication, rating of overall health, level of formal education, religious affiliation). To measure bilingualism, parents also reported the percentage of time the child uses English and Spanish in a variety of settings, including during religious practices, as well as the percentage of time the parent speaks to their child in English and Spanish.

Measure of Child Religious Engagement

To measure child religiosity and religious engagement, parents indicated their child's frequency of participation in the following: (1) attend events sponsored by their religious organization, (2) participate in public religious practices (e.g., at a religious institution), (3) attend religious services (e.g., mass), (4) participate in private religious practices (e.g., at home), and (5) receive any sort of formal religious education or training. Items were scored on a 9-point Likert scale of [0] *Never* to [8] *Multiple Times a Day* and averaged (Overall Cronbach's α = .685; English α = .717; Spanish α = .626).

Average scores for the full sample ranged from 0 to 6.50 (M = 2.058, SD = 1.466)

Measure of Parent Religious Engagement and Religious Beliefs

To measure parent religiosity and religious engagement, parents indicated their own frequency of participation in the following: (1) participate in public religious practices (e.g., at a religious institution), (2) attend religious services (e.g., mass), (3) participate in private religious practices (e.g., at home), (4) receive any sort of formal religious education or training, (5) confession (formal or informal), (6) adoration (formal or informal), and (7) attend retreats sponsored by their religious organization. Items were scored on a 9-point Likert scale of [0] *Never* to [8] *Multiple Times a Day* and averaged (Overall Cronbach's α = .815; English α = .846; Spanish α = .773). Average scores for the full sample ranged from 0 to 5.00 (M = 2.028, SD = 1.360)

Parents also reported their certainty in the existence of God on a 5-point Likert scale, *God Definitely Does Not Exist* [-2] to *God Definitely Does Exist* [+2], as well as how religious they consider themselves to be (*Not at all Religious* [-2] to *Very Religious* [+2]), and how spiritual they consider themselves to be *Not at all Spiritual* [-2] to *Very Spiritual* [+2]).

Real/Not Real for Causal Mechanisms

Parents were asked to report the reality status of the same 26 causal mechanisms children were asked about in the real/not real sorting task (see Table 1 for list of causes). However, unlike children, parents were not shown cards of the causes. The order of the causal mechanisms was randomized on the survey. Additionally, parents were able to choose, "Real", "Not Real", or "Don't Know."

Analytic Reasoning (CRT-D)

Parents were asked the same seven brain-teaser questions as children in order to measure their analytic and intuitive reasoning (Young et al., 2018; Young & Shtulman, 2020; in press). Answers were coded as *Correct/Analytic* [1] and *Incorrect/Intuitive* [0]. Unlike children, parents rarely gave "Don't Know" and "other" responses (e.g., saying "*a veces* (sometimes)" in response to what cows drink; see Appendix L for more details). Thus, unlike children, all seven questions were included in the calculation of proportion scores correct (Overall Cronbach's $\alpha = .425$; English $\alpha = .423$; Spanish $\alpha = .448$). Scores for the full sample ranged from 0 to 1.00 ($M = .452$, $SD = .219$). However, due to the low reliability for the parent sample, this measure was not included in any analyses.

Measures of Parent Bilingualism

Although parents were not required to be bilingual in English and Spanish (unlike their child), two different methodologies were used to measure parent's proficiency in each language. One was a self-report of their understanding of each language, how often they use each language in different settings, and how old they were when they began learning each language. The other was a standardized vocabulary assessment in the NIH Toolbox that the parent completed.

NIH Toolbox Picture Vocabulary Test (TPVT). Parents completed a vocabulary assessment in the NIH Toolbox on an iPad to measure their understanding of each language (Gerson et al., 2013). For parents interviewed in English, they completed the English vocabulary assessment after completing the parent survey but before participating in the parent interview, and the Spanish vocabulary assessment was done at

the very end. For parents interviewed in Spanish, they completed the Spanish vocabulary assessment after completing the parent survey but before participating in the parent interview, and the English vocabulary assessment was done at the very end.

The task involves a screen with four pictures, an audio voice says a word, and children must match the word that was said to the picture that most closely represents the meaning of that word. The task is also adaptive such that each question depends on the parent's previous response and becomes progressively harder the better the parent does. The age-adjusted scores represent how the parent does for their age level. A score of 100 means the parent is average for their age level whereas a score of 115 means above average, a score of 130+ means superior ability, a score of 85 means below average, and a score of 70 or below means significant impairment in language ability. Age-adjusted computed scores of English vocabulary for parents in the current study ranged from 54 to 111 (M = 77.461, SD = 14.570). Age-adjusted computed scores of Spanish vocabulary for parents in the current study ranged from 73 to 127 (M = 98.763, SD = 12.631).

Parent Interview

Parent interviews consisted of questions regarding parental ethnotheories of teaching children about illnesses and a story completion task for each causal mechanism and inference type (see Appendix C for a full list of questions and detailed procedure).

Parental Ethnotheories

After completing the computer-based survey, parents were interviewed with the goal of understanding three components of parental ethnotheories of explanatory systems. Specifically, the first component (parental developmental expectations of children

learning about illness) was measured in four questions:

(a) Who should be the primary person(s) to teach children about each illness?

(b) Has the parent previously spoken to their child about the causes of each illness?

(c) If yes, who brought it up in conversation – the parent or the child?

(d) If yes, how old was the child when the parent or child first brought up each illness?

The first question (*a*) measures parental developmental expectations by examining parents' beliefs about what their own role is a source of transmission of information about the causes of illnesses (i.e., primary, secondary). Questions (*b*) to (*d*) measure parental developmental expectations by assessing parents' beliefs about who should bring up this topic of information – the parent or child, and how old is the child when this information is typically brought up.

Regarding the second and third components of parental ethnotheories, for both cold and cancer, parents were asked if children should learn about the causes of each illness from 5 communities, and if so, at what age, and what the child should learn. The five communities were: (a) older siblings or older cousins, (b) friends, (c) educational community, (d) medical community, (e) religious community. This series of questions measures parent's views on the acceptability of different social partners or communities as information sources to children as well as the developmental expectations of child age in relation to these information sources. That is, when (if ever) should these other social partners or communities be a part of the child's intellectual life for these topics?

Causal Mechanisms & Inference Type

During the parent interview, parents were also told the same vignettes and asked the same questions as the child for cold - sick, cold - better, cancer - sick, and cancer - better. The only differences between the child and parent methodology for the causal chain and solution chain was that (1) parents were not provided pictures of the characters or the individual causal cards, and (2) parents were asked about all causes regardless if they indicated on the parent survey if a cause was real or not real.

Free-List Recall Task: *How* vs. *Why*. Similar to children, parents were first asked *how* and *why* the character in the story got sick with the illness (or better from the illness), allowing them to provide any cause, unprompted, prior to introducing each of the potential causal mechanisms of interest. Two independent coders coded parents' responses based on the content of the response; all coding was done in the original language of the interviews (i.e., Spanish transcriptions were not translated to English prior to coding). A third coder reviewed all discrepancies with the initial two independent coders to finalize the data set.

Overall, the 116 parents provided 704 explanations for *how* and *why* Martin/Clara could get sick with the common cold. Of those 704, there were 56 instances of repeated responses within parent (e.g., a parent repeating the same response over and over for how). Repeated responses were dropped from subsequent analyses to avoid over-inflation of a category; thus, the total number of unique explanations parents provided for *how* and *why* Martin/Clara could get sick with the cold was 648. Parents' 648 responses were categorized into 36 disparate categories (92.3% match between coders for the initial total

of 704 explanations that included repeats; see Appendix K, Table 1K for all parent coding categories and example quotes).

For cancer sick, parents provided 629 explanations for *how* and *why* Javier/Violeta could get sick with cancer. Of those 629, there were 36 instances of repeated responses within parent, dropping the total number of unique explanations parents provided for *how* and *why* Javier/Violeta could get sick with cancer to 593. Parents' 593 responses were categorized into 35 disparate categories (86.6% match between coders for the initial total of 629 explanations that included repeats; see Appendix K, Table 2K for all parent coding categories and example quotes).

For cold better, parents provided 855 explanations for *how* and *why* Martin/Clara could get sick better from a cold. Of those 855, there were 68 instances of repeated responses within parent, dropping the total number of unique explanations parents provided for *how* and *why* Martin/Clara could get better from a cold to 787. Parents' 787 responses were categorized into 37 disparate categories (89.7% match between coders for the initial total of 855 explanations that included repeats; see Appendix K, Table 3K for all parent coding categories and example quotes).

For cancer better, parents provided 908 explanations for *how* and *why* Javier/Violeta could get better from cancer. Of those 908, there were 62 instances of repeated responses within parent, dropping the total number of unique explanations parents provided for *how* and *why* Javier/Violeta could get better from cancer to 846. Parents' 846 responses were categorized into 34 disparate categories (93.9% match between coders for the initial total of 908 explanations that included repeats; see

Appendix K, Table 4K for all parent coding categories and example quotes).

If parents' explanations included multiple categories, they were split up into the corresponding category. For example, the following response, "Uh, and I mean, praying to God" was split into two separate categories: prayer [*orar*] and God. However, an explanation such as, "And, I mean, prayers obviously. Yeah," was only coded as prayer [*orar*]. Finally, something had to be listed at least twice to be its own category (excluding within-parent repeats, such as a response saying the same response over and over); all explanations that were only given once were grouped into "other" (for both *how* and *why*: $n_{cold\text{-}sick} = 8$; $n_{cancer\text{-}sick} = 14$; $n_{cold\text{-}better} = 10$; $n_{cancer\text{-}better} = 16$). The "irrelevant" category consisted of parent responses that did not provide an explanation that says *how* or *why* the character got better (for both *how* and *why*: $n_{cold\text{-}sick} = 6$; $n_{cancer\text{-}sick} = 4$; $n_{cold\text{-}better} = 4$; $n_{cancer\text{-}better} = 1$). The "don't know" category consisted of the parent indicating they did not know *how* or *why* the character got sick (for both *how* and *why*: $n_{cold\text{-}sick} = 15$; $n_{cancer\text{-}sick} = 103$; $n_{cold\text{-}better} = 5$; $n_{cancer\text{-}better} = 19$).

Procedure

Each child and his or her parent/guardian were interviewed in an on-campus laboratory ($n = 56$) or in the family's home ($n = 60$); parents chose the location. For the families interviewed in English, 57.7% of them were completed in the on-campus laboratory, and 40.6% of families interviewed in Spanish were completed in the on-campus laboratory. All parents provided written informed consent. and all children provided verbal informed assent. Participants were compensated $20 for their time, and each child also received a small toy worth approximately $1.

Children were interviewed one-on-one by a trained, bilingual, Latinx undergraduate research assistant while the accompanying adult filled out a computer survey and also completed a one-on-one interview by a different trained, bilingual, Latinx undergraduate research assistant. Child interviews completed in English took an average of 75-minutes (Range: 44- to 145-minutes), and those completed in Spanish took an average of 89-minutes (Range: 60- to 136-minutes). Parent online surveys took an average of 35- to 40-minutes for both languages. Parent interviews completed in English took an average of 52-minutes (Range: 33- to 123-minutes), and those completed in Spanish took an average of 54-minutes (Range: 31- to 89-minutes).

The child interview began with the researcher coloring a picture with the child before asking verbal assent. Children were first asked to complete the Real/Not Real sorting task. Afterwards, children were asked two counterfactual reasoning questions followed by completing an executive function task on the iPad. Children were then asked how and why people get sick (in general), and then asked a series of questions about the first sickness: the common cold. First they were asked the causal chain questions (the causes of the cold) followed by the solution chain (treatment). Next, children played a vocab game on the iPad (English if the interview was in English, Spanish if the interview was in Spanish). Afterwards, they were asked the series of questions about the second sickness: cancer. Then children were asked two more counterfactual reasoning questions followed by questions on their understanding of biological phenomena and the analytic reasoning task (CRT-D). Finally, the child interview concluded with children being asked some questions about their understanding of prayer, and the last iPad game (Spanish

vocab if the interview was in English, English vocab if the interview was in Spanish). Children also received stickers throughout the interview process.

Parents completed the online survey, followed by an iPad vocab game (English if the interview was in English, Spanish if the interview was in Spanish). Then, parents were interviewed one-on-one by a researcher. Parents also provided verbal consent to participating in the interview. The interview started with some confirmation questions about who lives in the home and what percentage of time the child interacts with each caregiver. Parents were then asked how and why people get sick (in general), and then asked the series of questions about the specific illnesses. However, for parents, they were presented with the causal chain, followed questions regarding their ethnotheories of teaching children about that illness, before concluding with the solution chain. Parents completed this twice: first for the cold, second for cancer. Finally, the parent interview concluded with parents being asked some questions about their understanding of prayer, and the last iPad game (Spanish vocab if the interview was in English, English vocab if the interview was in Spanish).

Chapter 3

Results

Four sets of preliminary analyses were conducted. First, as one of the goals of the current study was to assess how the language of the interview might relate to bilingual children's reasoning about causality, the nature of bilingualism and potential differences in the Spanish and English conditions in the parent and child samples were examined. Although parents were not required to be bilingual in order to participate in this study, all parents reported that their child was to some extent bilingual. Second, Pearson Product Moment Correlations were conducted to examine the relationships between the main variables of interest for both parent and child. To explore the language of the interview, the correlations were run both for the full sample as well as within each language condition. Third, because children and parents were asked if a variety of different causal mechanisms could either cause or treat two illnesses, the extent to which participants in this study believed these causal mechanisms to be real was analyzed, again for the sample as a whole as well as within each language group. This analysis provide a qualitative picture of the nature of parents' and children's reasoning about biological illness. Fourth, as one of aims of this study was to examine whether parents and children utilize coexisting natural and supernatural explanations for illness, a series of response-focused and participant-focused analyses delineated the nature of parents' and children's responses. The first analysis approach examined *if* both supernatural and natural explanations were even present in parent and child explanations before assessing the frequency with which specific causal mechanisms were endorsed. Second, a cluster-

analysis tested the extent to which children's responses can be differentiated by whether they prioritize a particular type of explanation or utilize a variety of explanations and whether these clusters differ meaningfully from each other.

To answer the four main research questions, results will focus on a set of mixed-methods analyses and will be discussed in the following order: (1) salience scores on open-ended explanations for *how* and *why* illnesses occurred (i.e., a character became sick) or went away (i.e., the character was no longer sick), (2) cultural consensus analyses on the causes and treatments of illnesses for both parents and children, (3) cluster analyses on patterns of natural and supernatural explanations endorsed, and (4) descriptions of parental ethnotheories on communities who should teach children about the common cold and cancer and appropriate ages for children to learn about each illness.

Preliminary Analysis

Bilingualism in English and Spanish

Parent. To assess parents' level of bilingualism, parents reported their own levels of understanding of English and Spanish (see Table 5). Though it should again be noted that the parent was able to choose the interview language, so the interview language itself did not use a random assignment methodology, and any differences between these two groups may be related to the lack of random assignment. For instance, 76.9% of parents who opted to interview in English reported English as their primary language, whereas 92.2% of parents who opted to interview in Spanish reported Spanish as their primary language. Additionally, there were 13 parents who were interviewed in Spanish who reported they did not know any English – even though their child did.

Parents interviewed in Spanish began learning English at a significantly older age (M = 11.529 years, SD = 4.012) than the parents who were interviewed in English (M = 5.769 years, SD = 3.551) – with about a 5.75-year age difference on average. However, there was not significant difference for parents for when they began learning Spanish.

Parents also reported that the percentage of time that they typically speak English significantly varied by interviewed language: those interviewed in English tended to speak English more frequently (M = 74.4% of the day) compared to parents interviewed in Spanish (M = 27.2% of the day). However, the opposite was also true: parents interviewed in Spanish tended to speak Spanish more frequently (M = 84.7% of the day) compared to parents interviewed in English (M = 58.8% of the day).

Finally, parents in both interview-language groups reported using Spanish (M = 82.2%) more frequently than English (M = 22.0%) during religious practices. Moreover, parents interviewed in English reported using English (M = 35.6%) during religious practices significantly more often than parents interviewed in Spanish (M = 10.9%), whereas parents interviewed in Spanish reported using Spanish (M = 86.9%) during religious practices slightly more often than parents interviewed in English (M = 76.5%) – though this difference was not statistically significant.

Regarding how well parents understand and speak each language, parents interviewed in English reported that they understood English and spoke English significantly better than their Spanish-interviewed counterparts. There was no significant difference in parent reports on how well they understood Spanish or spoke Spanish.

Finally, to assess parents' understanding of English and Spanish in a more

standardized way, they each completed the NIH Toolbox Vocabulary assessment in both languages. Results indicated that parents interviewed in English performed significantly better on the English vocabulary assessment than the parents who were interviewed in Spanish. But, parents interviewed in Spanish performed significantly better on the Spanish vocabulary assessment than the parents who were interviewed in English.

Additionally, Pearson Product Moment Bivariate Correlations were conducted to assess if the parent reports of how well they understand each language was related to their performance on these standardized measures. Results indicated that parents did accurately report their understanding of English but not Spanish. How well the parent reported that they understood English (M = 4.422, SD = 1.866) was positively, significantly related to the parent's age-adjusted English NIH vocabulary score (M = 77.461, SD = 14.570), $r(113) = .509$, $p < .001$. However, parent-reported of Spanish understanding (M = 5.853, SD = 0.622) was not significantly related to their age-adjusted Spanish NIH vocabulary score (M = 98.763, SD = 12.631), $r(112) = .009$, $p = .925$. This lack of correlation may be because parents reported a very high understanding of Spanish (M = 5.853 on a scale of 0 to 6), so there was a ceiling effect on this particular measure.

Table 5

Measures of Language Fluency for Bilingualism in Parent Sample

	Full Parent Sample (*N* = 116)	**English (*n* = 52)**	**Spanish (*n* = 64)**	***t*** [d]	***r*** ***effect -size*** [d]
Age Parent Began Learning English – *M (SD)* [a]	8.621 (4.751)	5.769 (3.551)	11.529 (4.012)	-7.720***	.605
Age Range	0 to 20.000	0 to 20.000	1.000 to 19.000		
Age Parent Began Learning Spanish – *M (SD)*	0.452 (1.037)	0.385 (1.087)	0.508 (0.998)	0.633	.061
Age Range	0 to 6.000	0 to 6.000	0 to 5.000		
Primary Language in the Home					
% English Primary	20.7%	42.3%	3.1%		
% Spanish Primary	75.9%	53.8%	93.8%		
% Both English and Spanish	3.4%	3.8%	3.1%		
Primary Language of Parent					
% English Primary	37.9%	76.9%	6.3%		
% Spanish Primary	60.3%	21.2%	92.2%		
% Both English and Spanish	1.7%	1.9%	1.6%		
% of Time Parent Speaks In… (Typically) [b]					
English – *M (SD)*	48.4% (32.8)	74.4% (21.2)	27.2% (24.1)	11.067***	.721
Spanish – *M (SD)*	73.1% (29.7)	58.8% (30.5)	84.7% (23.6)	-5.144***	.428
% of Time Parent Participates in Religious Practices (in Home, at Church) In… [b]					
English – *M (SD)*	22.0% (30.6)	35.6% (36.3)	10.9% (19.0)	4.696***	.391
Spanish – *M (SD)*	82.2% (30.1)	76.5% (32.7)	86.9% (27.3)	-1.857	.169

	Full Parent Sample (*N* = 116)	English (*n* = 52)	Spanish (*n* = 64)	*t* [d]	$r_{effect\text{-}size}$ [d]
How Well Parent… [*Scale of 0 to 6*]					
Understands English – *M (SD)*	4.422 (1.866)	5.846 (0.538)	3.266 (1.757)	10.202***	.705
Understands Spanish – *M (SD)*	5.853 (0.622)	5.865 (0.345)	5.844 (0.781)	0.185	.017
Speaks English – *M (SD)*	4.078 (2.188)	5.750 (0.590)	2.719 (2.066)	10.238***	.706
Speaks Spanish – *M (SD)*	5.802 (0.675)	5.769 (0.509)	5.828 (0.788)	-0.466	.044
NIH Toolbox Vocabulary Measure [c]					
English – *M (SD)*	77.461 (14.570)	83.558 (12.544)	72.429 (14.283)	4.392***	.382
Spanish – *M (SD)*	98.763 (12.631)	95.745 (12.252)	101.206 (12.497)	-2.340*	.215

Note. All parent and child data reported in this table reflect those of the full sample (116 parent-child dyads), even if the child did not complete the study due to no verbal assent or not wanting to answer any questions.

[a] = There were 13 parents interviewed in Spanish who reported they did not know English/had not started learning yet. The means and standard deviations are for the remaining 51 parents other than the NIH Toolbox Vocabulary measures. These 13 parents still completed the NIH Toolbox measures are included in the reported means and standard deviations.

[b] = Parents were asked to report the % of time they use each language for these items on a 10-point Likert scale of 0% to 100% (each point of the Likert scale increasing by 10%) in two separate questions, so the % of each language may not add up to 100%.

[c] = The age-adjusted standard score in the NIH Toolbox was reported for both the English and Spanish vocabulary measures.

[d] = Independent Samples T-Tests were done to compare if parents interviewed in English differed from parents interviewed in

Spanish on any of the variables. Effect-size *r* is reported.

* $p < .05$. ** $p < .01$. *** $p < .001$; two-tailed

Child. To assess bilingualism in children, parents were also asked a variety of questions on the parent survey on child's understanding of each language, how often the child uses each language in different settings, and how old the child was when they began learning each language (see Table 6). Children also completed a standardized measure of vocabulary understanding in English and in Spanish using the NIH Toolbox Vocabulary assessments.

Similar to parents, children interviewed in Spanish began learning English at a significantly older age (M = 2.407 years, SD = 1.325) than the children who were interviewed in English (M = 0.980 years, SD = 1.046) – with about a 1.4-year age difference on average. However, there was not significant difference between the ages at which children began learning Spanish.

Parents also reported that the percentage of time that children speak English generally varied by interviewed language: children interviewed in English typically spoke English significantly more frequently (M = 80.6%) compared to children interviewed in Spanish (M = 51.6%). However, the opposite was also true: children interviewed in Spanish typically spoke Spanish significantly more often (M = 62.0%) compared to children interviewed in English (M = 40.8%). These patterns were also similar for the percentage of time that parents spoke to their children in each language; parents spoke to their children more often in English (M = 71.2% of the day) than Spanish for the children who were interviewed in English, whereas parents spoke to their children more often in Spanish (M = 86.1% of the day) than English for the children who were interviewed in Spanish. Finally, children interviewed in English spend about an equal percentage of time

using English (*M* = 51.0%) and Spanish (*M* = 55.5%) during religious practices – though the percent of time doing religious practices in English was significantly higher for these children than the children interviewed in Spanish. Children interviewed in Spanish use Spanish during religious practices (*M* = 71.8%) more often than they use English (*M* = 24.6%); the percent of time doing religious practices in Spanish was also significantly higher for these children than the children interviewed in English.

Regarding how well children understand and speak each language, parents reported that children interviewed in English understood English and spoke English better than their Spanish-interviewed counterparts. However, children interviewed in Spanish were reported as speaking Spanish significantly better than their English-interviewed counterparts. There was no significant difference in parent reports on how well children understood Spanish.

To assess children's understanding of English and Spanish in a more standardized way, children completed the NIH Toolbox Vocabulary assessment in both languages. Results indicated that children interviewed in English performed as well as children interviewed in Spanish on the English vocabulary measure. However, children interviewed in Spanish performed significantly better in Spanish than the children who were interviewed in English. Additionally, Pearson Product Moment Bivariate Correlations were conducted to assess if the parent reports of how well children understand each language were related to children's performance on these standardized measures. Results indicated that parents did indeed accurately report their child's understanding of each language. How well the parent reported that the child understood

English (M = 5.000, SD = 1.569) was positively, significantly related to the child's age-adjusted English NIH vocabulary score (M = 88.702, SD = 16.725), $r(102) = 0.385$, $p < .001$. Similarly, how well the parent reported that the child understood Spanish (M = 4.788, SD = 1.432) was positively, significantly related to the child's age-adjusted Spanish NIH vocabulary score (M = 100.608, SD = 14.952), $r(99) = 0.226$, $p = .023$.

Conclusion. Altogether, although children were reported as being bilingual, the extent to which children use each language – whether it is in everyday activities or religious activities – varies between each interview-language group. Because specific socialization practices may be different depending on language use (e.g., see Miller et al., 1997), the main analyses will be separated out by interview language, and the cluster analysis will examine language proficiency alongside other child-specific factors (e.g., age, religious participation).

Table 6

Measures of Language Fluency for Bilingualism in Child Sample

	Full Child Sample (*N* = 105)	**English (*n* = 49)**	**Spanish (*n* = 56)**	***t*** [c]	***r*** ***effect -size*** [c]
Age Child Began Learning English – *M (SD)*	1.728 (1.393)	0.980 (1.046)	2.407 (1.325)	-6.029***	.513
Age Range	0 to 4.500	0 to 4.00	0 to 4.500		
Age Child Began Learning Spanish – *M (SD)*	0.629 (0.880)	0.520 (0.918)	0.723 (0.841)	-1.181	.115
Age Range	0 to 4.500	0 to 4.500	0 to 3.000		
Primary Language in the Home					
% English Primary	21.0%	42.9%	1.8%		
% Spanish Primary	76.2%	53.1%	96.4%		
% Both English and Spanish	2.8%	4.1%	1.8%		
Primary Language that Child Speaks					
% English Primary	46.6%	81.6%	16.1%		
% Spanish Primary	50.5%	18.4%	78.6%		
% Both English and Spanish	2.9%	-	5.4%		
% of Time Child Speaks In… (Typically) [a]					
English – *M (SD)*	65.1% (27.8)	80.6% (21.1)	51.6% (26.0)	6.225***	.523
Spanish – *M (SD)*	52.1% (27.6)	40.8% (22.9)	62.0% (27.7)	-4.231***	.384
% of Time Parent Speaks to Child In… [a]					
English – *M (SD)*	44.1% (32.8)	71.2% (20.0)	20.4% (21.3)	12.564***	.776
Spanish – *M (SD)*	68.0% (28.3)	47.3% (21.9)	86.1% (19.6)	-9.568***	.681

	Full Child Sample (*N* = 105)	English (*n* = 49)	Spanish (*n* = 56)	*t* [c]	$r_{effect\text{-}size}$ [c]
% of Time Child Participates in Religious Practices (in Home, at Church) In… [a]					
English – *M (SD)*	37.0% (37.5)	51.0% (24.6)	24.6% (31.3)	3.824***	.348
Spanish – *M (SD)*	64.2% (34.8)	55.5% (34.3)	71.8% (33.6)	-2.450*	.233
How Well Child… [*Scale of 0 to 6*]					
Understands English – *M (SD)*	5.000 (1.569)	5.735 (0.638)	4.357 (1.843)	4.975***	.447
Understands Spanish – *M (SD)*	4.788 (1.432)	4.592 (1.383)	4.964 (1.465)	-1.326	.129
Speaks English – *M (SD)*	4.800 (1.620)	5.571 (0.866)	4.125 (1.820)	5.081***	.452
Speaks Spanish – *M (SD)*	4.390 (1.554)	3.939 (1.464)	4.786 (1.534)	-2.883**	.272
NIH Toolbox Vocabulary Measure [c]					
English – *M (SD)*	88.702 (16.725)	90.082 (15.883)	87.473 (17.494)	0.793	.078
Spanish – *M (SD)*	100.608 (14.952)	96.021 (16.035)	104.685 (12.728)	-3.038**	.287

[a] = Parents were asked to report the % of time their child uses each language for these items on a 10-point Likert scale of 0% to 100% (each point of the Likert scale increasing by 10%) in two separate questions, so the % of each language may not add up to 100%.

[b] = The age-adjusted standard score in the NIH Toolbox was reported for both the English and Spanish vocabulary measures.

[c] = Independent Samples T-Tests were done to compare if children interviewed in English differed from children interviewed in Spanish on any of the variables. Effect-size *r* is reported.

* $p < .05$. ** $p < .01$. *** $p < .001$; two-tailed

Relationships of Main Variables

Parent. To assess if and how the parent variables were related, Pearson Product Moment Bivariate correlations were conducted (see Table 7). Across the full sample, as well as within each interview language, parent level of religious engagement was strongly, positively correlated with how religious they considered themselves to be and how spiritual they considered themselves to be. Similarly, levels of perceived religiosity also were strongly, positively correlated to levels of perceived spirituality. Lastly, parent English vocabulary skills was strongly, positively correlated to their Spanish vocabulary skills.

Additionally, Independent Samples T-Tests compared if parents interviewed in English differed from parents interviewed in Spanish on any of these variables. Similar to the children, results indicated that parents interviewed in Spanish had higher religious engagement on average compared to parents interviewed in English. There was not a significant difference between interview language for perceived levels of religiosity or spirituality though.

Table 7

Correlation Matrix, Means, and Standard Deviations for Parents

Full Parent Sample (*N* = 116)

	1	2	3	4	5	*M* (*SD*)
1. Parent Religious Engagement	—					2.027 (1.359)
2. Level of Perceived Religiosity	.464***	—				0.224 (0.987)
3. Level of Perceived Spirituality	.376***	.566***	—			0.319 (0.929)
4. Parent NIH Vocab – English	-.102	-.143	.003	—		77.461 (14.570)
5. Parent NIH Vocab – Spanish	.160	.061	.030	.338***	—	98.763 (12.631)

Parents Interviewed in English (*n* = 52)

	1	2	3	4	5	*M* (*SD*)	*t* [a]	$r_{effect\text{-}size}$ [a]
1. Parent Religious Engagement	—					1.738 (1.302)	-2.103*	.193
2. Level of Perceived Religiosity	.426**	—				0.058 (0.895)	-1.648	.153
3. Level of Perceived Spirituality	.489***	.474***	—			0.173 (0.901)	-1.534	.142
4. Parent NIH Vocab – English	.106	-.143	.099	—		83.558 (12.544)	4.392***	.382
5. Parent NIH Vocab – Spanish	.199	.195	.128	.492***	—	95.745 (12.252)	-2.340*	.215

Parents Interviewed in Spanish (*n* = 64)

	1	2	3	4	5	*M* (*SD*)
1. Parent Religious Engagement	—					2.263 (1.369)
2. Level of Perceived Religiosity	.463***	—				0.359 (1.045)
3. Level of Perceived Spirituality	.263*	.613***	—			0.438 (0.941)
4. Parent NIH Vocab – English	-.120	-.054	.047	—		72.429 (14.283)
5. Parent NIH Vocab – Spanish	.063	-.081	-.095	.450***	—	101.206 (12.497)

[a] = Independent Samples T-Tests were done to compare if parents interviewed in English differed from parents interviewed in Spanish on any of the variables. Effect-size *r* is reported.

* $p < .05$. ** $p < .01$. *** $p < .001$; two-tailed

Child. To assess if and how the child variables were related, Pearson Product Moment Bivariate correlations were conducted (see Table 8 for correlation matrix for full child sample and see Table 9 for correlation matrix by interview language). As anticipated, child's age was positively and significantly related to their understanding of the limitations of what is possible for humans, understanding of English vocabulary, and performance on the executive functioning flanker task (i.e., attention and inhibition). Additionally, higher executive functioning was positively, significantly related to children's understanding of human (im)possibility, children's English vocabulary, and children's Spanish vocabulary skills. Children's biological understanding was positively and significantly related to their Spanish vocabulary skills. However, children's religious engagement was not significantly related to any of the other variables.

Additionally, Independent Samples T-Tests compared if children interviewed in English differed from children interviewed in Spanish on any of these variables. Results indicated that children interviewed in English had a higher proportion correct for the biological understanding task (74.9%) compared to the children interviewed in Spanish (62.0%). However, children interviewed in Spanish had higher religious engagement on average compared to children interviewed in English. There was not a significant difference between interview language for child age, executive functioning, or understanding of human (im)possibility.

Table 8

Correlation Matrix, Means, and Standard Deviations for Children – Full Sample

	Full Child Sample (*N* = 105)							
	1	2	3	4	5	6	7	*M* (*SD*)
1. Child Age (years)	—							5.338 (0.833)
2. Biological Understanding	.017	—						0.679 (0.261)
3. Human (Im)possiblity	.332**	-.118	—					0.766 (0.310)
4. Executive Functioning	.581***	.063	.482***	—				3.835 (2.111)
5. Child Religious Engagement	.051	-.154	-.062	-.013	—			2.070 (1.480)
6. Child NIH Vocab – English	.286**	-.087	.552***	.561***	-.080	—		88.702 (16.725)
7. Child NIH Vocab – Spanish	.095	.256*	.084	.220*	.040	.168	—	100.608 (14.952)

* $p < .05$. ** $p < .01$. *** $p < .001$; two-tailed

Table 9

Correlation Matrix, Means, and Standard Deviations for Children – By Interview Language

Children Interviewed in English (*n* = 49)										
	1	2	3	4	5	6	7	*M* (*SD*)	***t*** [a]	***r*** [a]
1. Child Age (years)	—							5.241 (0.844)	-1.117	.109
2. Biological Understanding	.337*	—						0.749 (0.199)	2.557*	.250
3. Human (Im)possiblity	.328*	.003	—					0.826 (0.288)	1.798	.177
4. Executive Functioning	.480**	.418*	.475**	—				3.975 (1.971)	0.619	.062
5. Child Religious Engagement	-.080	-.306*	.235	-.001	—			1.731 (1.405)	-2.237*	.214
6. Child NIH Vocab – English	.131	.148	.481**	.518***	.091	—		90.082 (15.883)	0.793	.078
7. Child NIH Vocab – Spanish	.241	.306*	.287	.384**	.163	.093	—	96.021 (16.035)	-3.038**	.287
Children Interviewed in Spanish (*n* = 56)										
	1	2	3	4	5	6	7	*M* (*SD*)		
1. Child Age (years)	—							5.423 (0.821)		
2. Biological Understanding	-.134	—						0.620 (0.291)		
3. Human (Im)possiblity	.367**	-.261	—					0.716 (0.321)		
4. Executive Functioning	.679***	-.141	.479***	—				3.714 (2.237)		
5. Child Religious Engagement	.120	.004	-.201	.006	—			2.366 (1.492)		
6. Child NIH Vocab – English	.436***	-.253	.583***	.586***	-.084	—		87.473 (17.494)		
7. Child NIH Vocab – Spanish	-.122	.388**	.004	.126	-.165	-.020	—	104.685 (12.728)		

[a] = Independent Samples T-Tests were done to compare if children interviewed in English differed from children interviewed in Spanish on any of the seven variables. Effect-size *r* is reported.

* $p < .05$. ** $p < .01$. *** $p < .001$; two-tailed

Reality Status of Causal Mechanisms

The third set of preliminary analyses examined parent and child judgments (as well as potential differences by language of interview) of the reality status of natural, religious, and supernatural causal mechanisms used in the story completion task.

Parent. Parents were asked to judge the reality status of 21 causal mechanisms, however, unlike children, parents were given the option of "Real", "Not Real", and "Don't Know." Percentages of items judged as real are discussed below, but it should be noted that the remaining % were either judged as "Not Real" or the parent was not sure and chose "Don't Know" (see Figures 2, 3, 4; see Appendix M for full summary, including % by language).

For the four natural causal mechanisms, the majority of parents judged germs (94.8%), medicine (98.3%), herbal remedies (93.1%), and a doctor (100%) as real. The majority of parents also judged the 10 religious causal mechanisms as real: God (97.4%), Jesus (97.4%), angels (91.4%), saints (82.8%), a priest (93.1%), prayer (*orar*; 97.4%), praying the rosary (*rezar el rosario*; 93.1%), miracles (94.8%), the devil (70.7%), and demons (70.7%).

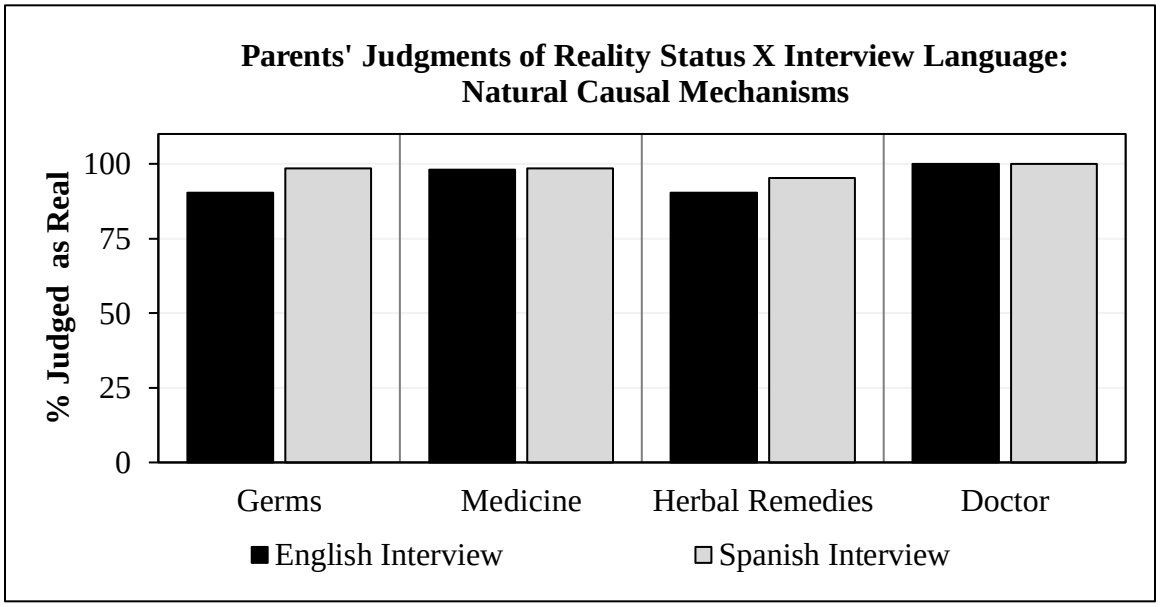
There was less consensus among parents for the reality status of supernatural causal mechanisms. Overall, parents seem to not be sure if luck (52.2%), ghosts and spirits (59.5%), witchcraft (41.4%), and karma (61.2%) were real or not real, whereas a majority of parents judged the evil eye (34.5%) and magic (21.6%) as not real and destiny/fate as real (81.0%). A slightly higher percentage of parents interviewed in English judged all of the supernatural causal mechanisms as real, compared to those

interviewed in Spanish – though none of the differences were significantly different from one another (range in p = .066 to .931).

Overall, these preliminary findings are similar to findings from nationally representative adult samples, such as the Pew Research Center (2014a,b). For instance, in the Pew Forum findings, belief in the evil eye among Catholic Hispanics was 41% and among Mexican Hispanics, 37%; the current sample reported a slightly lower, but comparable frequency in belief in the evil eye at 34.5%. Similarly, in the Pew Forum findings (2014a), belief in magic or witchcraft being able to influence people's lives among Catholic Hispanics was 42%; the current sample reported a frequency in belief in the witchcraft at 41.5%. For magic, the 21.6% of the current sample judged magic as real, 60.3% of the current sample judged it as not real, and 18.1% did not know if magic was real or not real. It is not known if the current sample was referring to magic as in black-magic/witchcraft-related or magic done by a magician when reporting their beliefs on the reality status of magic.

Figure 2

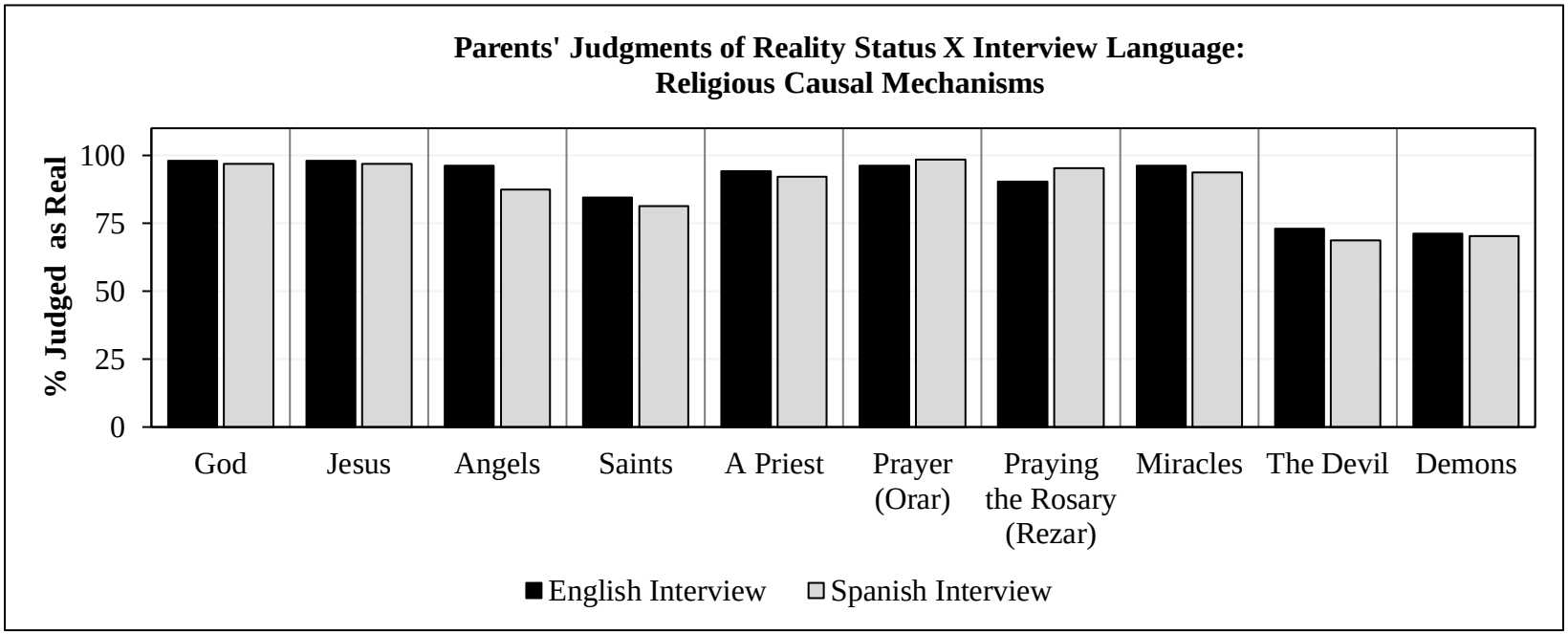
Parents' Judgments of the Reality Status of Natural Causal Mechanisms



Note. The % judged as real is reported in the figure, but the remaining % was split between "Not Real" and "Don't Know."

Figure 3

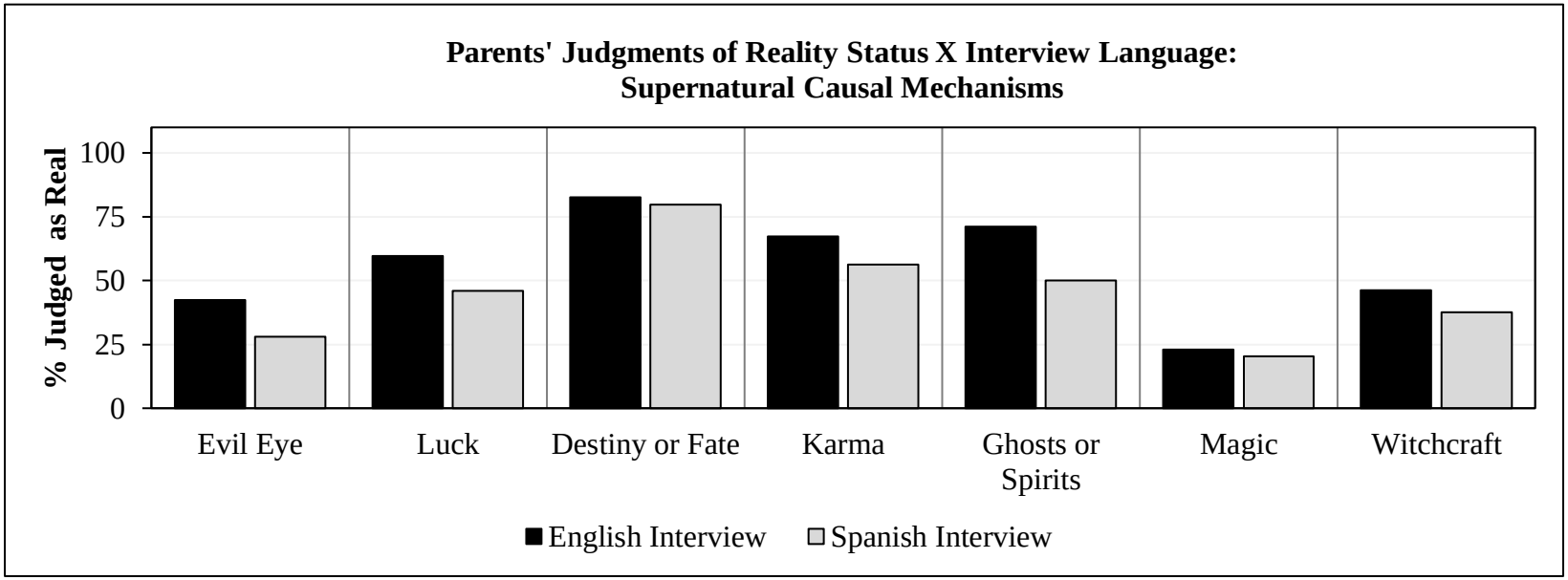
Parents' Judgments of the Reality Status of Religious Supernatural Causal Mechanisms



Note. The % judged as real is reported in the figure, but the remaining % was split between "Not Real" and "Don't Know."

Figure 4

Parents' Judgments of the Reality Status of Supernatural Causal Mechanisms



Note. The % judged as real is reported in the figure, but the remaining % was split between "Not Real" and "Don't Know." Additionally, of the 116 parents interviewed, one parent declined to answer if Luck was real or not real (Spanish interview); percentages are out of the remaining parents' responses.

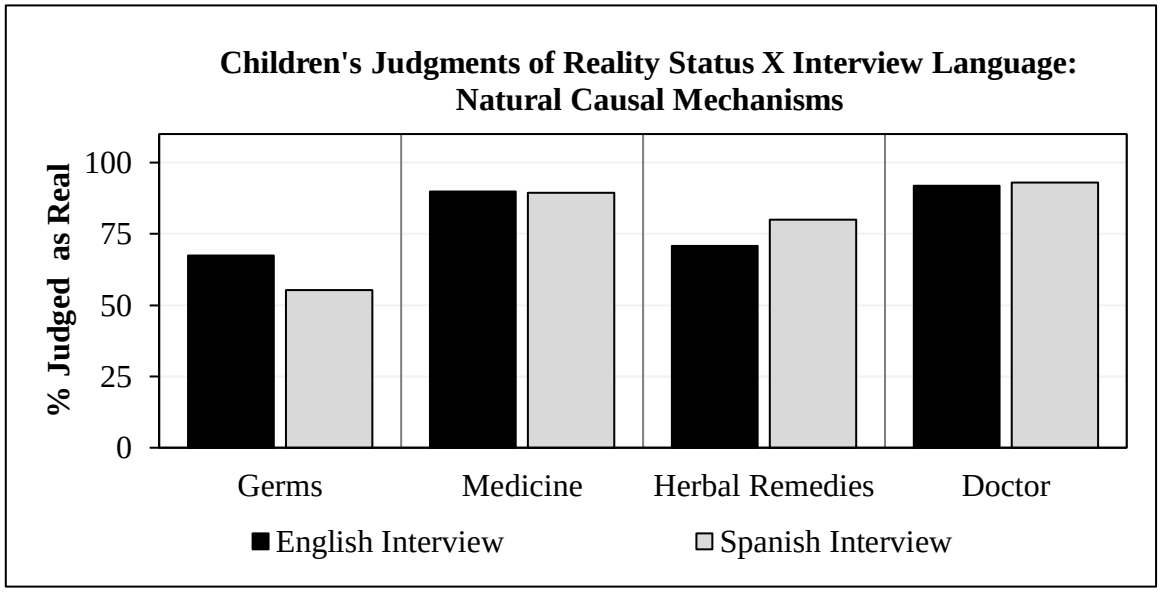
Child. Children were also asked to judge the reality status of 21 causal mechanisms through a sorting task of "Real" and "Not Real." To assess if children's judgements of the reality status varied by interview language, χ^2 Tests of Independence were conducted (see Figures 5, 6, and 7; see Appendix N for full summary). Of the four natural causal mechanisms, the majority of children judged medicine (89.5%), herbal remedies (75.7%), and a doctor (92.4%) as real, but as expected, there was less agreement on the reality status of germs (61%). This may be because children within this age range (4- to 6-years) are still developing an understanding of germs, and previous research has shown children typically begin to understand more complex concepts of germ theory by the age of 6-years-old (e.g., Au & Romo, 1999).

Regarding the 10 religious causal mechanisms, the majority of children judged the following seven as real: God (78.1%), Jesus (88.6%), angels (71.4%), saints (80.8%), a priest (90.5%), prayer (*orar*; 84.8%), and praying the rosary (*rezar el rosario*; 85.7%). However, children interviewed in Spanish were significantly more likely to judge praying the rosary [*rezar el rosario*] as real (94.6%; $\chi^2(1) = 7.813$, $p = .005$, $r_{effect\text{-}size} = .272$) compared to children interviewed in English (75.5%). Somewhat surprisingly, children interviewed in English were significantly more likely to judge Jesus as real (95.9%; $\chi^2(1) = 4.899$, $p = .027$, $r_{effect\text{-}size} = .216$) and an angel as real (81.6%; $\chi^2(1) = 4.688$, $p = .030$, $r_{effect\text{-}size} = .211$) than those interviewed in Spanish (82.1%, 62.5%, respectively). This is surprising since the names *Jésus* and *Ángel* are common male names in Spanish. Overall, children seemed uncertain if miracles were real (61.9%), but a majority of children judged the devil (22.9%) and demons (11.4%) as not real.

Similar to parents, there was less consensus among children for the reality status of supernatural causal mechanisms. Overall, children seem to be unsure if the evil eye (41.9%), destiny/fate (56.2%), magic (49.5%), and witchcraft (46.7%) were real or not real, whereas a majority of children judged luck as real (77.1%), but ghosts and spirits as not real (22.9%). Finally, children interviewed in Spanish were significantly more likely to judge karma (*karma*) as real (66.1%; $\chi^2(1) = 9.017$, $p = .003$, $r_{effect\text{-}size} = .293$) compared to children interviewed in English (36.7%).

Figure 5

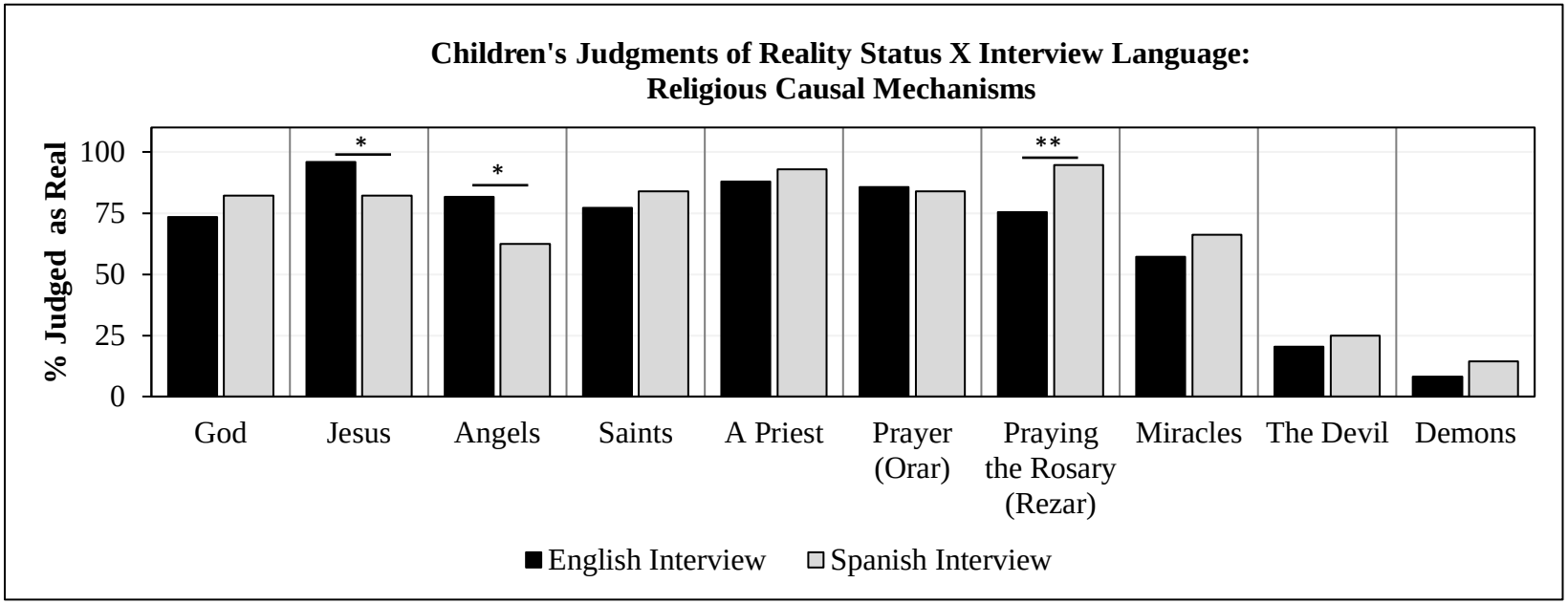
Children's Judgments of the Reality Status of Natural Causal Mechanisms



Note. Of the 105 children interviewed, two children were not asked if Herbal Remedies was real or not real (one English interview, one Spanish interview); percentages are out of the remaining children's responses.

Figure 6

Children's Judgments of the Reality Status of Religious Supernatural Causal Mechanisms

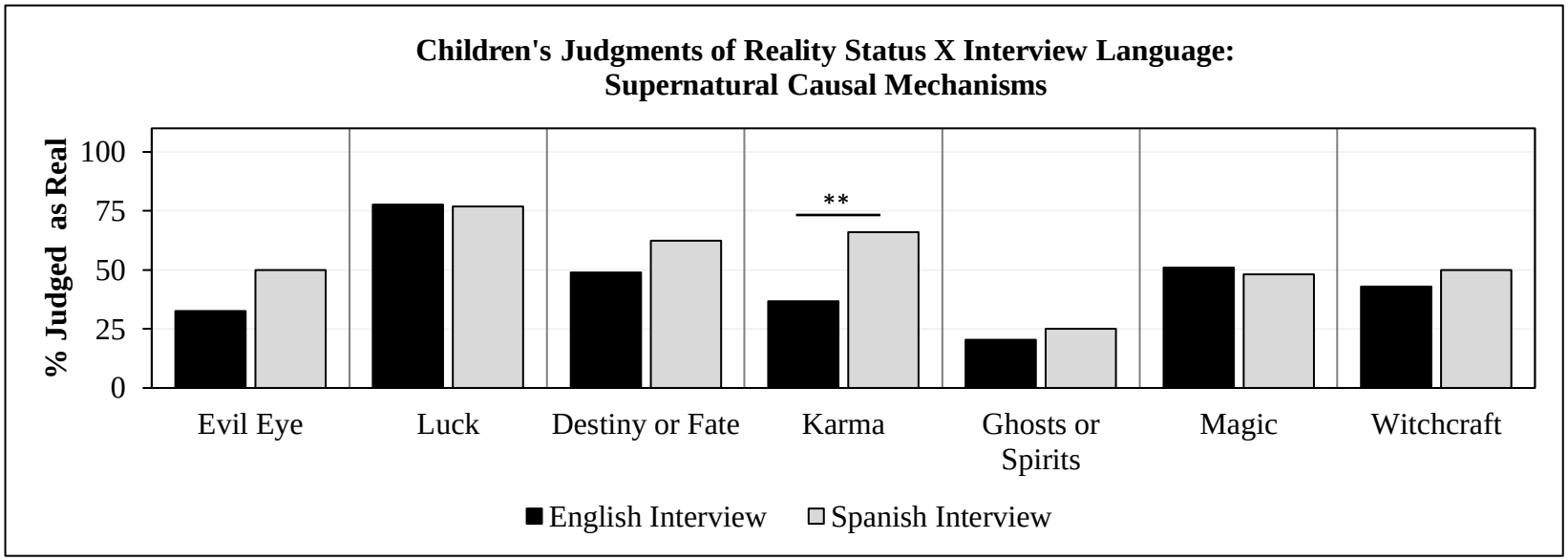


Note. Of the 105 children interviewed, one child was not asked if Saints was real or not real (English interview); percentages are out of the remaining children's responses.

* $p < .05$, ** $p < .01$

Figure 7

Children's Judgments of the Reality Status of Religious Supernatural Causal Mechanisms



** $p < .01$

Parent-Child Correspondence. Exploratory analyses examined the frequency of correspondence in reality status judgments between each parent and their child (see Appendix O for full summary). Overall, there was a higher match in parent-child judgments for the natural causal mechanisms (76.8% on average) than the religious causal mechanisms (66.1% on average) or supernatural causal mechanisms (41.3% on average). Of note, when a parent-child dyad disagreed on the reality status of a specific causal mechanism, it was not necessarily because children were saying that everything was real. Instead, for both the natural and religious causal mechanisms, the majority of the disagreements between a parent and their child was because the child said that the item was not real, but the parent said it was real or they were not sure if it was real. For the non-religious supernatural causal mechanisms, there was a wider range in the type of disagreement between a parent and their child. Although the current study did not assess the act of transmission itself, the overall high correspondence levels between parent-child dyads for reality status of natural and religious causal mechanisms support the argument that parents may play an important role in shaping their child's concept development and understanding of what is real and what is not real – in particular for invisible entities such as germs and God (e.g., see Harris et al., 2006).

The Presence of Supernatural and Natural Causes in Parents' and Children's Justifications for How vs. Why

The fourth and final set of preliminary analyses examined if both supernatural and natural causes were even present in parents' and children's open-ended explanations of the causes and treatments of the illnesses, prior to analyzing what salient responses were provided. It was hypothesized (2a) that there would be both natural and supernatural explanations present at the group level in children's and parents' justifications for how and why someone gets sick or gets better – indicating co-existence of natural and supernatural explanations. Instead of calculating the co-occurrence of natural and supernatural explanations within the individual's explanation (which is done later in this results section), this analysis examined that hypothesis that both natural and supernatural explanations would be present across the entire sample of participants. To analyze this hypothesis, the proportion of supernatural and natural explanations overall were calculated for both the causal chain and solution chain for parents and children.

Parent. Hypothesis 2a was supported for parents as both natural and supernatural explanations were present across all four open-ended responses (cold sick, cancer sick, cold better, cancer better; see Table 10 and Table 11). This co-existence, however, reflected that parents mentioned fewer supernatural than natural causes in open-ended responses. There was only 1 instance out of 627 explanations for *how* and *why* in which a parent provided a supernatural explanation for the cause of a cold, suggesting Catholic, Mexican-American adults do not typically view supernatural causes as the reason for what causes the common cold. There also were not many instances of providing

supernatural causes for what causes cancer – with only 29 mentions out of the 486 justifications.

Regarding causal treatment, parents also did not tend to give supernatural causes in their explanations for what causes someone to get better from the common cold, with only 26 instances out of the 778 explanations. However, this changed for the causal treatments of cancer: about 30% of justifications (246 total) mentioned some type of supernatural cause for *how* and *why* someone gets better from cancer.

Table 10

Number of Natural and Supernatural Justifications Present in Parent How and Why Free-List Recall Task – Overall

	Number of Explanations for Full Parent Sample (*N* = 116)					
	***How* Explanations**			***Why* Explanations**		
	Total *N* [a]	Supernatural % (*N*)	Natural % (*N*)	Total *N* [a]	Supernatural % (*N*)	Natural % (*N*)
Causal Chain						
Cold Sick	348	0% (-)	100% (348)	279	.4% (1)	99.6% (278)
Cancer Sick	202	6.0% (12)	94.0% (190)	284	6.0% (17)	94.0% (267)
Solution Chain						
Cold Better	371	6.0% (12)	94.0% (190)	407	3.4% (14)	96.6% (393)
Cancer Better	453	29.4% (133)	70.6% (320)	373	30.3% (113)	69.7% (260)

[a] = The total *N* reported excludes irrelevant responses, don't know responses, and within-parent repeats (e.g., the parent saying "germs" over and over for *how* someone gets sick) so the remaining total represents total number of explanations that are either natural or supernatural.

Table 11

Number of Natural and Supernatural Justifications Present in Parent How and Why Free-List Recall Task – Split by Language

	Parent Interviews in English (*n* = 52)					
	***How* Explanations**			***Why* Explanations**		
	Total *N* [a]	Supernatural % (*N*)	Natural % (*N*)	Total *N* [a]	Supernatural % (*N*)	Natural % (*N*)
Causal Chain						
Cold Sick	140	0% (-)	100% (140)	119	.8% (1)	99.2% (118)
Cancer Sick	76	5.3% (4)	94.7% (72)	109	4.6% (5)	95.4% (104)
Solution Chain						
Cold Better	170	5.3% (9)	94.7% (161)	198	3.0% (6)	97.0% (192)
Cancer Better	201	31.3% (63)	68.7% (138)	166	35.5% (59)	64.5% (107)
	Parent Interviews in Spanish (*n* = 64)					
	***How* Explanations**			***Why* Explanations**		
	Total *N* [a]	Supernatural % (*N*)	Natural % (*N*)	Total *N* [a]	Supernatural % (*N*)	Natural % (*N*)
Causal Chain						
Cold Sick	208	0% (-)	100% (208)	160	0% (-)	100% (160)
Cancer Sick	126	6.3% (8)	93.7% (118)	175	6.9% (12)	93.1% (163)
Solution Chain						
Cold Better	201	5.3% (11)	94.5% (190)	209	3.8% (8)	96.2% (201)
Cancer Better	252	27.8% (70)	72.2% (182)	207	26.1% (54)	73.0% (153)

[a] = The total N reported excludes irrelevant responses, don't know responses, and within-parent repeats (e.g., the parent saying "germs" over and over) so the remaining total represents total number of explanations that are either natural or supernatural.

Child. Hypothesis 2a also was supported for children as both supernatural and natural causes were present in children's open-ended explanations on the causes and treatments of illness (see Table 12 and Table 13). As with parents, however, the presence of natural explanations was more common than supernatural explanations. There was only 1 instance out of 310 explanations in which a child provided a supernatural explanation for the cause of a cold. This number slightly increased for the causes of cancer, with children mentioning supernatural causes 8 out of 225 justifications. Thus, Catholic, Mexican-American children do not appear to typically give supernatural reasons for what causes illnesses, though both natural and supernatural causes were technically present in their reasoning on the causes of illness. For the causal treatments of illnesses, children provided supernatural justifications more frequently, with 40 of the 415 explanations containing a supernatural cause for the treatment of the cold, and 67 of the 318 justifications containing a supernatural cause for the treatment of cancer – though the prevalence across the sample was still quite low.

Table 12

Number of Natural and Supernatural Justifications Present in Child How and Why Free-List Recall Task – Overall

	Number of Explanations for Full Child Sample (*N* = 105)					
	***How* Explanations**			***Why* Explanations**		
	Total *N* [a]	Supernatural % (*N*)	Natural % (*N*)	Total *N* [a]	Supernatural % (*N*)	Natural % (*N*)
Causal Chain						
Cold Sick	161	.6% (1)	99.4% (160)	149	0% (-)	100% (149)
Cancer Sick	138	2.2% (3)	135 (97.8%)	87	5.7% (5)	94.3% (82)
Solution Chain						
Cold Better	251	10.4% (26)	89.6% (225	164	8.5% (14)	91.2% (150)
Cancer Better	180	21.7% (39)	78.3% (141)	138	20.3% (28)	79.7% (110)

[a] = The total *N* reported excludes irrelevant responses, don't know responses, and within-child repeats (e.g., the child saying "germs" over and over for *how* someone gets sick) so the remaining total represents total number of explanations that are either natural or supernatural.

Table 13

Number of Natural and Supernatural Justifications Present in Child How and Why Free-List Recall Task – Split by Language

	Child Interviews in English (*n* = 49)					
	***How* Explanations**			***Why* Explanations**		
	Total *N* [a]	Supernatural % (*N*)	Natural % (*N*)	Total *N* [a]	Supernatural % (*N*)	Natural % (*N*)
Causal Chain						
Cold Sick	87	1.1% (1)	98.9% (86)	70	0% (-)	100% (70)
Cancer Sick	72	1.4% (1)	98.6% (71)	65	4.6% (3)	95.4% (62)
Solution Chain						
Cold Better	115	7.0% (8)	93.0% (107)	71	11.3% (8)	88.7% (63)
Cancer Better	95	22.1% (21)	77.9% (74)	67	23.9% (16)	76.1% (51)
	Child Interviews in Spanish (*n* = 56)					
	***How* Explanations**			***Why* Explanations**		
	Total *N* [a]	Supernatural % (*N*)	Natural % (*N*)	Total *N* [a]	Supernatural % (*N*)	Natural % (*N*)
Causal Chain						
Cold Sick	79	0% (-)	100% (79)	74	0% (-)	100% (74)
Cancer Sick	66	3.0% (2)	97.0% (64)	52	3.8% (2)	96.2% (50)
Solution Chain						
Cold Better	136	13.2% (18)	86.8% (118)	93	6.5% (6)	93.5% (87)
Cancer Better	85	21.2% (18)	78.8% (67)	71	16.9% (12)	83.1% (59)

[a] = The total *N* reported excludes irrelevant responses, don't know responses, and within-child repeats (e.g., the child saying "germs" over and over); the remaining total represents total number of explanations that are either natural or supernatural.

Main Research Objective 1 – Proximity of the Cause: Examining Explanations of *How* vs. *Why*

To test Hypotheses 1, which stated that distal causes (e.g., supernatural or religious) would be more salient in explanations for *why* people get sick or get better, whereas proximal causes (e.g., scientific or folk) would be more salient for *how* people get sick or get better, parents' and children's open-ended responses to *how* and *why* the character in each story completion task got sick or got better were coded and then analyzed in R using the "AnthroTools" package (Purzycki & Jamieson-Lane, 2016). This R package was specifically designed by anthropologists to analyze free-list data and consensus data in a way that categorizes responses by salience but also avoids inflation in the results due to repeated items. Salience is reported with Smith's S values, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended responses (see Appendix I for more information on the calculation of salience scores).

Causal Chain: Cold Sick

Parent.

Salient Explanations by Interview Language. For *how* and *why* Martin/Clara got sick with the cold, parents tended to provide very similar explanations across both languages (see Table 14). Contagion, coldness in general, and improper outerwear were all salient explanations for both *how* and *why* Martin/Clara got sick with the cold for parents interviewed in either English or Spanish. Germs also were prominent in English for *how* and *why* and in Spanish for *how*. Similarly, a low immune system was common

in Spanish for *how* and *why* and in English for *why.* Not washing hands was pertinent in English for *how* and *why*, whereas not taking care of self (generally) was notable in Spanish for *how* and *why*. Finally, a change in temperature was common for *how* in English but for *why* in Spanish. Supernatural explanations as the cause of a cold were not salient for parents interviewed in either language.

Table 14

Salient Categories of How and Why Free-List Responses for Parent Cold Sick – Split by Language

Interviews in English			
Coding Category	How *Smith's S*	Coding Category	Why *Smith's S*
Contagion	0.451	Contagion	0.365
Germs	0.273	Low Immune System	0.217
Coldness in General	0.244	Coldness in General	0.192
Improper Outerwear	0.149	Germs	0.118
Not Washing Hands	0.109	Not Washing Hands	0.107
Temperature Change	0.103	Improper Outerwear	0.100
All Other Categories	< 0.100	*All Other Categories*	< 0.100
Interviews in Spanish			
Coding Category	How *Smith's S*	Coding Category	Why *Smith's S*
Contagion	0.348	Improper Outerwear	0.226
Improper Outerwear	0.312	Contagion	0.225
Germs	0.227	Coldness in General	0.196
Coldness in General	0.216	Not Taking Care of Self	0.193
Being Wet	0.171	Low Immune System	0.175
Low Immune System	0.146	Temperature Change	0.105
Not Taking Care of Self	0.132	Don't Know	0.103
All Other Categories	< 0.100	*All Other Categories*	< 0.100

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

Salient Explanations – Overall for the Full Sample. Contagion, improper outerwear, coldness in general, and low immune system were all prominent in parents' explanations for *how* and *why* someone gets sick with a cold (see Table 15). Germs and being wet were also salient for *how* and not taking care of self was salient for *why*.

Table 15

Salient Categories of How and Why Free-List Responses for Parent Cold Sick – Full Sample

	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Contagion	0.394	Contagion	0.284
Germs	0.248	Coldness in General	0.194
Improper Outerwear	0.239	Low Immune System	0.193
Coldness in General	0.229	Improper Outerwear	0.173
Being Wet	0.109	Not Taking Care of Self	0.149
Low Immune System	0.107	*All Other Categories*	< 0.100
All Other Categories	< 0.100		

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

Child.

Salient Explanations by Interview Language. For *how* and *why* Martin/Clara got sick with the cold, children tended to provide very similar explanations across both languages (see Table 16). Improper outerwear, coldness in general, symptoms present, and irrelevant responses were most salient for both *how* and *why* Martin/Clara got sick with the cold for children interviewed in English. For children interviewed in Spanish, coldness in general, don't know, improper outerwear, and symptoms present were most

salient for *how* and *why*, with irrelevant also being salient for *why*. Overall, this suggests children's spontaneous explanations for the causes of sickness did not differ by the language of the interview and children were not more likely to provide supernatural explanations when interviewed in Spanish.

Table 16

Salient Categories of How and Why Free-List Responses for Child Cold Sick – Split by Language

Interviews in English			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Improper Outerwear	0.362	Improper Outerwear	0.268
Coldness in General	0.314	Coldness in General	0.250
Symptoms Present	0.168	Irrelevant	0.150
Irrelevant	0.140	Symptoms Present	0.121
All Other Categories	< 0.100	*All Other Categories*	< 0.100
Interviews in Spanish			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Coldness in General	0.240	Coldness in General	0.242
Don't Know	0.236	Don't Know	0.230
Improper Outerwear	0.231	Symptoms Present	0.191
Symptoms Present	0.117	Improper Outerwear	0.178
All Other Categories	< 0.100	Irrelevant	0.103
		All Other Categories	< 0.100

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

***Salient Explanations by Age Group*.** Because there were few differences in the types of explanations children provided in each language overall (see Table 17), children's responses by language of interview were combined into a single data set for

analysis of salient categories by each age group. Symptoms present, improper outerwear, don't know, coldness in general, and irrelevant explanations were most salient for both *how* and *why* Martin/Clara got sick with the cold for 4-year-olds. Five-year-olds showed a similar pattern, and provided improper outerwear, coldness in general, and don't know explanations for *how* and *why*, with symptoms present and irrelevant responses also being relevant for *why*. For 6-year-olds, coldness in general and improper outwear were most salient for both *how* and *why*; don't know, irrelevant, and not washing hands explanations were also very salient for *why*.

Table 17

Salient Categories of How and Why Free-List Responses for Child Cold Sick – Split by Age

4-year-olds			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Symptoms Present	0.291	Improper Outerwear	0.262
Improper Outerwear	0.246	Symptoms Present	0.239
Don't Know	0.206	Coldness in General	0.158
Coldness in General	0.194	Irrelevant	0.153
Irrelevant	0.187	Don't Know	0.103
All Other Categories	< 0.100	*All Other Categories*	< 0.100
5-year-olds			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Improper Outerwear	0.394	Coldness in General	0.294
Coldness in General	0.258	Improper Outerwear	0.204
Don't Know	0.152	Don't Know	0.134
All Other Categories	< 0.100	Symptoms Present	0.124
		Irrelevant	0.107
		All Other Categories	< 0.100
6-year-olds			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Coldness in General	0.411	Coldness in General	0.310
Improper Outerwear	0.233	Improper Outerwear	0.179
All Other Categories	< 0.100	Don't Know	0.179
		Irrelevant	0.106
		Not Washing Hands	0.106
		All Other Categories	< 0.100

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

***Salient Explanations – Overall for the Full Sample*.** Overall, improper outerwear, coldness in general, and describing symptoms that are present (e.g., boogers, runny nose) were the three most salient causes of the cold for 4- to 6-year-old children, in addition to saying "I don't know" and providing irrelevant explanations (see Table 18). Additionally, these results indicate children were not more likely to provide supernatural, distal causes when asked *why* someone gets sick with a cold compared to when they were asked *how*.

Table 18

Salient Categories of How and Why Free-List Responses for Child Cold Sick – Full Sample

How		Why	
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Improper Outerwear	0.291	Coldness in General	0.245
Coldness in General	0.274	Improper Outerwear	0.220
Don't Know	0.153	Symptoms Present	0.159
Symptoms Present	0.141	Don't Know	0.134
Irrelevant	0.112	Irrelevant	0.125
All Other Categories	< 0.100	*All Other Categories*	< 0.100

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

Cold Sick – Conclusion. In sum, for both parents and children, Hypothesis 1 was not supported for their explanations on the causes of the common cold, as supernatural causes were not salient in their explanations of *why* – or even for *how* – colds are caused.

Causal Chain: Cancer Sick

Parent.

***Salient Explanations by Interview Language*.** For *how* and *why* Javier/Violeta got sick with cancer, parents interviewed in English or Spanish often said they didn't know or genetics or heredity caused cancer (see Table 19). Eating unhealthy was also a common explanation in Spanish for both *how* and *why* as well as for *why* in English. Saying cancer "just happens" or it is not something that is explainable was salient in English for both *how* and *why* as well as for *why* in Spanish. Parents interviewed in Spanish also frequently said the explanation would depend on the type of cancer as well as the lifestyle of the individual. Finally, harmful substances (e.g., toxins) were salient in explanations for *why* someone gets cancer in English and Spanish.

Table 19

Salient Categories of How and Why Free-List Responses for Parent Cancer Sick – Split by Language

Interviews in English			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Don't Know	0.386	Genetics or Heredity	0.508
Genetics or Heredity	0.300	Don't Know	0.326
Just Happens	0.108	Just Happens	0.154
All Other Categories	< 0.100	Harmful Substance	0.117
		Eating Unhealthy	0.104
		All Other Categories	< 0.100
Interviews in Spanish			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Don't Know	0.387	Genetics or Heredity	0.368
Genetics or Heredity	0.290	Don't Know	0.365
Eating Unhealthy	0.168	Eating Unhealthy	0.202
Type of Cancer	0.163	Just Happens	0.162
All Other Categories	< 0.100	Type of Cancer	0.142
		Harmful Substance	0.122
		Lifestyle	0.110
		All Other Categories	< 0.100

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

Salient Explanations – Overall for the Full Sample. Don't know, genetics or heredity, eating unhealthy, and indicating the explanation would depend on the type of cancer were the four most salient parental explanations of the causes of cancer for *how* and *why* (see Table 20). Parents also frequently said harmful substances (e.g., toxins) were *why* someone could get sick with cancer as well as saying cancer "just happens" or it is not something that is explainable.

Table 20

Salient Categories of How and Why Free-List Responses for Parent Cancer Sick – Full Sample

How		Why	
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Don't Know	0.386	Genetics or Heredity	0.430
Genetics or Heredity	0.294	Don't Know	0.348
Eating Unhealthy	0.120	Just Happens	0.159
Type of Cancer	0.116	Eating Unhealthy	0.158
All Other Categories	< 0.100	Type of Cancer	0.122
		Harmful Substance	0.120
		All Other Categories	< 0.100

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

Child.

***Salient Explanations by Interview Language*.** For *how* and *why* Violeta/Javier got sick with cancer, children tended to provide very similar explanations across both languages (see Table 21). Don't know and irrelevant were the most salient explanations – indicating children at these ages might not know much about cancer. Describing symptoms that were present was also prominent for *how* in English and Spanish as well as *why* in English; hair loss and loss of appetite were mentioned most often, and these were two symptoms visible on drawing accompanying the vignette. Eating too much (English: *how*) or eating unhealthy (Spanish: *how* and *why*) were also common in children's explanations, and one of the symptoms children were explicitly told in the vignette was that Violeta/Javier could not eat very much food. Children interviewed in English also gave injuries as a reason for *how*. Overall, there was a strong resemblance in

children's explanations for *how* and *why* in both languages.

Table 21

Salient Categories of How and Why Free-List Responses for Child Cancer Sick – Split by Language

Interviews in English			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Don't Know	0.195	Don't Know	0.203
Irrelevant	0.161	Irrelevant	0.143
Eating Too Much	0.159	Symptoms Present	0.101
Symptom Present	0.126	*All Other Categories*	< 0.100
Injury	0.126		
All Other Categories	< 0.100		
Interviews in Spanish			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Don't Know	0.360	Don't Know	0.318
Irrelevant	0.184	Irrelevant	0.181
Symptom Present	0.147	Eating Unhealthy	0.121
Eating Unhealthy	0.139	*All Other Categories*	< 0.100
All Other Categories	< 0.100		

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

***Salient Explanations by Age Group*.** Once again, when examining children's explanations of the causes of cancer, don't know was the most prominent in every age group, for both *how* and *why* (see Table 22). Symptoms and food-related categories were also common across ages for *how* and *why*. Finally, for 6-year-olds, contagion was also a salient explanation.

Table 22

Salient Categories of How and Why Free-List Responses for Child Cancer Sick – Split by Age

4-year-olds			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Don't Know	0.362	Don't Know	0.299
Irrelevant	0.264	Irrelevant	0.212
Eating Too Much	0.105	*All Other Categories*	< 0.100
Symptom Present	0.101		
All Other Categories	< 0.100		
5-year-olds			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Don't Know	0.260	Don't Know	0.259
Symptom Present	0.227	Irrelevant	0.161
Eating Unhealthy	0.193	Eating Unhealthy	0.125
Irrelevant	0.141	Eating Too Much	0.111
Eating Too Much	0.109	Symptom Present	0.100
All Other Categories	< 0.100	*All Other Categories*	< 0.100
6-year-olds			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Don't Know	0.213	Don't Know	0.224
Contagion	0.110	Eating Unhealthy	0.141
No Food	0.100	*All Other Categories*	< 0.100
All Other Categories	< 0.100		

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

Salient Explanations – Overall for the Full Sample. Altogether, don't know, irrelevant, symptoms present, and food-related (either eating unhealthy or eating too much) were the four most salient explanations for the causes of cancer across the full sample of 4- to 6-year-old children (see Table 23). Once again, distal, supernatural causes

were not more salient when asked to explain *why* someone gets sick with cancer.

Table 23

Salient Categories of How and Why Free-List Responses for Child Cancer Sick – Full Sample

	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Don't Know	0.272	Don't Know	0.282
Irrelevant	0.177	Irrelevant	0.161
Eating Unhealthy	0.112	Eating Too Much	0.113
Symptom Present	0.108	Symptom Present	0.105
All Other Categories	< 0.100	*All Other Categories*	< 0.100

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

Cancer Sick – Conclusion. In sum, for both parents and children, Hypothesis 1 was also not supported for their explanations on the causes of cancer, as supernatural causes were not salient in their explanations of *why* – or even for *how* – a person gets sick with cancer.

Solution Chain: Cold Better

Parent.

***Salient Explanations by Interview Language*.** For *how* and *why* Martin/Clara got better from the cold, parents interviewed in either language frequently mentioned medicine, doctor, and rest (see Table 24). Time passing (i.e., the sickness being a temporary thing which ends with time) and taking care of self were also salient for *how* and *why* in Spanish as well as *why* in English. Parents interviewed in English often

mentioned having an improved immune systems for *how* and *why* someone gets better from a cold, whereas parents interviewed in Spanish often talked about eating healthy for *how* and *why* and having proper outerwear for *how.*

Table 24

Salient Categories of How and Why Free-List Responses for Parent Cold Better – Split by Language

Interviews in English			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Medicine	0.596	Medicine	0.539
Rest	0.382	Rest	0.326
Improved Immune System	0.135	Time Passed	0.230
Doctor	0.119	Taking Care of Self	0.211
All Other Categories	< 0.100	Doctor	0.171
		Improved Immune System	0.142
		All Other Categories	< 0.100
Interviews in Spanish			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Medicine	0.560	Medicine	0.593
Taking Care of Self	0.228	Taking Care of Self	0.302
Doctor	0.208	Doctor	0.212
Rest	0.184	Rest	0.189
Proper Outerwear	0.174	Time Passed	0.161
Eating Healthy	0.133	Eating Healthy	0.153
Time Passed	0.121	*All Other Categories*	< 0.100
All Other Categories	< 0.100		

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

Salient Explanations – Overall for the Full Sample. Overall, parents' explanations for *how* and *why* someone gets better from a cold were almost identical,

with medicine, doctor, rest, taking care of self, eating healthy, and time passing all being salient explanations (see Table 25). Proper outwear was also prominent in parents' explanations for *how*.

Table 25

Salient Categories of How and Why Free-List Responses for Parent Cold Better – Full Sample

	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Medicine	0.576	Medicine	0.569
Rest	0.273	Taking Care of Self	0.261
Doctor	0.167	Rest	0.250
Taking Care of Self	0.167	Doctor	0.194
Eating Healthy	0.117	Time Passed	0.192
Proper Outerwear	0.111	Eating Healthy	0.132
Time Passed	0.103	*All Other Categories*	< 0.100
All Other Categories	< 0.100		

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

Child.

***Salient Explanations by Interview Language*.** For *how* and *why* Martin/Clara got better from a cold, children tended to provide very similar explanations across both languages – specifically, medicine and eating healthy (see Table 26). Proper outerwear was also common for *how* in English and Spanish, as well as *why* in Spanish. Irrelevant responses were salient for *how* in English and both *how* and *why* in Spanish. Children interviewed in Spanish also frequently mentioned warm or hot for *how* and that they did

not know for *why*.

Table 26

Salient Categories of How and Why Free-List Responses for Child Cold Better – Split by Language

Interviews in English			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Proper Outerwear	0.271	Medicine	0.183
Medicine	0.244	Eating Healthy	0.144
Eating Healthy	0.110	Irrelevant	0.100
All Other Categories	< 0.100	*All Other Categories*	< 0.100
Interviews in Spanish			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Medicine	0.197	Don't Know	0.173
Irrelevant	0.179	Irrelevant	0.156
Eating Healthy	0.151	Medicine	0.143
Warm or Hot	0.122	Proper Outerwear	0.103
Proper Outerwear	0.104	Eating Healthy	0.102
All Other Categories	< 0.100	*All Other Categories*	< 0.100

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

***Salient Explanations by Age Group*.** As in previous analysis, responses in different interview languages were combined for the analysis of salient categories by each age group because there were few differences in the types of explanations children provided in each language overall (see Table 27). Children across the three age groups gave similar explanations for *how* and *why* someone gets better from a cold. Eating healthy, medicine, and proper outerwear were salient for 4-, 5-, and 6-year-olds. Of note, 6-year-olds also mentioned taking precautions and washing hands for *how* to get better

from a cold. Supernatural explanations were not salient for *how* or *why* at any age.

Table 27

Salient Categories of How and Why Free-List Responses for Child Cold Better – Split by Age

4-year-olds			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Irrelevant	0.268	Irrelevant	0.225
Proper Outerwear	0.147	Don't Know	0.163
Symptom Present	0.126	Eating Healthy	0.142
Medicine	0.121	Other	0.113
Eating Healthy	0.109	*All Other Categories*	< 0.100
All Other Categories	< 0.100		
5-year-olds			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Proper Outerwear	0.233	Medicine	0.281
Medicine	0.227	Proper Outerwear	0.125
Eating Healthy	0.124	*All Other Categories*	< 0.100
Warm or Hot	0.107		
All Other Categories	< 0.100		
6-year-olds			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Medicine	0.350	Medicine	0.191
Eating Healthy	0.175	Irrelevant	0.145
Proper Outerwear	0.165	Eating Healthy	0.117
Warm or Hot	0.131	Don't Know	0.111
Washing Hands	0.130	Other	0.105
Taking Precautions	0.122	Proper Outerwear	0.105
All Other Categories	< 0.100	*All Other Categories*	< 0.100

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

***Salient Explanations – Overall for the Full Sample*.** Overall, medicine and eating healthy (as well as irrelevant responses) are the most salient causal treatments for a cold for 4- to 6-year-old children (see Table 28). For *how*, children also frequently suggested proper outerwear as a treatment, and for *why*, children also often said they did not know. Once again, distal, supernatural causes were not more salient when asked to explain *why* someone gets better from a cold.

Table 28

Salient Categories of How and Why Free-List Responses for Child Cold Better – Full Sample

	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Medicine	0.219	Medicine	0.161
Proper Outerwear	0.181	Irrelevant	0.130
Irrelevant	0.138	Eating Healthy	0.121
Eating Healthy	0.132	Don't Know	0.120
All Other Categories	< 0.100	*All Other Categories*	< 0.100

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

Cold Better – Conclusion. In sum, for both parents and children, Hypothesis 1 was also not supported for their explanations on the causal treatments of the common cold, as supernatural causes were not salient in their explanations of *why* or *how* a person gets better from a cold.

Solution Chain: Cancer Better

Parent.

Salient Explanations by Interview Language. Although supernatural explanations were salient for causes of a treatment for this particular illness, they were present in both languages and for both *how* and *why* explanations (see Table 29). Medical treatment (e.g., having surgery or receiving radiation), medicine, a doctor, God, and prayer were all salient explanations for *how* and *why* in both languages. For parents interviewed in English, faith was also a prominent explanation for *how* and *why*. In both English and Spanish, eating healthy was a common explanation for *how* whereas following the doctor's orders and receiving care from others was common for *why*.

Table 29

Salient Categories of How and Why Free-List Responses for Parent Cancer Better – Split by Language

Interviews in English			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Medical Treatment	0.497	Medical Treatment	0.402
Medicine	0.457	Medicine	0.311
Doctor	0.305	Faith	0.188
Faith	0.184	Doctor	0.188
Prayer	0.175	Followed Doctor Orders	0.170
God	0.165	God	0.144
Eating Healthy	0.123	Prayer	0.131
All Other Categories	< 0.100	*All Other Categories*	< 0.100
Interviews in Spanish			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Medical Treatment	0.462	Medicine	0.399
Medicine	0.431	Medical Treatment	0.332
Doctor	0.284	Doctor	0.246
God	0.213	God	0.189
Eating Healthy	0.180	Followed Doctor Orders	0.157
Prayer	0.154	Care from Others	0.108
All Other Categories	< 0.100	Prayer	0.103
		All Other Categories	< 0.100

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

***Salient Explanations – Overall for the Full Sample*.** Once again, parents' explanations overall for *how* and *why* someone gets better from cancer were almost identical, with medical treatment, medicine, doctor, God, prayer, and faith all being salient explanations (see Table 30). Eating healthy was also common for *how*, and following doctors' orders was also common for *why*. Unlike other explanatory chains,

supernatural causes were salient in parents' explanations for *how* and *why* a person gets better from cancer.

Table 30

Salient Categories of How and Why Free-List Responses for Parent Cancer Better – Full Sample

How		Why	
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Medical Treatment	0.477	Medical Treatment	0.362
Medicine	0.443	Medicine	0.361
Doctor	0.294	Doctor	0.221
God	0.192	God	0.170
Prayer	0.163	Followed Doctor Orders	0.163
Eating Healthy	0.155	Faith	0.116
Faith	0.123	Prayer	0.115
All Other Categories	< 0.100	*All Other Categories*	< 0.100

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

Child.

***Salient Explanations by Interview Language*.** For *how* and *why* Violeta/Javier got better from cancer, children tended to provide very similar explanations across both languages – specifically, food related items (eating healthy, nutrition in general) as well as irrelevant responses and indicating they did not know (see Table 31). Obeying was also common for *how* in English, and a doctor was common for *how* in Spanish.

Table 31

Salient Categories of How and Why Free-List Responses for Child Cancer Better – Split by Language

Interviews in English			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Eating Healthy	0.290	Irrelevant	0.195
Irrelevant	0.126	Eating Healthy	0.148
Obeying	0.116	Don't Know	0.125
Don't Know	0.102	Nutrition in General	0.114
All Other Categories	< 0.100	*All Other Categories*	< 0.100
Interviews in Spanish			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Eating Healthy	0.227	Don't Know	0.240
Irrelevant	0.179	Eating Healthy	0.187
Don't Know	0.145	Nutrition in General	0.148
Nutrition in General	0.129	Irrelevant	0.132
Doctor	0.129	*All Other Categories*	< 0.100
All Other Categories	< 0.100		

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

***Salient Explanations by Age Group*.** The language of the interview was combined for the analysis of salient categories by each age group because there were few differences in the types of explanations children provided in each language overall (see Table 32). Overall, children across the three age groups gave similar explanations for *how* and *why* someone gets better from cancer with eating healthy, nutrition in general and don't know common for 4-, 5-, and 6-year-olds; irrelevant responses were also common for 4- and 5-year-olds. For *how*, doctor and medicine were also prevalent for all age groups, and of note, God was quite salient in 6-year-olds' explanations for *how* and

positive immanent justice was quite salient for *why* in this age group. Supernatural explanations were not salient in any other instance across children's explanations of cold sick, cancer sick, cold better, cancer better – and, these two specific instances of supernatural explanations were salient only for 6-year-olds' explanations of *how* and *why* someone can get better from cancer. For 4-year-olds, the *Smith's S* salience score of God was 0.049 for *how* someone gets better from cancer, but God was not given as an explanation for *why* someone gets better from cancer in this age group. For 5-year-olds, the *Smith's S* salience score of God was 0.055 for *how* and 0.021 for *why* someone gets better from cancer. Finally, for 6-year-olds, the *Smith's S* salience score of God was 0.020 for *why* someone gets better from cancer. Therefore, it is not the case that God was a common explanation in 4- and 5-year-olds' explanations but fell just below the normative practice of reporting of scores above 0.100. Similarly, for positive immanent justice, for 4-year-olds, the *Smith's S* salience score was 0.031 for *why* someone gets better from cancer but 0.019 for *how*. No 5-year-old gave positive immanent justice as an explanation for *how* and *why* someone gets better from cancer. Finally, for 6-year-olds, the *Smith's S* salience score of positive immanent justice was 0.064 for *how* someone gets better from cancer. For 4-year-olds, the most salient supernatural explanation for *how* someone gets better from cancer was God, and the most salient supernatural explanation for *why* was positive immanent justice. The most salient supernatural explanation for *why* someone gets better from cancer for 5-year-olds was ghosts or spirits, with a *Smith's S* salience score of 0.031, followed by God with a score of 0.021; God was the most salient supernatural explanation given for 5-year-olds' explanations for *how* someone gets better

from cancer. Intriguingly, supernatural explanations were also only likely to be salient in parents' explanations for *how* and *why* a person gets better from cancer (the more serious illness).

Table 32

Salient Categories of How and Why Free-List Responses for Child Cancer Better – Split by Age

4-year-olds			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Irrelevant	0.333	Don't Know	0.223
Don't Know	0.208	Irrelevant	0.182
Eating Healthy	0.171	Eating Healthy	0.174
Doctor	0.104	*All Other Categories*	< 0.100
All Other Categories	< 0.100		
5-year-olds			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Eating Healthy	0.342	Eating Healthy	0.208
Medicine	0.131	Irrelevant	0.203
Nutrition in General	0.116	Nutrition in General	0.180
All Other Categories	< 0.100	Don't Know	0.172
		All Other Categories	< 0.100
6-year-olds			
	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Eating Healthy	0.255	Don't Know	0.160
Nutrition in General	0.153	Nutrition in General	0.133
Other	0.121	Positive Immanent Justice	0.120
Doctor	0.117	Eating Healthy	0.112
God	0.107	*All Other Categories*	< 0.100
Medicine	0.100		
All Other Categories	< 0.100		

Note: Smith's S represent salience scores, with higher scores indicating the item was

listed more frequently and listed earlier within each open-ended response.

***Salient Explanations – Overall for the Full Sample*.** Overall, irrelevant explanations were the most salient for the treatments of cancer for both *how* and *why* (see Table 33). Eating healthy was also salient in children's explanations for *how*. All in all, distal, supernatural causes were not more salient for children when asked to explain *why* someone gets better from cancer.

Table 33

Salient Categories of How and Why Free-List Responses for Child Cancer Better – Full Sample

	How		Why
Coding Category	*Smith's S*	Coding Category	*Smith's S*
Irrelevant	0.156	Irrelevant	0.134
Eating Healthy	0.126	*All Other Categories*	< 0.100
All Other Categories	< 0.100		

Note: Smith's S represent salience scores, with higher scores indicating the item was listed more frequently and listed earlier within each open-ended response.

Cancer Better – Conclusion. In sum, for both parents and children, Hypothesis 1 was also not supported for their explanations on the causal treatments of cancer. Even though supernatural causes were salient in parent explanations across the full sample, this type of explanation was salient for both *why* and *how*. On the other hand, by the age of 6-years-old, God was salient in children's explanations for *how* someone gets better from cancer. That is, by 6-years-old, children (and adults) give credit to God for ***healing*** an

illness, but God is *not* blamed for *causing* the illness. Even though parents and children were not differentiating in their explanations when asked *how* compared to when asked *why*, supernatural explanations were salient overall when asked to justify what causes someone to get better from cancer.

Main Research Objective 2: Cultural Consensus on the Causes and Treatments of Illnesses

To test Hypothesis 2b, responses to the items included in the direct prompt task (26-items for the causal chain, 20-items for the solution chain) were analyzed using cultural consensus analysis in the "AnthroTools" package in R (Purzycki, & Jamieson-Lane, 2016; Weller, 2007; see Appendix I for a more thorough overview of cultural consensus theory).

Children were asked about a specific causal mechanism in the causal chain and solution chain only if they had previously judged the item as real. This resulted in varying degrees of missingness for each child and up to 20% for each sickness or treatment across the full child data set. Because the aim of using cultural consensus was to assess what items adults and children agree are causes or treatments of illnesses, items that were judged as not real were coded as [0], or *No* to causing the illness or treatment. That is, for children, a response of *Yes* [1] for the consensus analysis indicate that the child said the item was real *and* that the item could cause or treat the illness. However, a response of No [0] for children indicate that either (a) the child judged the item as real, *but* the item cannot cause or treat the illness or (b) the child did not judge the item as real, therefore the item could not cause or treat the illness.

Additionally, in line with what is recommended for imputing missing data and responses of "don't know" when conducting consensus analyses, the remaining missing data for children and parents (i.e., missing because the researcher made an error and should have asked it or missing because the participant asked to skip the question) and all "don't know" responses were guessed via a random number generator providing a response of [1] or [0] (see Weller, 2007).

Lastly, of note, Comrey Ratio values are often used as a metric of determining fit in consensus, with a value of at least 3 usually indicating that participants come from a single, unified culture. A "non single, unified culture," refers to the idea that there may be sub-groups within any given culture, as members of a cultural group are not homogenous. On the other hand, if there is not enough variation within participant responses, this can also result in a low Comrey Ratio. Like any other type of statistical analysis, some caution should be reserved in using the rule of 3:1 as a hard and fast rule to make any final decisions, as the results may still be meaningful if they do not meet this specific criteria (e.g., see Purzycki, & Jamieson-Lane, 2016).

Causal Chain

In the results from the two sicknesses in the causal chain, cold and cancer, the Comrey Ratios were lower than 3 for children, indicating children may not all be coming from a single, unified culture. For this analysis, the term "single, unified culture" refers to the idea that there may be sub-groups within any given culture, as members of a cultural group are not homogenous. Alternatively, if there is not enough variation within participant responses, this can also result in a low Comrey Ratio. Because children are

still learning the culturally appropriate responses, it is not surprising that the Comrey Ratios are lower than 3, and in fact, a lot of prior work using Comrey Ratios to assess if participants come from a single culture do so with adult participants. That said, there was quite a bit of overlap in the consensus between the parents and children.

Cold Sick. Results from the cultural consensus analysis indicated that none of the supernatural causes were judged as being able to cause a common cold for either parents or children (see Table 34). Parents overall, as well as within each interview language group, judged the following natural causes as possible causes of the common cold: (1) going outside with wet hair, (2) improper outerwear, (3) cold weather, (4) playing with sick friends (i.e., contagion), (5) bad air or pollution, (6) eating unhealthy, and (7) germs.

Children across the sample also judged (1) going outside with wet hair, (2) improper outerwear, (3) cold weather, (4) playing with sick friends (i.e., contagion), (5) bad air or pollution, and (6) germs as causes of the cold, but not eating unhealthy. Additionally, eating cold food was also seen as a possible cause of a cold for children. There was some variation in child responses depending on the interview language, with children interviewed in Spanish saying “no” to going outside with wet hair, but yes to eating unhealthy whereas children interviewed in English judged the opposite to be true: yes to going outside with wet hair, but no to eating unhealthy.

Table 34

Cultural Consensus on the Causes of a Cold for Parent and Child – Split by Interview Language

Causal Mechanism	Parent			Child		
	Overall (*n* = 116)	English (*n* = 52)	Spanish (*n* = 64)	Overall (*n* = 104)	English (*n* = 49)	Spanish (*n* = 55)
Going Outside with Wet Hair	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No
Improper Outerwear	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Cold Weather	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Eating Cold Foods	No	No	No	**Yes**	**Yes**	**Yes**
Playing with Sick Friends [a]	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Bad Air or Pollution	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Eating Unhealthy	**Yes**	**Yes**	**Yes**	No	No	**Yes**
Germs	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No
Genetics or Heredity	No	No	No	No	No	No
God	No	No	No	No	No	No
Jesus	No	No	No	No	No	No
Angel	No	No	No	No	No	No
Saints	No	No	No	No	No	No
Priest	No	No	No	No	No	No
Devil	No	No	No	No	No	No
Demon	No	No	No	No	No	No
Not Praying	No	No	No	No	No	No
Not Attending Church	No	No	No	No	No	No
Evil Eye	No	No	No	No	No	No
Luck	No	No	No	No	No	No
Destiny or Fate	No	No	No	No	No	No

	Parent			Child		
Causal Mechanism	Overall (*n* = 116)	English (*n* = 52)	Spanish (*n* = 64)	Overall (*n* = 104)	English (*n* = 49)	Spanish (*n* = 55)
Karma	No	No	No	No	No	No
Ghosts or Spirits	No	No	No	No	No	No
Witchcraft	No	No	No	No	No	No
Negative Immanent Justice	No	No	No	No	No	No
Comrey Ratio Value [b]	3.37	3.13	3.41	1.99	2.28	1.73

[a] = Playing with sick friends was used to represent contagion as 4- to 6-year-old children may not know the specific word, but still understand the concept.

[b] = Comrey Ratio Values are often used as a metric of determining fit in consensus, with a value of at least 3 usually indicating that participants come from a single, unified culture.

Cancer Sick. Once again, the cultural consensus analysis indicated that none of the supernatural causes were judged as being able to cause cancer for either parents or children (see Table 35). However, the specific causes endorsed for cancer were different from those endorsed for the common cold. Results were the same for parents interviewed in either language; parents reported the following natural causes as possible causes of cancer: (1) bad air or pollution, (2) eating unhealthy, and (3) genetics or heredity.

There was some variation in child responses depending on the interview language. Children interviewed in English endorsed two natural causes as possible causes of cancer: (1) improper outerwear and (2) playing with friends who are sick (i.e., contagion). Children interviewed in Spanish only endorsed eating unhealthy as a cause of cancer. When collapsing across the two languages to examine the full sample, the only cause endorsed as a cause of cancer was improper outerwear.

Table 35

Cultural Consensus on the Causes of Cancer for Parent and Child – Split by Interview Language

Causal Mechanism	Parent			Child		
	Overall (*n* = 116)	English (*n* = 51)	Spanish (*n* = 64)	Overall (*n* = 103)	English (*n* = 47)	Spanish (*n* = 56)
Going Outside with Wet Hair	No	No	No	No	No	No
Improper Outerwear	No	No	No	**Yes**	**Yes**	No
Cold Weather	No	No	No	No	No	No
Eating Cold Foods	No	No	No	No	No	No
Playing with Sick Friends [a]	No	No	No	No	**Yes**	No
Bad Air or Pollution	**Yes**	**Yes**	**Yes**	No	No	No
Eating Unhealthy	**Yes**	**Yes**	**Yes**	No	No	**Yes**
Germs	No	No	No	No	No	No
Genetics or Heredity	**Yes**	**Yes**	**Yes**	No	No	No
God	No	No	No	No	No	No
Jesus	No	No	No	No	No	No
Angel	No	No	No	No	No	No
Saints	No	No	No	No	No	No
Priest	No	No	No	No	No	No
Devil	No	No	No	No	No	No
Demon	No	No	No	No	No	No
Not Praying	No	No	No	No	No	No
Not Attending Church	No	No	No	No	No	No
Evil Eye	No	No	No	No	No	No
Luck	No	No	No	No	No	No
Destiny or Fate	No	No	No	No	No	No

	Parent			Child		
Causal Mechanism	Overall (*n* = 116)	English (*n* = 51)	Spanish (*n* = 64)	Overall (*n* = 103)	English (*n* = 47)	Spanish (*n* = 56)
Karma	No	No	No	No	No	No
Ghosts or Spirits	No	No	No	No	No	No
Witchcraft	No	No	No	No	No	No
Negative Immanent Justice	No	No	No	No	No	No
Comrey Ratio Value [b]	3.56	3.53	3.65	1.610	1.634	1.561

[a] = Playing with sick friends was used to represent contagion as 4- to 6-year-old children may not know the specific word, but still understand the concept.

[b] = Comrey Ratio Values are often used as a metric of determining fit in consensus, with a value of at least 3 usually indicating that participants come from a single, unified culture.

Solution Chain

Once again, in the results from the two treatments of sicknesses in the solution chain, treatment of the common cold and treatments of cancer, the Comrey Ratios were lower than 3 for children, but the ratios were also lower than 3 for parents, indicating both children and parents may not all be coming from a single, unified culture. Typically, the rule of thumb is to have a ratio of at least 3:1 (Weller, 2007), but there is some debate about having a somewhat arbitrary number such as 3 as a hard-cutoff value to determine if there is indeed a single, shared culture among participants (Purzycki & Jamieson, 2016).

Cold Better. The cultural consensus analysis indicated a wide range in the endorsements of both natural and supernatural causes for the treatment of a cold in both parents and children (see Table 36). For parents, results were slightly different depending on the language of the interview. Parents interviewed in either English or Spanish endorsed all four natural causes: (1) herbal remedies, (2) eating healthy, (3) medicine, and (4) a doctor. However, parents interviewed in Spanish also endorsed God as a causal mechanism for treating the common cold.

For children, the results varied widely depending on the language of the interview. Children interviewed in English tended to endorse three natural causes as treatments of the common cold: (1) eating healthy, (2) medicine, and (3) a doctor. However children interviewed in Spanish endorsed the four natural causes (herbal remedies, eating healthy, medicine, and a doctor) as well as 12 of the 16 supernatural causal mechanisms: (1) God, (2) Jesus, (3) an angel, (4) saints, (5) a priest, (6) prayer

[*orar*], (7) praying the rosary [*rezar el rosario*], (8) attending mass or church, (9) luck, (10) destiny or fate, (11) magic, and (12) positive immanent justice (i.e., good moral actions that may lead to immanent justice). In fact, the only supernatural causal mechanisms children interviewed in Spanish did not endorse were miracles, karma, ghosts or spirits, and witchcraft.

Table 36

Cultural Consensus on the Treatments of a Cold for Parent and Child – Split by Interview Language

Causal Mechanism	Parent			Child		
	Overall (*n* = 116)	English (*n* = 52)	Spanish (*n* = 64)	Overall (*n* = 103)	English (*n* = 47)	Spanish (*n* = 56)
Herbal Remedies	**Yes**	**Yes**	**Yes**	**Yes**	No	**Yes**
Eating Healthy	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Medicine	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Doctor	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
God	No	No	**Yes**	**Yes**	No	**Yes**
Jesus	No	No	No	**Yes**	No	**Yes**
Angel	No	No	No	**Yes**	No	**Yes**
Saints	No	No	No	**Yes**	No	**Yes**
Priest	No	No	No	**Yes**	No	**Yes**
Miracles	No	No	No	**Yes**	No	No
Prayer [*orar*]	No	No	No	**Yes**	No	**Yes**
Praying the Rosary [*rezar*]	No	No	No	**Yes**	No	**Yes**
Attending Church	No	No	No	**Yes**	No	**Yes**
Luck	No	No	No	**Yes**	No	**Yes**
Destiny or Fate	No	No	No	No	No	**Yes**
Karma	No	No	No	No	No	No
Magic	No	No	No	**Yes**	No	**Yes**
Ghosts or Spirits	No	No	No	No	No	No
Witchcraft	No	No	No	**Yes**	No	No
Positive Immanent Justice	No	No	No	**Yes**	No	**Yes**
Comrey Ratio Value [a]	1.80	1.87	1.74	1.207	1.225	1.238

[a] = Comrey Ratio Values are often used as a metric of determining fit in consensus, with a value of at least 3 usually indicating that participants come from a single, unified culture.

Cancer Better. Results from the cultural consensus analysis for the treatments of cancer showed parents endorsing more supernatural causes than they did for the treatments of the common cold (see Table 37). Specifically, parents interviewed in either English or Spanish endorsed three of the four natural causal mechanisms (eating healthy, medicine, and a doctor) as well as five of the 12 supernatural causal mechanisms (God, Jesus, miracles, prayer [*orar*], praying the rosary [*rezar el rosario*]). Parents interviewed in English also endorsed destiny or fate as a possible causal treatment of cancer whereas parents interviewed in Spanish also endorsed herbal remedies.

For children, once again, the results varied depending on the language of the interview. Similar to their beliefs about treatments of the common cold, children interviewed in English endorsed three natural causes as treatments of cancer: (1) eating healthy, (2) medicine, and (3) a doctor. For treatments of cancer, children interviewed in English also endorsed the supernatural causal mechanism of positive immanent justice (i.e., good moral actions that may lead to immanent justice).

Comparable to their beliefs about the causal treatments of the common cold, children interviewed in Spanish once again endorsed the four natural causes (herbal remedies, eating healthy, medicine, and a doctor) as well as 14 of the 16 supernatural causal mechanisms: (1) God, (2) Jesus, (3) an angel, (4) saints, (5) a priest, (6) prayer [*orar*], (7) praying the rosary [*rezar el rosario*], (8) attending mass or church, (9) luck, (10) destiny or fate, (11) magic, (12) positive immanent justice (i.e., good moral actions that may lead to immanent justice), and adding on (13) miracles and (14) karma this time for cancer. The only two supernatural causal mechanisms children interviewed in Spanish

did not endorse were ghosts or spirits, and witchcraft.

Table 37

Cultural Consensus on the Treatments of Cancer for Parent and Child – Split by Interview Language

	Parent			Child		
Causal Mechanism	Overall (*n* = 116)	English (*n* = 52)	Spanish (*n* = 64)	Overall (*n* = 103)	English (*n* = 47)	Spanish (*n* = 56)
Herbal Remedies	**Yes**	No	**Yes**	No	No	**Yes**
Eating Healthy	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Medicine	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Doctor	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
God	**Yes**	**Yes**	**Yes**	No	No	**Yes**
Jesus	**Yes**	**Yes**	**Yes**	No	No	**Yes**
Angel	No	No	No	No	No	**Yes**
Saints	No	No	No	No	No	**Yes**
Priest	No	No	No	No	No	**Yes**
Miracles	**Yes**	**Yes**	**Yes**	No	No	**Yes**
Prayer [*orar*]	**Yes**	**Yes**	**Yes**	No	No	**Yes**
Praying the Rosary [*rezar*]	**Yes**	**Yes**	**Yes**	No	No	**Yes**
Attending Church	No	No	No	No	No	**Yes**
Luck	No	No	No	No	No	**Yes**
Destiny or Fate	No	**Yes**	No	No	No	**Yes**
Karma	No	No	No	No	No	**Yes**
Magic	No	No	No	No	No	**Yes**
Ghosts or Spirits	No	No	No	No	No	No
Witchcraft	No	No	No	No	No	No
Positive Immanent Justice	No	No	No	No	**Yes**	**Yes**
Comrey Ratio Value [a]	1.64	1.57	1.71	1.303	1.281	1.352

[b] = Comrey Ratio Values are often used as a metric of determining fit in consensus, with a value of at least 3 usually indicating that participants come from a single, unified culture.

Conclusion

Hypothesis 2b was partially supported. It was expected children and adults would endorse both natural and supernatural causes for the causes and treatments of illnesses in the recognition task, and that the number and type of specific causes would vary by the severity of the illness, with children and adults endorsing more supernatural causes for the more severe illness (cancer) than the less severe illness (cold). Parents and children alike did not endorse any supernatural causes as being able to cause the common cold or cancer.

Regarding the causal mechanisms of treatments, parents interviewed in Spanish endorsed one supernatural cause (God) alongside the four natural causes as being able to cause someone to get better from the common cold. The number of supernatural causes endorsed by parents increased when asked about possible treatments of cancer, with parents interviewed in Spanish endorsing 5 of the 12 supernatural causal mechanisms, and parents interviewed in English endorsing 6 of the 12 supernatural causal mechanisms.

For children, the number of supernatural causes endorsed for the causes of treatments varied by the language the child was interviewed in: children interviewed in English did not endorse any supernatural causes for treatments of the common cold, whereas children interviewed in Spanish endorsed 12 of the 16 supernatural causes. Similarly, for the causal treatments of cancer, children interviewed in English endorsed only 1 of the 16 supernatural causes whereas children interviewed in Spanish endorsed 14 out of the 16 supernatural causes.

Exploratory Analyses: Proportion of Parent-Child Correspondence in Directed Prompt Task

To test Hypotheses 2e, exploratory analyses examined the proportion of correspondence (i.e., match) for parent and child responses to the causal mechanisms in the directed prompt task for each story. That is, did children endorse the same causal mechanisms as their own parent?

Child responses for this set of analysis were coded in the following manner: a response of *Yes* indicated that the child said the item was real *and* that the item could cause or treat the illness. However, a response of *No* for children indicated that either (a) the child judged the item as real, *but* the item cannot cause or treat the illness or (b) the child did not judge the item as real, therefore the item could not cause or treat the illness. Similarly, parent responses for this set of analyses were coded in the following manner: a response of *Yes* indicated that parent said that the item could cause or treat the illness, however, a response of *No* indicated that the parent judged the item as not able cause or treat the illness. Parents' judgments on the reality status of the items was not used in the parent-child correspondence analysis.

Parent-child correspondence was calculated as the proportion of "match" responses for each of the four stories – cold sick, cancer sick, cold better, cancer better (see Table 38 and 39). That is, if a parent said "yes" and their child said "yes" to a specific cause, they received a score of [1] *Match* for that causal mechanism, but if a parent said "no" and a child said "yes" to a specific cause, they received a score of [0] *Non-Match* for that causal mechanism (the same coding applied for parents who said

"yes" to a cause but their child said "no"). Because there was some missing data in which the parent or child should have been asked about a specific cause but were not asked, a proportion was created for the total number of match responses out of the total number of causal mechanisms asked.

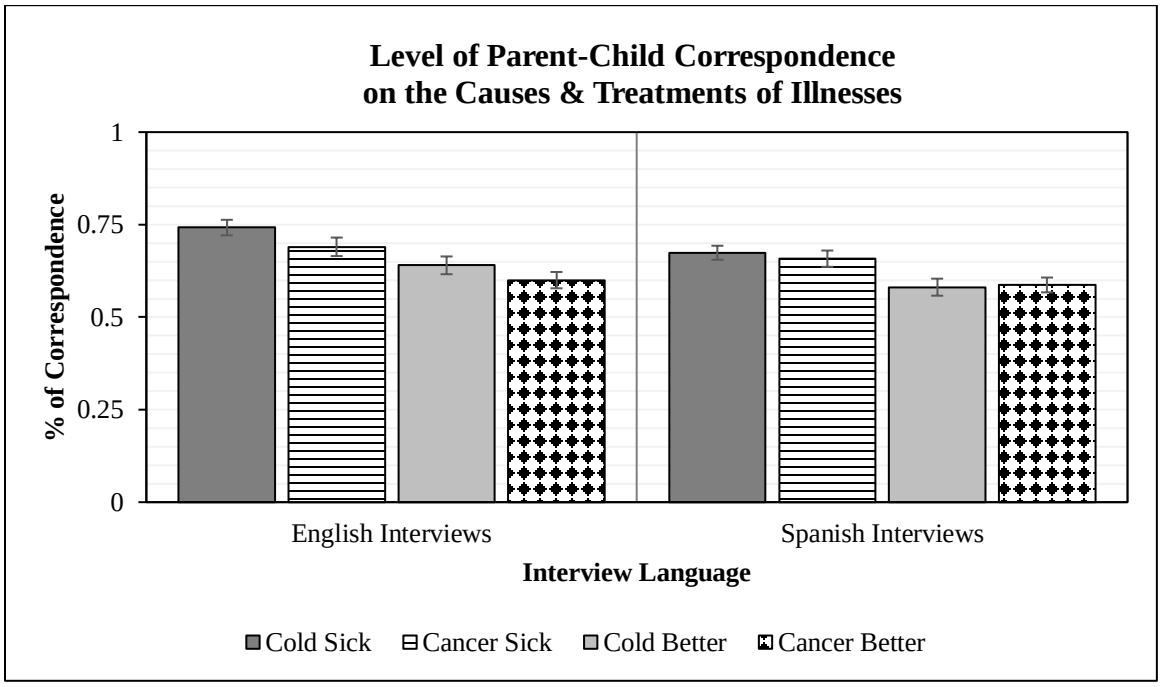
Levels of Parent-Child Correspondence

Across the full parent-child sample, parent-child judgments on the causes of the cold had the highest level of correspondence (M = 0.704, SD = 0.148), followed by cancer sick (M = 0.673, SD = 0.171), cold better (M = 0.608, SD = 0.167), and cancer better (M = 0.593, SD = 0.152) (see Table 38). In other words, on average, a parent and their child agreed on the causes of the common cold 70.4% of the time in the directed prompt task but this decreased slightly to an average agreement of 67.3% for the causes of cancer.

These patterns were also similar when examining levels of correspondence by interview language. For parents and children interviewed in English, the causes of the cold had the highest level of correspondence (M = 0.737, SD = 0.113), followed by cancer sick (M = 0.690, SD = 0.159), cold better (M = 0.639, SD = 0.172), and cancer better (M = 0.600, SD = 0.150) (see Table 39 and Figure 8). For parents and children interviewed in Spanish, the causes of the cold also had the highest level of correspondence (M = 0.674, SD = 0.168), followed by cancer sick (M = 0.658, SD = 0.181), cold better (M = 0.581, SD = 0.159), and cancer better (M = 0.587, SD = 0.154) (see Table 39 and Figure 8).

Figure 8

Level of Correspondence Between Parent-Child Responses – by Interview Language



Error bars represent Standard Error.

Differences in Levels of Parent-Child Correspondence

A 2 (Type of Illness: Cold, Cancer) X 2 (Causal Sequence: Cause of Illness, Treatments of Illness) X 2 (Interview Language: English, Spanish) Repeated Measures ANOVA with interview language as a between-subjects variable was done to examine variation in the levels of parent-child correspondence. There was a main effect of type of illness, such that the level of correspondence between parents and children was significantly higher for the causes of the cold (M_{cold} = 0.659, SE_{cold} = 0.012) than the causes of cancer (M_{cancer} = 0.634, SE_{cancer} = 0.012), $F(1, 102) = 6.081$, $p = .015$, η_p^2 =

.056. Additionally, there was a significant interaction between interview language and type of illness, such that the level of correspondence for both cold and cancer was higher for the parents and children interviewed in English (M_{cold} = 0.691, SE_{cold} = 0.017; M_{cancer} = 0.645, SE_{cancer} = 0.017) than the parents interviewed in Spanish, (M_{cold} = 0.627, SE_{cold} = 0.016; M_{cancer} = 0.623, SE_{cancer} = 0.016), $F(1, 102) = 4.058$, $p = .047$, $\eta_p^2 = .038$.

There was also a main effect of causal sequence, such that the proportion of correspondence between parents and children was significantly higher for the causes of illness (M_{causes} = 0.691, SE_{causes} = 0.014) than the treatments of illness ($M_{treatments}$ = 0.602, $SE_{treatments}$ = 0.013), $F(1, 102) = 27.177$, $p < .001$, $\eta_p^2 = .210$. However, there was not a significant interaction between interview language and causal sequence, $F(1, 102) = 0.164$, $p = .687$, $\eta_p^2 = .002$. There was also not a significant interaction between type of illness and causal sequence, $F(1, 102) = 0.556$, $p = .457$, $\eta_p^2 = .005$, or a significant interaction between type of illness, causal sequence, and interview language, $F(1, 102) = 0.049$, $p = .825$, $\eta_p^2 < .001$ (see Figure 8). This suggests that overall, how much a parent and child matched in their judgments on the causal mechanisms was similar when comparing judgments of the causes of illness to the treatments of the illness across both languages.

Finally, there was a significant main effect of interview language, with parents and children interviewed in English ($M_{English}$ = 0.668, $SE_{English}$ = 0.015) having a higher proportion of correspondence overall than parents and children interviewed in Spanish ($M_{Spanish}$ = 0.625, $SE_{Spanish}$ = 0.014), $F(1, 102) = 4.193$, $p = .043$, $\eta_p^2 = .039$.

Conclusion. Altogether, results from the Repeated Measures ANOVA support the

notion that child responses would be somewhat similar to their own parents' responses, meaning that parents' own explanations do play a role in their own child's explanations. That said, there was not a 100% match for all parents and children in their judgments on the causes and treatments of illnesses, as there was variation depending on the type of illness, if the child and parent were being asked about the causes of the illness or the treatments of the illness, and the interview language.

Correlates of Levels of Parent-Child Correspondence

Bivariate correlations were also done to examine what child factors might be related to the level of correspondence between a parent and child dyad. Results showed that the proportion of correspondence was not necessarily related to the child's age since age was only significantly related to the level of correspondence for cold sick – both in the full sample and when examining the sub-groups by interview language. That is, across the full sample, older children did not necessarily match their parents' responses more than the younger children. Age was related to a higher parent-child match only for the causes of the cold. Specifically, children who were older (M = 5.338, SD = 0.833) had a significantly higher level of correspondence to their parent's responses for the causes of the cold (M = 0.704, SD = 0.148), $r(103) = .313$, $p = 001$. Additionally, a child's understanding of human (im)possibility and level of executive functioning was also positively, significantly related to the proportion of correspondence to their parent's responses for the causes and treatments of the cold (see Table 38), and a child's understanding of human (im)possibility was positively, significantly related to the proportion of correspondence to their parent's responses for the causes of cancer (see

Table 38). For the full sample, a child's biological understanding and a child's frequency of religious engagement was not significantly related to the proportion of parent-child correspondence for the causes and treatments of cold and cancer (see Table 38). However, for children and parents interviewed in Spanish, children's frequency of religious engagement was significantly, negatively related to the proportion of correspondence between parents' and children's judgments of the treatments of cancer (see Table 39).

Table 38

Correlation Matrix, Means, and Standard Deviations for Parent-Child Proportion of Correspondence – Full Sample

Full Parent-Child Sample (*N* = 105)						
	1	2	3	4	*M* (*SD*)	*Range* [b]
1. Cold Sick Correspondence – *All 26* [a]	—				0.704 (0.148)	0.269 to 1.000
2. Cancer Sick Correspondence – *All 26* [a]	.537***	—			0.673 (0.171)	0.040 to 1.000
3. Cold Better Correspondence – *All 20* [a]	.206*	.231*	—		0.608 (0.167)	0.200 to 0.950
4. Cancer Better Correspondence – *All 20* [a]	.129	.079	.469***	—	0.593 (0.152)	0.158 to 0.895
5. Child Age (years)	.313**	.179	.092	.127	5.338 (0.833)	
6. Child Biological Understanding	.044	-.062	.038	.027	0.679 (0.261)	
7. Child Human (Im)possiblity	.464***	.305**	.245*	.159	0.766 (0.310)	
8. Child Executive Functioning	.390***	.082	.320**	.163	3.835 (2.111)	
9. Child Religious Engagement	-.079	-.009	-.102	-.186	2.070 (1.480)	

[a] = This table represents the results for all causal mechanisms asked in the directed prompt task (n = 26 for sickness; n = 20 for treatment).

[b] = The range reported is the range in proportion of correspondence between parent-child dyads.

* $p < .05$. ** $p < .01$. *** $p < .001$; two-tailed

Table 39

Correlation Matrix, Means, and Standard Deviations for Parent-Child Proportion of Correspondence – By Interview Language

Parents & Children Interviewed in English (*n* = 49)							
	1	2	3	4	*M* (*SD*)	***t*** [b]	***r*** [b]
1. Cold Sick Correspondence – *All 26* [a]	—				0.737 (0.113)	2.234*	.216
2. Cancer Sick Correspondence – *All 26* [a]	.403**	—			0.690 (0.159)	.948	.093
3. Cold Better Correspondence – *All 20* [a]	.112	.048	—		0.639 (0.172)	1.820	.175
4. Cancer Better Correspondence – *All 20* [a]	.050	-.066	.400**	—	0.600 (0.150)	.413	.041
5. Child Age (years)	.424**	.204	.024	.059	5.241 (0.844)	-1.117	.109
6. Child Biological Understanding	.276	-.135	-.011	-.197	0.749 (0.199)	2.557*	.249
7. Child Human (Im)possiblity	.497***	.350*	.190	.020	0.826 (0.288)	1.798	.178
8. Child Executive Functioning	.306*	.103	.291*	-.018	3.975 (1.971)	.619	.062
9. Child Religious Engagement	.047	.207	.012	.058	1.731 (1.405)	-2.237*	.214
Parents & Children Interviewed in Spanish (*n* = 56)							
	1	2	3	4	*M* (*SD*)		
1. Cold Sick Correspondence – *All 26* [a]	—				0.674 (0.168)		
2. Cancer Sick Correspondence – *All 26* [a]	.605***	—			0.658 (0.181)		
3. Cold Better Correspondence – *All 20* [a]	.223	.363**	—		0.581 (0.159)		
4. Cancer Better Correspondence – *All 20* [a]	.166	.181	.534***	—	0.587 (0.154)		
5. Child Age (years)	.312*	.182	.201	.194	5.423 (0.821)		
6. Child Biological Understanding	-.120	-.060	.004	.116	0.620 (0.291)		
7. Child Human (Im)possiblity	.424**	.261	.252	.233	0.716 (0.321)		
8. Child Executive Functioning	.432**	.059	.339*	.285*	3.714 (2.237)		
9. Child Religious Engagement	-.080	-.131	-.137	-.371**	2.366 (1.492)		

[a] = This table represents the results for all causal mechanisms asked in the directed prompt task (n = 26 for sickness; n = 20 for treatment).

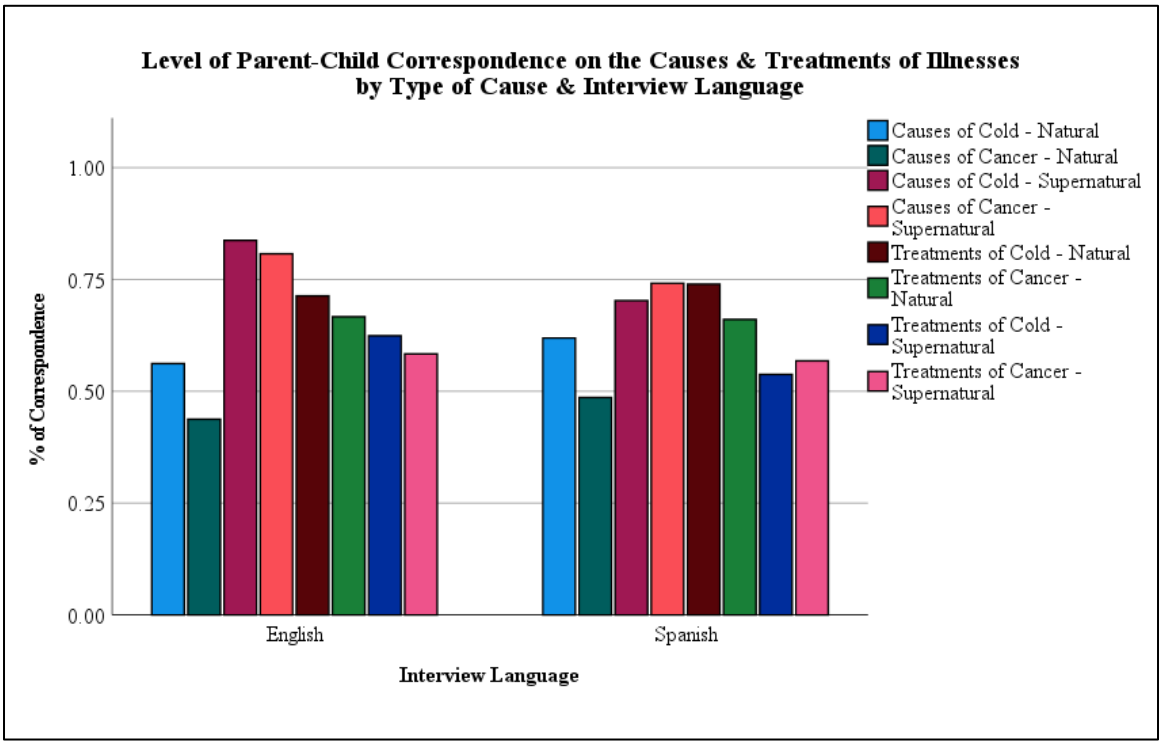
[b] = Independent Samples T-Tests were done to compare if the level of correspondence for parents and children varied by interview language. Effect-size r is reported.

* $p < .05$. ** $p < .01$. *** $p < .001$; two-tailed

Further analyses were done for the level of correspondence of natural causes and supernatural causes within each type of illness (cold, cancer) and story type (cause of sickness, treatment) (see Table 40) as well as interview language (see Table 41 and Figure 9). Overall across the full parent-child dyad sample (N = 105), the proportion of correspondence between parents and children was lower for the natural causes of the cold with a 59.0% match on average for natural causes of a cold but a 76.3% match on average for the supernatural causes of the cold. A similar pattern emerged for the causes of cancer: there was a 46.5% match between parent-child dyads on average for the natural causes of cancer but a 77.2% match on average for the supernatural causes of cancer. The opposite pattern was true for the treatments of the common cold and cancer: the rate of correspondence between parents and children was higher for the supernatural causes than the natural causes. Specifically, for the common cold, parent-child dyads matched 72.5% on average in their responses about the natural treatments of the common cold but it dropped slightly down to a 65.8% match on average for the supernatural treatments of the common cold. For cancer, parent-child dyads agreed on the natural causes to treat cancer 66.3% of the time on average, but they agreed on supernatural causes to treat cancer 57.5% of the time on average. These patterns were similar for both interview languages (see Table 41).

Figure 9

Level of Correspondence Between Parent-Child Responses – by Type of Cause and Interview Language



Moreover, once again, older children did not necessarily match their parents' responses more than the younger children. That is, the proportion of parent-child correspondence was not necessarily related to the child's age since age was only significantly related to the level of correspondence for the supernatural causes of cold and cancer but the natural causes to treat the cold and cancer (see Table 40).

Furthermore, a child's biological understanding of humans was actually significantly, negatively related to the proportion of parent-child correspondence for the natural causes of cancer for the full sample and for parents and children interviewed in

English (see Table 41). That is, children who knew more about human biology had a lower rate of matching to their parent's responses for the natural causes of cancer. However, a child's biological understanding was not significantly related to the rate of correspondence between parents and children for any other types of causes and treatments of illness.

That said, a child's understanding of human (im)possibility was positively, significantly related to the proportion of correspondence to their parent's responses for the supernatural causes of the cold and cancer and the supernatural treatments of the cold – across the full sample (see Table 40) as well as for both interview language groups (see Table 41). Children who had a better grasp of what is possible for humans to do also had a higher proportion of matches with their parents for the supernatural causes and treatments of illnesses.

Child levels of executive functioning was also positively, significantly related to the rate of parent-child correspondence for the supernatural causes of cancer, the natural and supernatural treatments of the cold, and the natural treatments of cancer for the full sample (see Table 40). For children interviewed in English, executive functioning was positively, significantly related to the rate of parent-child correspondence for the supernatural causes of cancer and the natural treatments of the cold. For children interviewed in Spanish, executive functioning was positively, significantly related to the rate of parent-child correspondence for the supernatural causes of cancer, supernatural treatments of the common cold, and the natural treatments of cancer (see Table 41). That is, a child's inhibitory control and attention skills are related to a higher match in

children-parent responses for some types of causes but not all.

Finally, for the full sample, the child's frequency of religious engagement was not significantly related to rates of parent-child correspondence on the causes and treatments of illnesses (see Table 40). However, for children and parents interviewed in Spanish, children's frequency of religious engagement was significantly, negatively related to the rate of correspondence between parents' and children's judgments of the supernatural treatments of cancer (see Table 41). That is, children interviewed in Spanish who engaged in religious activities more often had a lower rate of matching to their parent's responses for the supernatural treatments of cancer. However, it is not clear why this is the case.

Table 40

Correlation Matrix, Means, and Standard Deviations for Parent-Child Proportion of Correspondence by Type of Causal Mechanism – Full Sample

	Full Parent-Child Sample (*N* = 105)									
	1	2	3	4	5	6	7	8	*M* (*SD*)	*Range* [a]
1. Cold Sick P-C *– 9 Natural Causes*	—								0.590 (0.209)	.111 to 1.000
2. Cold Sick P-C *– 17 Supernatural*	-.248*	—							0.763 (0.227)	.059 to 1.000
3. Cancer Sick P-C *– 9 Natural Causes*	-.082	.112	—						0.465 (0.220)	0 to 1.000
4. Cancer Sick P-C *– 17 Supernatural*	-.164	.703***	.280**	—					0.772 (0.201)	0 to 1.000
5. Cold Better P-C *– 4 Natural Causes*	.197*	-.155	-.229*	-.239*	—				0.725 (0.303)	0 to 1.000
6. Cold Better P-C *– 16 Supernatural*	.044	.462***	.212**	.517***	-.212*	—			0.658 (0.258)	.067 to 1.000
7. Cancer Better P-C *– 4 Natural Causes*	.094	.009	-.202*	-.166	.407***	-.135	—		0.663 (0.259)	0 to 1.000
8. Cancer Better P-C *– 16 Supernatural*	-.034	.138	.022	.202*	.041	.308**	.137	—	0.575 (0.170)	0.063 to 0.933
9. Child Age (years)	.023	.297**	-.054	.233*	.252*	.131	.239*	.047	5.338 (0.833)	
10. Child Biological Understanding	.141	-.022	-.249*	.043	.192	-.008	.008	.029	0.679 (0.261)	
11. Child Human (Im)possiblity	-.051	.489***	.015	.365***	-.009	.315**	.149	.119	0.766 (0.310)	
12. Child Executive Functioning	-.042	.404***	-.178	.184	.279**	.292**	.266**	.073	3.835 (2.111)	
13. Child Religious Engagement	.051	-.101	.092	-.078	-.002	-.056	-.055	-.186	2.070 (1.480)	

[a] = The range reported is the range in proportion of correspondence between parent-child dyads.

* $p < .05$. ** $p < .01$. *** $p < .001$; two-tailed

Table 41

Correlation Matrix, Means, and Standard Deviations for Parent-Child Proportion of Correspondence by Type of Causal Mechanism – By Interview Language

Parents & Children Interviewed in English (*n* = 49)										
	1	2	3	4	5	6	7	8	*M* (*SD*)	*Range* [a]
1. Cold Sick P-C *– 9 Natural Causes*	—								0.557 (0.213)	0.111 to 1.000
2. Cold Sick P-C *– 17 Supernatural*	-.304*	—							0.832 (0.169)	0.353 to 1.000
3. Cancer Sick P-C *– 9 Natural Causes*	-.059	.017	—						0.440 (0.238)	0 to 1.000
4. Cancer Sick P-C *– 17 Supernatural*	-.355*	.759***	.200	—					0.807 (0.180)	0.353 to 1.000
5. Cold Better P-C *– 4 Natural Causes*	.263	-.273	-.436**	-.294*	—				0.709 (0.316)	0 to 1.000
6. Cold Better P-C *– 16 Supernatural*	.007	.385**	.223	.376**	-.187	—			0.624 (0.218)	0.133 to 1.000
7. Cancer Better P-C *– 4 Natural Causes*	.292*	-.184	-.389**	-.262	.403**	-.015	—		0.667 (0.235)	0.250 to 1.000
8. Cancer Better P-C *– 16 Supernatural*	.010	.038	-.100	.124	.008	.247	.274	—	0.584 (0.164)	0.125 to 0.933
9. Child Age (years)	.069	.387**	-.021	.270	.293*	-.020	.255	-.032	5.241 (0.844)	
10. Child Biological Understanding	.120	.205	-.375**	.031	.266	-.105	.024	-.241	0.749 (0.199)	
11. Child Human (Im)possiblity	-.020	.521***	.056	.387**	-.197	.322*	.009	.015	0.826 (0.288)	
12. Child Executive Functioning	-.044	.342**	-.199	.244	.395**	.171	.171	-.088	3.975 (1.971)	
13. Child Religious Engagement	-.027	.069	.196	.109	-.147	.053	.030	.054	1.731 (1.405)	

Parents & Children Interviewed in Spanish (*n* = 56)										
	1	2	3	4	5	6	7	8	*M* (*SD*)	*Range* [a]
1. Cold Sick P-C *– 9 Natural Causes*	—								0.619 (0.203)	0.222 to 1.000
2. Cold Sick P-C *– 17 Supernatural*	-.172	—							0.703 (0.254)	0.059 to 1.000
3. Cancer Sick P-C *– 9 Natural Causes*	-.142	.248	—						0.486 (0.203)	0.111 to 1.000
4. Cancer Sick P-C *– 17 Supernatural*	.017	.668***	.398**	—					0.742 (0.215)	0 to 1.000
5. Cold Better P-C *– 4 Natural Causes*	.121	-.076	-.016	-.190	—				0.740 (0.294)	0 to 1.000
6. Cold Better P-C *– 16 Supernatural*	.111	.483***	.238	.589***	-.225	—			0.538 (0.211)	0.067 to 1.000
7. Cancer Better P-C *– 4 Natural Causes*	-.049	.095	-.049	-.115	.417**	-.214	—		0.661 (0.280)	0 to 1.000
8. Cancer Better P-C *– 16 Supernatural*	-.060	.182	.147	.248	.073	.345**	.045	—	0.568 (0.176)	0.063 to 0.875
9. Child Age (years)	-.050	.332*	-.115	.248	.204	.277*	.233	.121	5.423 (0.821)	
10. Child Biological Understanding	.228	-.215	-.142	-.007	.172	-.004	-.007	.134	0.620 (0.291)	
11. Child Human (Im)possiblity	-.033	.445**	.026	.322*	.123	.290*	.229	.164	0.716 (0.321)	
12. Child Executive Functioning	-.026	.440**	-.151	.133	.194	.364**	.323*	.176	3.714 (2.237)	
13. Child Religious Engagement	.060	-.104	-.047	-.151	.105	-.087	-.111	-.358**	2.366 (1.492)	

[a] = The range reported is the range in proportion of correspondence between parent-child dyads.

* $p < .05$. ** $p < .01$. *** $p < .001$; two-tailed

Main Research Objective 3: Cluster Analysis

A set of K-means cluster analyses was used to examine the total number of natural versus supernatural causal mechanisms parents and children endorsed for the causes and treatments of illness during the direct prompt task, and to see if parents and children would fall into different clusters depending on the patterns of endorsement: (1) high natural, low supernatural, (2) low natural, high supernatural, and (3) high natural, high supernatural. Two sets of proportion scores were created for the cluster analysis: (1) the total number of natural causes endorsed (out of 9 natural causal mechanisms for the causal chain, and out of 4 natural causal mechanisms for the solution chain), and (2) the total number of supernatural causes endorsed (out of 17 for the causal chain, and out of 16 for the solution chain). Cold and cancer were collapsed into one set of cluster analyses for the causal chain (i.e., sickness) and one set of cluster analyses for the solution chain (i.e., treatments).

For this set of analysis, if a parent or child had missing data, the proportion was created for the total number of "yes" responses out of the total number asked; thus for children who judged a causal mechanism as "not real" during the reality sorting task and subsequently was not asked about that cause during the direct prompt task, their proportion score was adjusted to reflect only the number of causal mechanisms they had said were real. That is, for children, a response of *Yes* [1] for the cluster analysis indicate that the child said the item was real *and* that the item could cause or treat the illness. However, a response of No [0] for children indicate that the child judged the item as real, *but* the item cannot cause or treat the illness. For parents, a response of *Yes* [1] for the

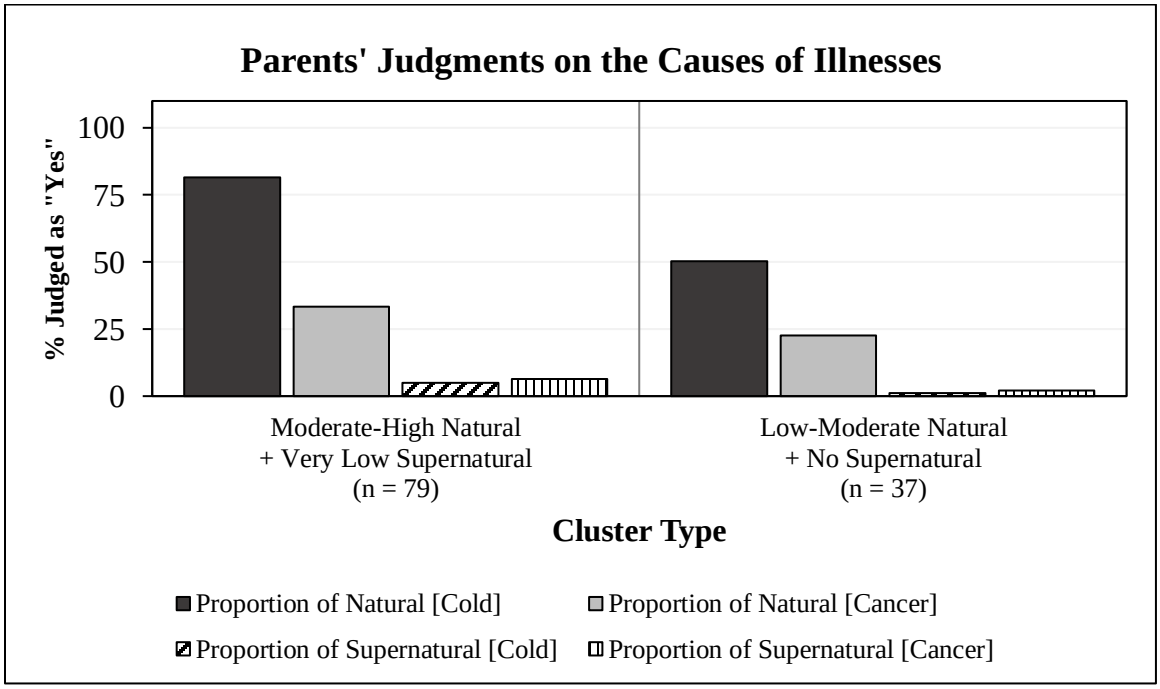
cluster analysis only indicates that the parent said that the item could cause or treat the illness, and a response of No [0] for parents indicate that the parent judged the item as not able to cause or treat the illness. Parents' judgments on the reality status of the items was not used in the cluster analyses.

Causal Chain – Sickness

Parent. The K-means cluster analyses divided parents into two clusters based on the proportion of natural and supernatural causes endorsed for the causes of both illnesses (see Figure 10 and Table 42).

Figure 10

Final Cluster Centers for Parents' Judgments on the Causes of Illnesses



In Cluster 1 (*n* = 79), parents tended to endorse natural causes and very few

supernatural causes [moderate-high natural + very low supernatural]. In Cluster 2 (*n* = 37), parents tended to endorse only some natural causes [low-moderate natural + no supernatural]. For parents, the biggest difference in the formation of the two clusters appears to be on how many natural causes the parent endorsed for the causes of the cold. In Cluster 1, parents endorsed an average of 81.5% of the natural causes of the cold and 33.3% of the natural causes of cancer, but for Cluster 2, the average number of natural causes endorsed for the cold dropped to 50.2% and also went down to 22.7% for cancer.

There was no significant differences between groups in parent religious engagement, how religious or spiritual the parent considered themselves to be, English and Spanish vocabulary skills, how often the parent typically visited the doctor or took medication, perceived level of health, education level, or interview language. Of the factors examined, the only significant difference between the two groups was the family level of yearly income, with parents in the moderate-high natural + very low supernatural group (*M* = $37,205.37, *SD* = $22,397.04) earning significantly less money per year than parents in the low-moderate natural + no supernatural group (*M* = $49,970.59, *SD* = $39,583.90). That said, there was no significant difference between the groups in perceived levels of food security (i.e., certainty that they will be able to buy or produce enough food to eat in the next month and next 6-months).

Table 42

Cluster Analysis for the Causes of Illnesses – Parent

	Parent Cluster					
	Moderate-High Natural + Very Low Supernatural (n = 79)		Low-Moderate Natural + No Supernatural (n = 37)		Between Clusters	
Parent Variables	***M***	***SD***	***M***	***SD***	***t***	$r_{effect\text{-}size}$
Parent Ave. Religious Engagement	2.116	1.338	1.839	1.402	1.023	.101
Level of Perceived Religiosity [a]	0.316	0.981	0.027	0.986	1.479	.146
Level of Perceived Spirituality [b]	0.367	0.922	0.216	0.947	0.814	.078
NIH Vocab – English	76.468	14.412	79.639	14.881	-1.083	.108
NIH Vocab – Spanish	98.436	12.930	99.472	12.105	-0.406	.041
Frequency of Doctor Visits [c]	1.392	0.668	1.378	0.794	0.099	.010
Frequency of Taking Medication [d]	2.013	2.351	2.405	2.576	-0.813	.079
Level of Perceived Health [e]	0.975	0.716	0.973	0.799	0.012	.001
SES Factors						
Family Yearly Income	$37,205.37	$22,397.04	$49,970.59	$39,583.90	-2.151*	-0.195
Food Security – 1 Month [f]	1.608	0.898	1.811	0.569	-1.262	-0.134
Food Security – 6 Months [g]	1.372	1.033	1.622	0.828	-1.287	-0.132
Parent Level of Education [h]						
High School or Less	n = 43		n = 19		χ^2 = 0.055	.022
Some College *to* Advanced Degree	n = 35		n = 17			
Interview Language						
English	n = 31		n = 21		χ^2 = 3.126	.164
Spanish	n = 48		n = 16			

[a] = Based on a single question of, “How religious do you consider yourself to be?”

[b] = Based on a single question of, “How spiritual do you consider yourself to be?”

[c] = Based on a single question of, “How often do you see a doctor in any given year?”

[d] = Based on a single question of, “How often do you take medication on a regular basis?”

[e] = Based on a single question of, “How would you rate your health, overall?”

[f] = Based on a single question of, “How certain are you that you will be able to buy or produce enough food to eat in the next month?”

[g] = Based on a single question of, “How certain are you that you will be able to buy or produce enough food to eat in the next 6-months?”

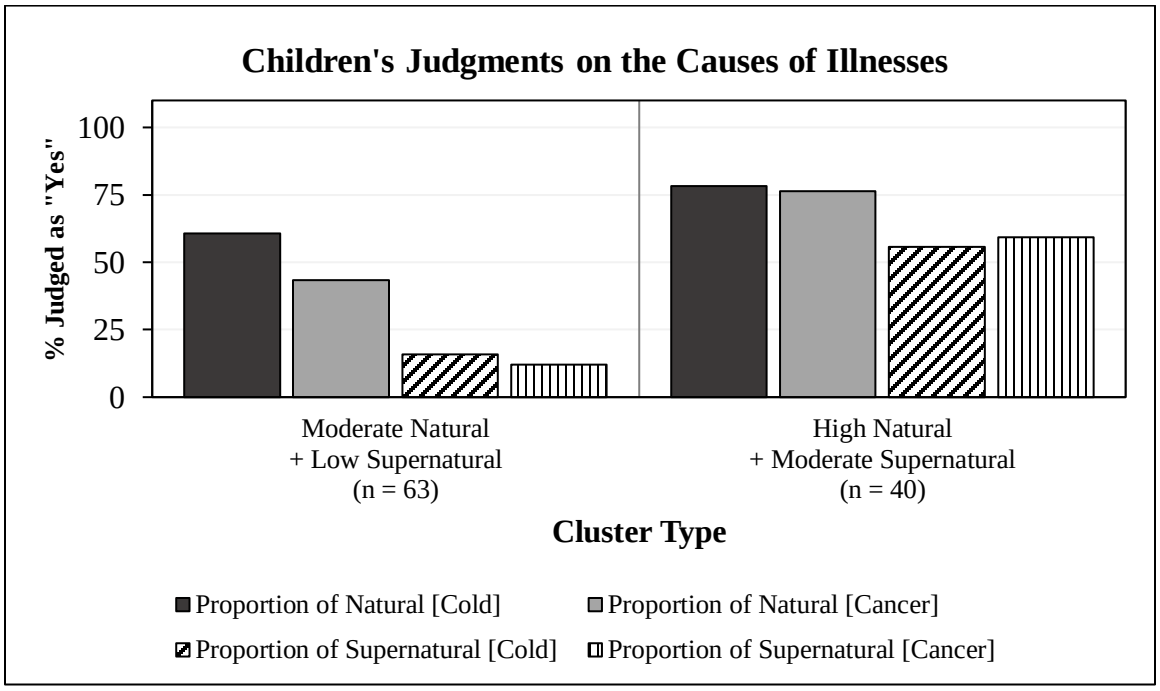
[h] = Parent level of education was split into two groups for this analysis: (1) having a high school or GED level of education or less, and (2) having at least 1 year or more of college up to having an advanced degree (e.g., MA, JD, PhD).

* $p < .05$

Child. The K-means cluster analyses divided children into two clusters based on the proportion of natural and supernatural causes endorsed for the causes of both illnesses (see Figure 11 and Table 43).

Figure 11

Final Cluster Centers for Children's Judgments on the Causes of Illnesses



In Cluster 1 (n = 63), children tended to endorse some natural causes and a few supernatural causes [moderate natural + low supernatural]. In Cluster 2 (n = 40), children endorsed most natural causes and some supernatural causes [high natural + moderate supernatural]. There was no significant differences between groups in most of the child variables or any of the parent variables: child's biological understanding, child executive functioning, child English and Spanish vocabulary skills, child religious exposure, how often the child typically visited the doctor or took medication, parent perceived level of

child health, interview language, family yearly income, parent perceived levels of food security (i.e., certainty that they will be able to buy or produce enough food to eat in the next month and next 6-months), parent education level, parent religious engagement, parent perceived level of religiosity and spirituality, how often the parent typically visited the doctor or took medication, or parent perceived level of parental health. The only significant differences between the two child clusters was for child age and human (im)possibility. Children in the moderate natural + low supernatural were significantly older (M = 5.543-years, SD = 0.845) than children in the high natural + moderate supernatural group (M = 5.056-years, SD = 0.728). Additionally, children in the moderate natural + low supernatural had a significantly higher understanding of what is possible for humans (M = 0.846, SD = 0.261) than children in the high natural + moderate supernatural group (M = 0.647, SD = 0.345).

Table 43

Cluster Analysis for the Causes of Illnesses – Child

	Child Cluster					
	Moderate Natural + Low Supernatural (n = 63)		High Natural + Moderate Supernatural (n = 40)		Between Clusters	
Child Variables	***M***	***SD***	***M***	***SD***	***t***	$r_{effect\text{-}size}$
Child Age (Years)	5.543	0.845	5.056	0.728	3.002**	.295
Biological Understanding	0.674	0.251	0.693	0.277	-0.350	.035
Human (Im)possibility	0.846	0.261	0.647	0.345	3.278**	.309
Executive Functioning (Flanker)	4.182	2.028	3.411	2.112	1.832	.183
Child NIH Vocab – English	91.548	17.061	85.825	14.593	1.748	.177
Child NIH Vocab – Spanish	100.850	12.797	102.175	15.865	-0.460	.046
Child Ave. Religious Engagement	1.965	1.535	2.203	1.418	-0.787	.080
Child Frequency of Doctor Visits [a]	1.587	0.663	1.725	0.506	-1.122	.116
Child Frequency of Taking Medication [b]	1.190	0.982	1.375	1.353	-0.801	.078
Level of Perceived Child Health [c]	1.413	0.638	1.325	0.616	0.689	.070
SES Factors						
Family Yearly Income	$43,419.80	$33,314.88	$37,749.74	$22,906.00	0.927	.099
Food Security – 1 Month [d]	1.524	1.030	1.825	0.385	-1.771	.190
Food Security – 6 Months [e]	1.387	1.030	1.500	0.987	-0.549	.056
Interview Language						
English	n = 32		n = 15		χ^2 = 1.743	.130
Spanish	n = 31		n = 25			

	Child Cluster					
	Moderate Natural + Low Supernatural (n = 63)		High Natural + Moderate Supernatural (n = 40)		Between Clusters	
Parent Variables	***M***	***SD***	***M***	***SD***	***t***	$r_{effect\text{-}size}$
Parent Ave. Religious Engagement	1.896	1.342	2.212	1.366	-1.156	.116
Parent Level of Perceived Religiosity [f]	0.190	1.045	0.250	0.954	-0.291	.030
Parent Level of Perceived Spirituality [g]	0.349	0.936	0.250	0.981	0.515	.052
Parent Frequency of Doctor Visits [h]	1.413	0.710	1.375	0.774	0.253	.025
Parent Frequency of Taking Medication [i]	2.111	2.370	2.225	2.557	-0.231	.023
Level of Perceived Parent Health [j]	0.952	0.705	0.950	0.783	0.016	.002
Parent Level of Education [k]						
High School or Less	n = 35		n = 22		χ^2 = 0.021	.014
Some College *to* Advanced Degree	n = 27		n = 18			

[a] = Based on a single question of, "How often does your child see a doctor in any given year?"

[b] = Based on a single question of, "How often does your child take medication on a regular basis?"

[c] = Based on a single question of, "How would you rate your child's health, overall?"

[d] = Based on a single question of, "How certain are you that you will be able to buy or produce enough food to eat in the next month?"

[e] = Based on a single question of, "How certain are you that you will be able to buy or produce enough food to eat in the next 6-months?"

[f] = Based on a single question to the parent of, “How religious do you consider yourself to be?”

[g] = Based on a single question to the parent of, “How spiritual do you consider yourself to be?”

[h] = Based on a single question to the parent of, “How often do you see a doctor in any given year?”

[i] = Based on a single question to the parent of, “How often do you take medication on a regular basis?”

[j] = Based on a single question to the parent of, “How would you rate your health, overall?”

[k] = Parent level of education was split into two groups for this analysis: (1) having a high school or GED level of education or less, and (2) having at least 1 year or more of college up to having an advanced degree (e.g., MA, JD, PhD).

** $p < .01$

Conclusion. Instead of finding three clusters for how parents and children endorse natural and supernatural causes of illness, two clusters emerged in each group. For parents, the two clusters differed both on the proportion of natural and the proportion of supernatural causes endorsed – with one cluster endorsing several natural causes of the cold, some natural causes of cancer, and very few supernatural causes of the cold or cancer, and the other cluster endorsing about half of the natural causes of the cold, a few natural causes of cancer, and virtually no supernatural causes of the cold or cancer. Interestingly, these two groups of parents did not differ on levels of religious engagement, level of education, or health-related variables.

For children, the two clusters also differed both on the proportion of natural and the proportion of supernatural causes endorsed – with one cluster endorsing about half of the natural causes for a cold and cancer and very few supernatural causes for a cold or cancer, and the other cluster endorsing about three-fourths of the natural causes for a cold and cancer and about half of the supernatural causes for a cold and cancer. Children who endorsed fewer natural and fewer supernatural on average (cluster 1) were older and had a better understanding of what is possible for humans to do compared to children who were in the high natural, moderate supernatural cluster (cluster 2). Additionally, children's proportions of endorsements for natural and supernatural causes was similar for cold and cancer within each cluster, suggesting that children's conceptions of cancer may be based more broadly on their conceptions of the common cold.

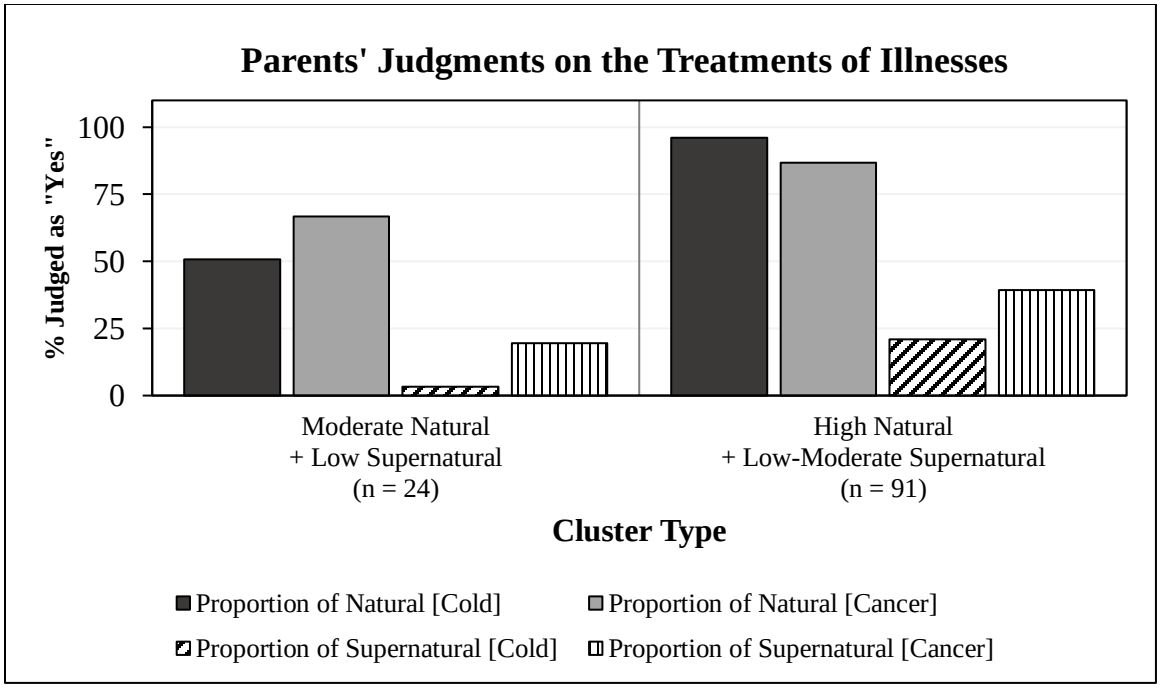
Solution Chain – Treatments

Parent. The K-means cluster analyses divided parents into two clusters based on

the proportion of natural and supernatural causes endorsed for the treatments of both illnesses (see Figure 12 and Table 44).

Figure 12

Final Cluster Centers for Parents' Judgments on the Treatments of Illnesses



In Cluster 1 (*n* = 24), parents tended to endorse some natural causes and a few supernatural causes [moderate natural + low supernatural]. In Cluster 2 (*n* = 91), parents endorsed most natural causes and some supernatural causes [high natural + low-moderate supernatural]. There was no significant differences between groups in Spanish vocabulary skills, how often the parent typically visited the doctor or took medication, perceived level of health, family yearly income, perceived levels of food security (i.e., certainty that they will be able to buy or produce enough food to eat in the next month

and next 6-months), parent education level, or interview language. However, parents in the high natural + low-moderate supernatural group did have significantly higher levels of parent religious engagement and high perceived level of religiosity and spirituality than parents in the moderate natural + low supernatural group. Additionally, parents in the moderate natural + low supernatural group had significantly higher English vocabulary skills than parents in the high natural + low-moderate supernatural group.

Table 44

Cluster Analysis for the Treatments of Illnesses – Parent

	Cluster					
	Moderate Natural + Low Supernatural (n = 24)		High Natural + Low-Moderate Supernatural (n = 91)		Between Clusters	
Parent Variables	***M***	***SD***	***M***	***SD***	***t***	$r_{effect\text{-}size}$
Parent Ave. Religious Engagement	1.241	1.056	2.248	1.359	-3.369**	.454
Level of Perceived Religiosity [a]	-0.250	0.897	0.374	0.950	-2.892**	.320
Level of Perceived Spirituality [b]	-0.083	0.881	0.429	0.921	-2.444*	.273
NIH Vocab – English	83.522	15.234	76.088	14.091	2.224*	.246
NIH Vocab – Spanish	98.773	12.649	98.868	12.725	-0.032	.004
Frequency of Doctor Visits [c]	1.250	0.794	1.429	0.685	-1.098	.120
Frequency of Taking Medication [d]	1.542	2.146	2.319	2.476	-1.404	.165
Level of Perceived Health [e]	0.875	0.992	1.000	0.667	-0.732	.074
SES Factors						
Family Yearly Income	$45,860.87	$38,226.95	$40,090.79	$26,592.23	0.837	.087
Food Security – 1 Month [f]	1.750	0.676	1.648	0.848	0.543	.066
Food Security – 6 Months [g]	1.583	0.881	1.411	1.004	0.765	.091
Parent Level of Education [h]						
High School or Less	n = 12		n = 49		χ^2 = 0.038	.018
Some College *to* Advanced Degree	n = 11		n = 41			
Interview Language						
English	n = 14		n = 37		χ^2 = 2.404	.145
Spanish	n = 10		n = 54			

[a] = Based on a single question of, "How religious do you consider yourself to be?"

[b] = Based on a single question of, “How spiritual do you consider yourself to be?”

[c] = Based on a single question of, “How often do you see a doctor in any given year?”

[d] = Based on a single question of, “How often do you take medication on a regular basis?”

[e] = Based on a single question of, “How would you rate your health, overall?”

[f] = Based on a single question of, “How certain are you that you will be able to buy or produce enough food to eat in the next month?”

[g] = Based on a single question of, “How certain are you that you will be able to buy or produce enough food to eat in the next 6-months?”

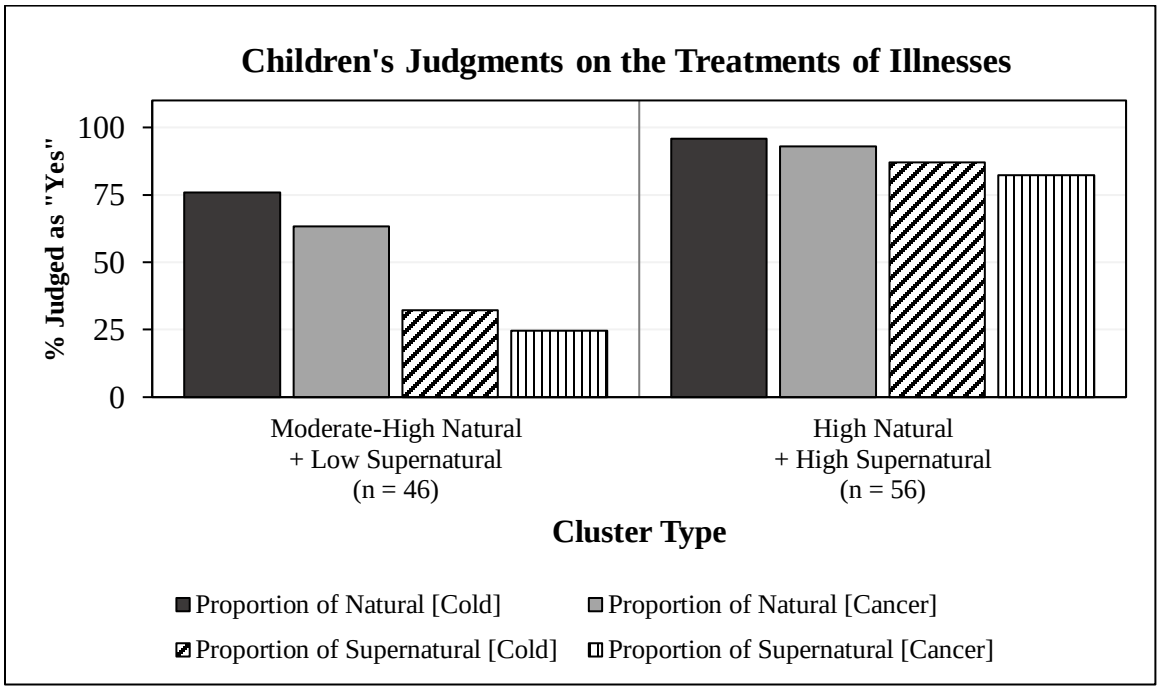
[h] = Parent level of education was split into two groups for this analysis: (1) having a high school or GED level of education or less, and (2) having at least 1 year or more of college up to having an advanced degree (e.g., MA, JD, PhD).

* $p < .05$, ** $p < .01$

Child. The K-means cluster analyses divided children into two clusters based on the proportion of natural and supernatural causes endorsed for the treatments of both illnesses (see Figure 13 and Table 45).

Figure 13

Final Cluster Centers for Children's Judgments on the Treatments of Illnesses



In Cluster 1 (n = 46), children tended to endorse natural causes and some supernatural causes [moderate-high natural + low supernatural]. In Cluster 2 (n = 56), children endorsed most natural causes and most supernatural causes [high natural + high supernatural]. There was no significant differences between groups in most of the child variables or any of the parent variables: child age, child's biological understanding, child executive functioning, child English and Spanish vocabulary skills, child religious exposure, how often the child typically took medication, parent perceived level of child

health, interview language, parent perceived levels of food security (i.e., certainty that they will be able to buy or produce enough food to eat in the next month and next 6-months), parent education level, parent religious engagement, parent perceived level of religiosity and spirituality, how often the parent typically visited the doctor or took medication, or parent perceived level of parental health.

The only significant differences between the two child clusters was children's understanding of human (im)possibility, how often the child typically visited the doctor, and family yearly income. Children in the moderate-high natural + low supernatural group had a significantly higher understanding of what is possible for humans (M = 0.844, SD = 0.275) than children in the high natural + high supernatural group (M = 0.700, SD = 0.328). Additionally, children in the moderate-high natural + low supernatural group had a significantly higher family income (M = $48,851.16, SD = $38,412.65) than children in the high natural + high supernatural group (M = $34,914.96, SD = $18,631.10). However, there was no differences between the two groups for parental perceived levels of food security. Finally, children in the high natural + high supernatural group visited the doctor significantly more often (M = 1.768, SD = 0.603) than children in the moderate-high natural + low supernatural group (M = 1.478, SD = 0.586) – though the reason for the doctor visits is not known and there was no difference in how healthy parents reported their children to be in each group.

Table 45

Cluster Analysis for the Treatments of Illnesses – Child

	Child Cluster					
	Moderate-High Natural + Low Supernatural (n = 46)		High Natural + High Supernatural (n = 56)		Between Clusters	
Child Variables	***M***	***SD***	***M***	***SD***	***t***	$r_{effect\text{-}size}$
Child Age (Years)	5.261	0.843	5.447	0.821	-1.129	.112
Biological Understanding	0.629	0.287	0.725	0.233	-1.855	.181
Human (Im)possibility	0.844	0.275	0.700	0.328	2.326*	.231
Executive Functioning (Flanker)	3.856	2.042	3.887	2.158	-0.073	.007
Child NIH Vocab – English	90.556	16.291	88.393	16.534	0.658	.066
Child NIH Vocab – Spanish	100.114	15.471	102.400	12.981	-0.799	.080
Child Ave. Religious Engagement	2.223	1.629	1.944	1.368	0.940	.092
Child Frequency of Doctor Visits [a]	1.478	0.586	1.768	0.603	-2.444*	.237
Child Frequency of Taking Medication [b]	1.196	1.067	1.339	1.195	-0.634	.063
Level of Perceived Child Health [c]	1.413	0.652	1.339	0.611	0.588	.058
SES Factors						
Family Yearly Income	$48,851.16	$38,412.65	$34,914.96	$18,631.10	2.344*	.225
Food Security – 1 Month [d]	1.587	0.979	1.679	0.741	-0.538	.053
Food Security – 6 Months [e]	1.457	1.089	1.400	0.955	0.278	.028
Interview Language						
English	n = 24		n = 22		χ^2 = 1.694	.129
Spanish	n = 22		n = 34			

	Child Cluster					
	Moderate-High Natural + Low Supernatural (n = 46)		High Natural + High Supernatural (n = 56)		Between Clusters	
Parent Variables	***M***	***SD***	***M***	***SD***	***t***	$r_{effect\text{-}size}$
Parent Ave. Religious Engagement	1.955	1.447	2.105	1.268	-0.556	.055
Parent Level of Perceived Religiosity [f]	0.152	1.095	0.304	0.893	-0.769	.076
Parent Level of Perceived Spirituality [g]	0.370	0.974	0.304	0.893	0.356	.035
Parent Frequency of Doctor Visits [h]	1.413	0.805	1.393	0.679	0.137	.014
Parent Frequency of Taking Medication [i]	2.109	2.549	2.214	2.372	-0.216	.021
Level of Perceived Parent Health [j]	0.978	0.830	0.929	0.657	0.338	.033
Parent Level of Education [k]						
High School or Less	n = 26		n = 31		χ^2 = 0.059	.024
Some College *to* Advanced Degree	n = 19		n = 25			

[a] = Based on a single question of, "How often does your child see a doctor in any given year?"

[b] = Based on a single question of, "How often does your child take medication on a regular basis?"

[c] = Based on a single question of, "How would you rate your child's health, overall?"

[d] = Based on a single question of, "How certain are you that you will be able to buy or produce enough food to eat in the next month?"

[e] = Based on a single question of, "How certain are you that you will be able to buy or produce enough food to eat in the next 6-months?"

[f] = Based on a single question to the parent of, “How religious do you consider yourself to be?”

[g] = Based on a single question to the parent of, “How spiritual do you consider yourself to be?”

[h] = Based on a single question to the parent of, “How often do you see a doctor in any given year?”

[i] = Based on a single question to the parent of, “How often do you take medication on a regular basis?”

[j] = Based on a single question to the parent of, “How would you rate your health, overall?”

[k] = Parent level of education was split into two groups for this analysis: (1) having a high school or GED level of education or less, and (2) having at least 1 year or more of college up to having an advanced degree (e.g., MA, JD, PhD).

* $p < .05$

Conclusion. Instead of finding three clusters for how parents and children endorse natural and supernatural causal treatments of illness, two clusters emerged in each group. For parents, the two clusters differed both on the proportion of natural and the proportion of supernatural causes endorsed – with one cluster endorsing around half of the natural causes to treat a cold and cancer, and very few (if any) supernatural causes to treat a cold or cancer, and the other cluster endorsing most of the natural causes to treat a cold and cancer, and some of the supernatural causes to treat a cold or cancer. Parents who endorsed a high number of natural causes and some supernatural causes (cluster 2) had a higher religious engagement and reported higher levels of religiosity and spirituality than parents who endorsed some natural causes and few supernatural causes to treat an illness. But there was no differences in level of education or other SES factors between the two groups.

For children, the two clusters also differed both on the proportion of natural and the proportion of supernatural causes endorsed – with one cluster endorsing about half of the natural causes and some supernatural causes to treat a cold and, and the other cluster endorsing about most natural and supernatural causes to treat a cold and cancer. Surprisingly, there was not a significant difference between the two groups for child religious engagement, but children who endorsed both natural and supernatural causes had a higher frequency in visiting the doctor than children who endorsed some natural and a few supernatural causes to treat a cold and cancer. Finally, as was the case for the causes of illness, children's proportions of endorsements for natural and supernatural causes to treat illnesses was similar for cold and cancer within each cluster, suggesting

that children's conceptions how to treat cancer may be based more broadly on their conceptions of how to treat the common cold.

Exploratory Analyses: Correspondence of Cluster Group Membership for Parents and Children

Exploratory analyses examined if each child-parent dyad fell into the same type of cluster group. That is, did children and their parents have a similar preference for natural causes or for both natural and supernatural (i.e., co-existence) causes?

First, the cluster membership of each parent-child dyad was examined for the causes and the treatments of illness (see Table 46). For the causes of illness, across the full sample, 47.6% of parents and their child matched for the type of cluster, with 21.4% of the parent-child dyads both preferring natural causes (i.e., endorsing natural but not supernatural causes) and 26.2% of the parent-child dyads both preferring co-existence of causes (i.e., endorsing both and supernatural causes). Of the 52.4% of parents and children who did not match for type of cluster for the causes of illness, the majority of children in these parent-child dyads preferred natural causes but their parent preferred co-existence for the causes of illness (39.8%). Only 12.6% of parent-child dyads mis-matched because the child preferred co-existence but the parent preferred natural causes of illness. Both parents and children interviewed in English and Spanish had similar patterns, with parent-child dyads interviewed in Spanish having a slightly higher match in cluster type (51.8%) for the causes of illness than parents and children interviewed in English (42.6%).

Regarding the treatments of illness, 57.4% of parent-child dyads matched in their

cluster type, with the majority of these dyads preferring co-existence (46.5%) and only 10.9% of the parent-child dyads both preferring natural treatments of illness. Of the 42.6% of parents and children who did not match for the treatments of illness, once again, the majority of children in these parent-child dyads preferred natural causes but their parent preferred co-existence of causes to treat the illness (33.7%). Only 8.9% of parent-child dyads mis-matched because the child preferred co-existence but the parent preferred natural treatments of illness. Parents and children interviewed in Spanish had a higher match (67.9%) in cluster type for the treatments of illness than parents and children interviewed in English (44.4%).

Next, when examining if the type of cluster for a parent-child dyad was the same for the causes of illness compared to the treatments of illness (i.e., preference of natural for cause *and* preference of natural for treatment = match), the percentage matches between parents and children for the full sample dropped down to a 21.8% match (with 78.2% mis-match). Only 17.8% of parent-child dyads preferred co-existence for both the causes and treatments of illness, but even fewer dyads preferred natural causes for the causes and treatments of illness (4.0%). However, the match rate between parents and children in the cross from the causes of illness to the treatments of illness differed by interview language, with a higher match for the parent-child dyads interviewed in Spanish (28.6%) than the parent-child dyads interviewed in English (13.3%).

Comparisons of type of cluster membership for just parents and just children were done next for the causes and treatments of illnesses. That is, without considering the full parent-child dyad, do parents (or children) themselves remain consistent in the cluster

type for the causes and treatments of illnesses? For the full sample, 70.2% of parents were in the same type of cluster for the causes and treatments of illness. Specifically, 58.7% of parents preferred co-existence for both the causes and treatments of illness whereas only 11.5% of parents preferred natural causes and treatments of illness. Of the 29.8% of parents who did not match in cluster membership for the type of causes of illness and treatments of illness, the majority of these parents (22.1%) preferred natural causes of the illness but co-existence for treatment, and only 7.7% of parents preferred co-existence for the causes of illnesses but natural for the treatments of illnesses. Parents interviewed in Spanish (75.0%) had a higher rate of staying in the same type cluster for the causes and treatments of illness compared to parents interviewed in English (64.6%).

Similarly, for children across the full sample, 62.7% of children were in the same type of cluster for the causes and treatments of illness. Specifically, 34.3% of children preferred natural causes and treatments of illness whereas 28.4% of children preferred co-existence for both the causes and treatments of illness. Of the 37.3% of children who did not match in cluster membership for the type of causes of illness and treatments of illness, the majority of these children (26.5%) preferred natural causes of the illness but co-existence for treatment, and only 10.8% of children preferred co-existence for the causes of illnesses but natural for the treatments of illnesses. Children interviewed in Spanish (62.5%) had a very similar rate of staying in the same type cluster for the causes and treatments of illness compared to children interviewed in English (63.0%).

Conclusion. Overall, these findings suggest there is some correspondence between a parent and their child in the types of explanations they endorse for the causes

and treatments of illness. Although the rate of correspondence was not 100%, about half of the parents and children matched in cluster membership for the causes of illness and a little over half of the parents and children matched in cluster membership for the treatments of illness. Moreover, the majority of parents and the majority of children had a similar profile when comparing their type of cluster membership for the causes and treatments of illness. That is, the parents who preferred co-existing causes of illness also preferred co-existing treatments of illness.

Table 46

Correspondence of Parent-Child Cluster Group Membership

	Interview Language					
	Full Sample (*N* = 105)		English Interview (*n* = 49)		Spanish Interview (*n* = 56)	
Cluster Group Membership	***N***	***%***	***N***	***%***	***N***	***%***
Causes of Illness						
Parent-Child Match	**49**	**47.6%**	**20**	**42.6%**	**29**	**51.8%**
Preference of Natural	*22*	*21.4%*	*12*	*25.5%*	*10*	*17.9%*
Preference of Co-Existence	*27*	*26.2%*	*8*	*17.0%*	*19*	*33.9%*
Parent-Child Do Not Match	**54**	**52.4%**	**27**	**57.4%**	**27**	**48.2%**
Child Prefers Natural, Parent Prefers Co-Existence	*41*	*39.8%*	*20*	*42.6%*	*21*	*37.5%*
Child Prefers Co-Existence, Parent Prefers Natural	*13*	*12.6%*	*7*	*14.9%*	*6*	*10.7%*
Treatments of Illness						
Parent-Child Match	**58**	**57.4%**	**20**	**44.4%**	**38**	**67.9%**
Preference of Natural	*11*	*10.9%*	*5*	*11.1%*	*6*	*10.7%*
Preference of Co-Existence	*47*	*46.5%*	*15*	*33.3%*	*32*	*57.1%*
Parent-Child Do Not Match	**43**	**42.6%**	**25**	**55.6%**	**18**	**32.1%**
Child Prefers Natural, Parent Prefers Co-Existence	*34*	*33.7%*	*18*	*40.0%*	*16*	*28.6%*
Child Prefers Co-Existence, Parent Prefers Natural	*9*	*8.9%*	*7*	*15.6%*	*2*	*3.6%*
Causes of Illness vs. Treatment [a]						
Parent-Child Match	**22**	**21.8%**	**6**	**13.3%**	**16**	**28.6%**
Preference of Natural	*4*	*4.0%*	*1*	*2.2%*	*3*	*5.4%*
Preference of Co-Existence	*18*	*17.8%*	*5*	*11.1%*	*13*	*23.2%*
Parent-Child Do Not Match	**79**	**78.2%**	**39**	**86.7%**	**40**	**71.4%**

	Interview Language					
	Full Sample (N = 105)		English Interview (n = 49)		Spanish Interview (n = 56)	
Cluster Group Membership	***N***	***%***	***N***	***%***	***N***	***%***
Causes of Illness vs. Treatment [b]						
Parent Cluster Match	**73**	**70.2%**	**31**	**64.6%**	**42**	**75.0%**
Preference of Natural	*12*	*11.5%*	*7*	*14.6%*	*5*	*8.9%*
Preference of Co-Existence	*61*	*58.7%*	*24*	*50.0%*	*37*	*66.1%*
Parent Cluster Does Not Match	**31**	**29.8%**	**17**	**35.4%**	**14**	**25.0%**
Prefers Natural for Sickness, Prefers Co-Existence for Treatment	*23*	*22.1%*	*12*	*25.0%*	*11*	*19.6%*
Prefers Co-Existence for Sickness, Prefers Natural for Treatment	*8*	*7.7%*	*5*	*10.4%*	*3*	*5.4%*
Causes of Illness vs. Treatment [c]						
Child Cluster Match	**64**	**62.7%**	**29**	**63.0%**	**35**	**62.5%**
Preference of Natural	*35*	*34.3%*	*19*	*41.3%*	*16*	*28.6%*
Preference of Co-Existence	*29*	*28.4%*	*10*	*21.7%*	*19*	*33.9%*
Child Cluster Does Not Match	**38**	**37.3%**	**17**	**37.0%**	**21**	**37.5%**
Prefers Natural for Sickness, Prefers Co-Existence for Treatment	*27*	*26.5%*	*12*	*26.1%*	*15*	*26.8%*
Prefers Co-Existence for Sickness, Prefers Natural for Treatment	*11*	*10.8%*	*5*	*10.9%*	*6*	*10.7%*

[a] = This compared if the parent-child cluster type was consistent when comparing if parent-child clusters stayed the same for the causes of sickness and the treatments of sickness.

[b] = This compared if the parent cluster type was consistent when comparing the parent clusters for the causes of sickness to the

parent clusters for the treatments of sickness.

[c] = This compared if the child cluster type was consistent when comparing the child clusters for the causes of sickness to the child clusters for the treatments of sickness.

Parental Ethnotheories

Parents were asked a series of questions regarding what communities and social partners children should learn about the causes of the cold and the causes of cancer from, as well as the appropriate age for teaching children within each of these social settings. Results for each community or social partner are discussed below (see Table 47; also see Appendix P for a table summary of the full sample, not split by interview language). It should be noted that parents were first asked about each community or social partner for the cold and then again for cancer, but not at the same time (i.e., parents were not asked if children should learn about the causes of a cold from friends and then immediately asked if they should learn about the causes of cancer from friends). Additionally, if a parent reported a range in ages in response to a question on how old a child should be, the youngest age in the range was used for the following analysis (e.g., for a parent who said a child could learn about the causes of a cold between 3- to 4-years-old, 3 was used in analysis). Therefore, all age results should be interpreted as being the youngest age that parents said for each question.

Three components of the parental ethnotheories portion are discussed below: (1) the parental developmental expectations (have parents already spoken with their children about these particular illnesses, and do parents think that they should be the primary person to talk to children about illnesses?), (2) the acceptability of different agents as information sources (what communities or social partners do parents believe children should be learning about these illnesses from?), and (3) the child age in relation to these potential information sources (what ages do parents believe children should be to learn

about these illnesses – both generally and with specific social partners or communities?).

Table 47

Parental Ethnotheories on Appropriate Social Partners to Teach Children about Illnesses and How Old Children Should Be to Learn from that Community

Parental Ethnotheories by Type of Illness and Interview Language								
	Common Cold				**Cancer**			
	English		***Spanish***		***English***		***Spanish***	
Community	***% Yes***	***% No***	***% Yes***	***% No***	***% Yes***	***% No***	***% Yes***	***% No***
Parent								
Previously Talked to Child	69.2%	30.8%	70.3%	29.7%	19.6%	80.4%	12.5%	87.5%
If yes:	(*n* = 36)		(*n* = 45)		(*n* = 10)		(*n* = 8)	
Who brought it up [a, b]	*P* = 54.1%	*C* = 27.0%	*P* = 68.9%	*C* = 26.7%	*P* = 63.6%	*C* = 27.3%	*P* = 66.7%	*C* = 33.3%
Age of child when first talked about the illness [c]	*M* = 2.854 (1.366)		*M* = 2.686 (1.150)		*M* = 4.227 (1.170)		*M* = 4.000 (1.155)	
Still talk about illness	70.3%	29.7%	84.4%	15.6%	40.0%	60.0%	87.5%	12.5%
Should parents be the primary community to teach children about this illness?	86.3%	13.7%	95.2%	4.8%	60.0%	40.0%	78.1%	21.9%
Older Siblings or Older Cousins								
Should teach children	72.5%	27.5%	85.9%	14.1%	23.5%	76.5%	50.0%	50.0%
If yes:	(*n* = 37)		(*n* = 55)		(*n* = 12)		(*n* = 32)	
Age sibling/cousin should be [c]	*M* = 8.412 (4.279)		*M* = 8.735 (3.633)		*M* = 10.778 (3.898)		*M* = 13.259 (3.737)	
Age child should be [c]	*M* = 3.657 (1.781)		*M* = 3.686 (1.855)		*M* = 6.182 (3.125)		*M* = 7.710 (3.681)	

Parental Ethnotheories by Type of Illness and Interview Language

	Common Cold				Cancer			
	English		*Spanish*		*English*		*Spanish*	
Community	***% Yes***	***% No***	***% Yes***	***% No***	***% Yes***	***% No***	***% Yes***	***% No***
Friends/Peers								
Should teach children	30.8%	69.2%	50.8%	49.2%	18.0%	82.0%	37.1%	62.9%
If yes:	(*n* = 16)		(*n* = 32)		(*n* = 9)		(*n* = 23)	
Age friend should be [c]	*M* = 5.929 (3.362)		*M* = 7.442 (3.601)		*M* = 9.600 (4.300)		*M* = 11.389 (4.258)	
Age child should be [c]	*M* = 4.067 (1.580)		*M* =4.569 (1.972)		*M* = 7.400 (4.742)		*M* = 7.591 (3.333)	
Educational Community								
Should teach children	98.1%	1.9%	95.2%	4.8%	67.3%	30.8%	69.8%	30.2%
If yes:	(*n* = 51)		(*n* = 60)		(*n* = 35)		(*n* = 44)	
Age child should be [c]	*M* = 4.157 (1.617)		*M* = 4.586 (1.697)		*M* = 8.171 (3.044)		*M* = 8.385 (2.952)	
Medical Community								
Should teach children	98.1%	1.9%	95.3%	4.7%	94.1%	5.9%	92.1%	7.9%
If yes:	(*n* = 51)		(*n* = 61)		(*n* = 48)		(*n* = 58)	
Age child should be [c]	*M* = 4.200 (2.050)		*M* = 4.393 (1.877)		*M* = 8.044 (3.155)		*M* = 8.388 (3.656)	
Religious Community								
Should teach children	30.8%	69.2%	35.9%	64.1%	31.4%	68.6%	22.6%	77.4%
If yes:	(*n* = 16)		(*n* = 23)		(*n* = 16)		(*n* = 14)	
Age child should be [c]	*M* = 4.867 (2.326)		*M* = 5.100 (2.770)		*M* = 8.412 (2.874)		*M* = 8.000 (3.821)	

Parental Ethnotheories by Type of Illness and Interview Language

	Common Cold		Cancer	
	English	***Spanish***	***English***	***Spanish***
Ages	***Mean (SD)***	***Mean (SD)***	***Mean (SD)***	***Mean (SD)***
Age – Children in General [c]	*M* = 3.364 (1.841)	*M* = 3.190 (1.889)	*M* = 7.280 (3.620)	*M* = 8.804 (3.610)
Age Range	0- to 10-years	1- to 11-years	1- to 15-years	2- to 15-years
Age – Own Child [c]	*M* = 3.720 (1.969)	*M* = 4.127 (2.396)	*M* = 8.280 (3.220)	*M* = 9.131 (3.423)
Age Range	.42- to 10-years	0- to 14-years	2- to 15-years	2- to 15-years

[a] = For these questions, parents were only asked the question if they had indicated "yes" to the child learning from that social partner or community. Subsequent percentages reported are only for those parents.

[b] = P refers to the % of parents who brought up the illness whereas C refers to the % of children who brought up the illness. The remaining % was parents who said both the parent and child brought up that illness (English: cold = 18.9%, cancer = 9.1%; Spanish: cold = 4.4%, cancer = 0%)

[c] = All ages are reported as *M* and (*SD*) in years. 0 indicates the parent said "newborn."

† $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Parents

For both interview language groups, a higher proportion of parents had previously spoken with their child about the causes of a cold (English: 69.2%; Spanish: 70.3%) than the causes of cancer (English: 19.6%; Spanish: 12.5%). That is, only 18 parents out of 116 said they had explicitly talked to their child about the causes of cancer before, whereas 81 of the 116 parents had previously talked to their child about the causes of the common cold. In examining who initiated the conversation about each illness, the majority of the time the parents were the person who brought up the causes of a cold (English: 54.1%; Spanish: 68.9%) and the causes of cancer (English: 63.6%; Spanish: 66.7%) – though there were several children who initiated these conversations as well (ranging from 26.7% to 33.3%), showing children are also active in their own learning. On average, children were about 1.3-years-older when parents talked to them about cancer for the first time (English: M = 4.227-years, SD = 1.170; Spanish: M = 4.000-years, SD = 1.155) compared to when they talked to them about the common cold (English: M = 2.854-years, SD = 1.366; Spanish: M = 2.686-years, SD = 1.150) for the first time.

Finally, for parents who had previously spoken to their child about each illness, about three-fourths of parents were still talking to their child about the causes of a cold (English: 70.3%; Spanish: 84.4%). However, for cancer, of the parents interviewed in English, only 4 of the 10 parents who had told their child about cancer were still talking about it with their child, but for the parents interviewed in Spanish, 7 out of the 8 parents who had told their child about cancer were still talking about it. This might be related

more to the context of why the parent told the child about cancer in the first place than differences in frequency about talking about illness. For example, some parents mentioned that the reason they even brought up cancer to the child was because there was a family member or friend who was sick with cancer, so the child was going to be exposed to discussions on this illness, but otherwise they would not have brought it up yet in conversation. but there was large range. Additionally, this range in frequency of talking about each illness suggests parents are not necessarily talking about these illnesses on a consistent basis after the initial conversation takes place.

Additionally, parents were asked if they thought they should be the primary person to teach children about the causes of each illness, or if they thought other communities or other people should have that responsibility. By in large, parents overwhelmingly said that they should be the primary person to talk to their child about the causes of cold (English: 86.3%; Spanish: 95.2%), whereas a smaller proportion (though still a majority) of parents felt that way about cancer (English: 60.0%; Spanish: 78.1%).

Older Siblings or Older Cousins

Overall, more parents were okay with older siblings or older cousins teaching a younger child about the causes of cold (English: 72.5%; Spanish: 85.9%) than the causes of cancer (English: 23.5%; Spanish: 50.0%) – though there was a larger decrease for parents interviewed in English than parents interviewed in Spanish. There was a large difference in ages for each illness as well. Parents thought that older siblings or older cousins should be around 8.4-years-old (English) or 8.7-years-old (Spanish) to teach a

sibling about the common cold, whereas they thought older siblings or older cousins should be around 10.8-years-old (English) or 13.3-years-old (Spanish) to teach a younger child about cancer – a 2.4-year difference for parents interviewed in English, and a 4.6-year difference for parents interviewed in Spanish. Similarly, parents thought that children should be at least around the age of 3.7-years (English and Spanish) to learn about the causes of the common cold from older siblings or older cousins, but they should be at least around the age of 6.2-years (English) or 7.7-years (Spanish) to learn about the causes of cancer – again, about a 2.5-year difference for parents interviewed in English, and a 4-year difference for parents interviewed in Spanish. This difference in age range might also explain part of the reason why there was a higher percentage of parents interviewed in Spanish who were okay with children learning about the causes of cancer from older siblings or older cousins than parents who were interviewed in English. That is, parents who were interviewed in Spanish were okay with it – if the older sibling or cousin was substantially older. It may be that parents interviewed in English were only thinking about children in the early childhood or middle childhood age range and not older, such as adolescence.

Friends

Regarding children learning from a similar-aged social partner, such as friend, parents interviewed in Spanish seemed unsure if children should learn about the causes of a cold from a friend (50.8% yes) whereas they seemed to think that children should *not* be learning about the causes of cancer from a friend (37.1% yes). The majority of parents interviewed in English did not think that children should be learning about the common

cold (30.8% yes) or cancer (18.0% yes) from a friend. Of the parents who did say children should learn about either illness from a friend, they thought that the friend should be at least around the age of 5.9-years (English) or 7.4-years (Spanish) to teach the child about the causes of a cold, whereas the friend should be around 9.6-years-years (English) or 11.4-years (Spanish) to teach the child about the causes of cancer – about a 3.7-year difference for parents interviewed in English, and a 4-year difference for parents interviewed in Spanish. Similarly, parents thought that children should be at least around the age of 4.1-years (English) or 4.6-years (Spanish) to learn about the causes of the common cold from friends, but they should be at least around the age of 7.4-years (English) or 7.6-years (Spanish) to learn about the causes of cancer – about a 3.3-year difference for parents interviewed in English, and around a 3-year difference for parents interviewed in Spanish. Once again, there were more parents interviewed in Spanish who were okay with children learning about the cold and cancer compared to parents who were interviewed in English, but the parents interviewed in Spanish thought that the friend should be older. It may be that parents interviewed in English were only thinking about children in the early childhood or middle childhood age range and not older, such as adolescence.

Educational Community

Overall, parents agreed that children should learn about the causes of a cold (English: 98.1%; Spanish: 95.2%) and the causes of cancer (English: 67.3%; Spanish: 69.8%) from the educational community, such as in classes at the school or from the teacher. However, there was a large age discrepancy for how old the child should be to

learn each subject matter: about 4.2-years (English) or 4.6-years (Spanish) for the common cold, but 8.2-years (English) or 8.4-years (Spanish) for cancer – a 4-year difference for parents interviewed in English, and a 3.8-year difference for parents interviewed in Spanish.

Medical Community

Parents overwhelming approved of the medical community (e.g., hospital, doctor, or nurse) teaching children about the causes of a cold (English: 98.1%; Spanish: 95.3%) and the causes of cancer (English: 94.1%; Spanish: 92.1%). Though, once again, there was about a 4-year difference in ages for each: around 4.2-years (English) or 4.4-years (Spanish) to learn about the cold and around 8.0-years (English) or 8.4-years (Spanish) to learn about cancer.

Religious Community

For the religious community (e.g., church, priest, religious text), the majority of parents did not think that they should be teaching children about the causes of a cold (% no – English: 69.2%; Spanish: 64.1%) or the causes of cancer (% no – English: 68.6%; Spanish: 77.4%). Of the few parents who did say children could learn about each illness from the religious community, they thought that children should be about 4.9-years-old (English) or 5.1-years-old (Spanish) to learn about the cold but 8.4-years-old (English) or 8.000-years-old (Spanish) to learn about cancer – about a 3-year-difference.

Best Ages to Learn About the Cold and Cancer

In comparing parents' views on how old children should be learn about the causes of each illness, parents were asked how old children in general should be to learn about

each as well as how old their own child (i.e., the child who completed the interview even if the parent had more than one child) should be to learn about each. All in all, parents did seem to think that children should be older to learn about the causes of cancer than the causes of a cold – whether the child in question was their own or not. There were some differences by interview language, however, and there was a wide range in ages, ranging from 0- (newborn) up to 15-years-old.

Parents interviewed in English reported children in general should be around 3.4-years to learn about the causes of the common cold, whereas their own child could learn about the causes of a cold around the age of 3.7-years on average, $t(51) = -1.549$, $p = .128$, **d** = .215. For cancer, parents interviewed in English reported children in general should be around 7.3-years to learn about the causes of cancer, whereas their own child could learn about the causes of cancer around the age of 8.3-years on average, $t(49) = -3.118$, $p = .003$, **d** = .441. For parents interviewed in English, the difference in ages for children in general to learn about the common cold (3.4-years) was also significantly younger than the age for children in general to learn about cancer (7.3-years), $t(49) = -8.386$, $p < .001$, **d** = 1.186. Lastly, for parents interviewed in English, the difference in ages for their own child to learn about the common cold (3.7-years) was also significantly younger than the age for their own child to learn about cancer (8.3-years), $t(51) = -11.070$, $p < .001$, **d** = 1.535.

Parents interviewed in Spanish reported children in general should be around 3.2-years to learn about the causes of the common cold, whereas their own child could learn about the causes of a cold around the age of 4.1-years on average, $t(61) = -3.529$, $p =$

.128, **d** = .448. For cancer, parents interviewed in Spanish reported children in general should be around 8.8-years to learn about the causes of cancer, whereas their own child could learn about the causes of cancer around the age of 9.1-years on average, $t(54) = -1.668$, $p = .101$, **d** = .225. For parents interviewed in Spanish, the difference in ages for children in general to learn about the common cold (3.2-years) was also significantly younger than the age for children in general to learn about cancer (8.8-years), $t(55) = -12.275$, $p < .001$, **d** = 1.640. Lastly, for parents interviewed in Spanish, the difference in ages for their own child to learn about the common cold (4.1-years) was also significantly younger than the age for their own child to learn about cancer (9.1-years), $t(51) = -11.568$, $p < .001$, **d** = 1.481.

When comparing these responses on appropriate ages for children by interview language, the only significant difference was regarding how old the parent thought that children in general should be to learn about the causes of cancer, with parents interviewed in Spanish reporting a significantly higher age on average (M = 8.804-years) compared to parents interviewed in English (M = 7.280-years), $t(104) = -2.166$, $p = .033$, **d** = .421.

Conclusion

Hypothesis 4a was supported as more parents in both interview languages reported they had already talked to their child about the common cold than cancer. Hypothesis 4b was also supported as parents in both interview languages reported children should learn about the causes of cold at an earlier age than the causes of cancer – though the specific ages for each depended on the community or social partner. All in all,

parents in both interview languages thought children should learn about the causes of a cold from older siblings or older cousins, the educational community, and the medical community – but not from friends or from the religious community. Similarly, parents in both interview languages thought children should learn about the causes of cancer from the educational community and the medical community – but not from older siblings or older cousins, friends, or from the religious community. That said, the majority of parents in both interview languages thought that they themselves should be the primary person to teach children about both illnesses.

Chapter 4

Discussion

The goal of the current study was to examine the emergence and endorsement of explanatory systems of biological illnesses within a specific cultural context using a mixed-method approach. Natural (folk, scientific) and supernatural (religious, supernatural) explanatory systems were examined. The two biological illnesses were the common cold and cancer, and the study examined perceptions both of what causes the illnesses and what treats the illnesses. The cultural context was Southern California, and the community involved in the study was Mexican-American, Catholic families with bilingual (Spanish, English) children between the ages of 4 and 6 years of age.

The specific causal mechanisms children and parents endorsed was measured in two ways: (1) a free-list recall task to assess what explanations are salient to the individual without any prompts, and (2) a direct prompt task to assess endorsements of a wide range of causal mechanisms. Additionally, parents were asked if a variety of communities and social partners should teach children about each illness, and if so, how old the child should be to learn within that community. Results for each set of analyses are discussed below.

Main Finding 1: Children and adults do not seem to differentiate between *how* and *why* when reasoning causally about the causes and treatments of illnesses, and they do not provide more distal and supernatural causes when asked *why* (e.g., why <u>me</u>??) compared to *how*

Salient Explanations and the Proximity of Cause: How *vs.* Why

Explanations were coded and assessed for what was most salient (i.e., most common and listed higher in a rank-order), and if participants provided different types of explanations when asked *why* than when asked *how*. Hypothesis 1 was that distal causes (e.g., supernatural or religious) would be more salient in explanations for *why* people get sick or get better, whereas proximal causes (e.g., scientific or folk) would be more salient for *how* people get sick or get better.

Parent. Hypothesis 1 was not supported for parents in the current study. Similar to children, parents gave natural explanations for both *how* and *why* people get sick from the common cold and cancer or get better from the common cold; some religious supernatural explanations were common in parents' justifications for how and why someone gets better from cancer though. Additionally, there were not large differences in parents' explanations for *how* compared to *why* or by interview language (English vs. Spanish).

Casual Chain. In regard to *how* and *why* parents think someone gets sick with the common cold, parents frequently listed a number of natural causes: contagion, improper outerwear, coldness in general, low immune system, germs, and being wet. All of these explanations were also present in other research studies examining how different Latino groups explain the causes and treatments of illness (Baer et al., 1999).

For cancer, many parents also tended to say they did not know *how* or *why* someone gets sick with cancer, or that there is no cause – cancer is something that just happens naturally, and it is not explainable. Of the causes mentioned, parents again

focused on natural causes: genetics or heredity, eating unhealthy, and harmful substances (e.g., toxins). This is similar to other studies on adults' views on the causes of cancer (e.g., Balmer et al., 2013) – including Hispanic adults' views specifically (McFall et al., 2006). For example, one study looking at what African American, Hispanic, and White adults believed about the causes of prostate cancer found that all three ethnic groups identified heredity, age (i.e., being older), race, sexual activity, and lifestyle choices or habits (e.g., eating greasy foods) as possible causes of prostate cancer (McFall et al., 2006). Interestingly, McFall et al. (2006) also noted that Hispanics were more likely to say "I don't know" than the other two groups, and they asked the most questions during the focus-group sessions.

However, the lack of supernatural causes of cancer being salient was somewhat unexpected, given the number of studies that have found adults mention "God's will", "chance", and "fate/destiny" in causal explanations of cancer (e.g., Taylor, 1995 for review). There were some parents who did list God as a cause of cancer, though they sometimes had a hard time believing God would cause cancer themselves. For example, here is one parent's explanation on what explanations they would give their child for the causes of cancer, after they listed genetics and not eating healthy as causes:

RESEARCHER:	¿Y esa es la explicación que le daría a su hija de por qué alguien se enfermara de cáncer?
PARENT:	Es que hay muchos tipos de cáncer. Por ejemplo, si es el cáncer en la matriz, no tú no - te pregunto, "¿Te chequeaste?" Porque ahí están chequeando y chequeando y cuando hay algo malo, rápido te revisan antes de que se haga cáncer. No actuar a tiempo.

RESEARCHER: Uh huh. Uh, okay ¿entonces le daría otra explicación?

PARENT: Sí, definitivamente.

RESEARCHER: ¿Y cuál sería la explicación que le daría a su hija de por qué alguien se enfermara de cáncer?

PARENT: A la niña con 17, le diría ya Dios o algo así como que…

RESEARCHER: Okay, ¿entonces crees que Dios causó que alguien se enferm-

PARENT: No lo creo, pero a ella, se lo explicaría. No tendría otra explicación para ella.

RESEARCHER: And is that the explanation that you would give your daughter for why someone gets sick with cancer?

PARENT: It's just, there are a lot of types of cancer. For example, if it's uterine cancer, and you don't – I ask you, "Did you check yourself?" Because they are there checking and checking and when there is something bad, they quickly examine you before it becomes cancer. They [didn't] act on time.

RESEARCHER: Uh huh. Uh, okay so then you would give her a different explanation?

PARENT: Yes, definitely.

RESEARCHER: And what is the explanation you would give your daughter for why someone gets sick with cancer?

PARENT: For the 17-year-old [daughter], I would tell her "God" or something like that so that…

RESEARCHER: Okay, so you think that God caused someone to get sick-

PARENT: No, I don't think so, but for her, [that's how] I would explain it. I wouldn't have another explanation for her.

Even though this parent did not actually believe God would cause someone to get sick with cancer, they still said that is the explanation they would tell their older, 17-year-old

child, because they did not have any other reason. This also gets at the complexity of the belief systems for the individual, in that, if there really is no "good" explanation for something, or the parent does not have the answer immediately available, what do they tell their child? Additionally, what are the contexts in which religious parent typically say "God" as an explanation when they do not know the answer to something (e.g., saying God for "why someone gets cancer" but not for "why someone is wearing a purple shirt")? It is *not* necessarily the case that religious parents say God is the reason for why a variety of things happen, especially since children who did not know the answer for *how*/*why* someone gets sick did not say, "I don't know… God?"

Solution Chain. For *how* and *why* someone gets better from the common cold, there were three causes that parents listed that were the same as children: medicine, eating healthy, and proper outwear. In addition to these three, parents also said the doctor, rest, taking care of self, and time passing would cause someone to get better from a cold. The focus on natural causal treatments again is in line with other prior research on Latino adults' views on the treatments of the common cold (Baer et al., 1999). It was somewhat surprising that Vicks VapoRub (*vaporu*) was not salient in parents' open-ended justifications, given the prevalence of Latinos using VapoRub to treat many different types of ailments (e.g., see McQuaid et al., 2014) – though the use is not widely documented within the research community outside of research on asthma (Bermudez, 2019).

Regarding cancer, just like children, parents also said eating healthy would cause someone to get better, in addition to medical treatment, medicine, a doctor, following

doctor's orders, God, prayer, and faith. Therefore, for Mexican-American, Catholic adults, God appears to play the role of treating cancer, instead of causing it.

Conclusion. Supernatural explanations were not at all salient for parents' explanations of *how* and *why* someone gets sick with a common cold or cancer or *how* and *why* someone gets better from a cold, but a few supernatural justifications (God, prayer, faith) were salient for parents' explanations for the treatments of cancer. That is, for a religious, Mexican-American adult, God is ***not*** viewed as some "ultimate" moral agent that is blamed for the causes of problems but the praises for successes (see Gray & Wegner, 2010). Instead, God is viewed as only being good and ***not*** causing harm, as also confirmed in the cultural consensus results from the directed prompt task. Additionally, the 'bad' types of religious causes (i.e., demons, the devil) were not mentioned once in parents' open-ended explanations for what causes illnesses suggesting Catholic, Mexican-American adults do not necessarily associate biological illnesses as being the result of supernatural causes, unlike adults in some African countries who link biological illnesses (e.g., AIDS) as being the result of witchcraft (e.g., Legare & Gelman, 2008). This demonstrates that the way an individual reasons about something is a function of cultural values and the specific contexts in which the mechanism is first introduced (Bender et al., 2017; Gauvain, 2001; Widlock, 2014).

Additionally, parents gave very similar justifications for *how* and *why* when interviewed in either language, and, similar to children, parents often explicitly asked, "Wasn't I just asked that?" when asked the second question between *how* and *why*. On the one hand, this suggests adults also do not seem to differentiate in their reasoning

about *how* and *why* within the domain of the causes of sickness and treatments. Alternatively, it could be that *why* is sometimes used to elicit mechanistic explanations, and in other instances, *why* is used to elicit teological explanations (e.g., see Joo et al., 2020). Future research could examine this null finding by really emphasizing the different processes each question is getting at. For instance, instead of just asking how, participants could be asked, "What are the mechanisms that lead to Clara getting sick with a cold." And instead of just asking why, participants could be asked, "Why did *Clara* get sick with the cold? Out of everyone? What is the reason that *she* got it?"

Child. Hypothesis 1 was also not supported for children in the current study. Similar to parents, children overwhelmingly gave natural explanations for both *how* and *why* people get sick or get better from the common cold and cancer, and in fact, gave very similar responses for *how* and *why* a person gets sick or better – even when comparing child responses by interview language (English vs. Spanish) and child age (4-years vs. 5-years vs 6-years).

Casual Chain. Regarding *how* and *why* children think someone gets sick with the common cold, improper outerwear, coldness in general, and describing symptoms that are present (e.g., boogers, runny nose) were the most prominent explanations. This supports prior research on children's understanding of the common cold that also found children in this age range frequently endorse inadequate clothing (Johnson et al., 1994) or the exposure to cold weather (Johnson et al., 1994; Toyama, 2016) as the cause of a cold. Moreover, Callanan et al. (2020) make the argument that listing symptoms for the cause of an illness may actually be considered a form of interpretive causal reasoning precisely

because the child may be reasoning "I know they are sick *because* they have this symptom" – which could still be considered a form of reasoning causally about the process.

For cancer, a lot of children tended to say they did not know *how* or *why* someone gets sick with cancer, and of the children who did provide causal explanations, they focused on food (eating unhealthy or eating too much) and the symptoms that were present in the sick character (e.g., hair loss, loss of appetite). This might be result of the narrative in the vignette children were told about the character who was sick with cancer. The story was: "This is Javier/Violeta. Javier is sick with cancer. He cannot eat very much food, and he has a lot of pain." In the picture that children were shown alongside the vignette, the character was lying in a hospital bed, wearing a hospital gown, and holding their stomach to emphasize that they were in pain. Additionally, the character was drawn as being bald (both Javier and Violeta), and there was a sandwich on a plate to the side of the hospital bed to emphasize that the character could not eat very much food (i.e., the food was untouched). It might be that the reason children focused on food in their explanations was because it was explicitly mentioned in the story and shown in the picture. Similarly, the focus on symptoms such as hair loss was also present in the drawing. Keil et al. (1999) note that an open-ended interview may lead children to provide explanations that are salient to the vignette due to the demand characteristics of the task and children being susceptible. That may have been the case here. Only 15.5% of parents (18 of the 116) reported having talked to their child about cancer before. Therefore, it might be that these children did not know much (if any) information about

cancer, and consequently, they focused on the details they had just been provided about the illness they were being asked about. Alternatively, it could be that children use a more folk framework to explain the causes of an illness they have never heard of before. Future research could test this by describing symptoms of a made-up illness and asking children about the causes and treatments of the illness. To illustrate, within the field of linguistics and language development, researchers have done numerous studies in which they show children two novel objects and ask the child which one is a "dax." In the current study, it could be that because children did not know what cancer was, the way they answered is how they would have answered if they had been told, "Violeta is sick with dax. She is in a lot of pain, and she cannot eat very much food. How/why do you think Violeta got sick with dax?" Therefore, instead of providing conceptually accurate or factually accurate explanations for the causes of cancer, children instead might be focusing on the aspects of illness they already know and understand: poor diet, eating too much food, the symptoms of the illness, and contagion.

Solution Chain. For *how* and *why* someone gets better from the common cold, children often said medicine, eating healthy, and proper outwear in their explanations. This is in line with prior work examining 4- to 6-year-old children's explanations of what helps someone to get better from a cold or fever – specifically eating healthy and medicine (Goldman et al., 1991) and adhering to a set of rules (Perrin & Gerrity, 1981), in this case, wearing proper outwear. However, children in the current study seemed not be sure what explanations to give for how and why someone gets better from cancer, with irrelevant explanations being the most salient followed by eating healthy. Prior work on

children's understanding of cancer has largely emphasized the ***cause*** of the illness (e.g. Bares & Gelman, 2008; Chin et al., 1998; Johnson et al., 1994; Solomon & Cassimatis, 1999; Toyama, 2016;) and not the causal ***treatment***. The current study adds to the literature by assessing both how children think about the causes of an illness and what could treat the illness so an individual is no longer sick.

Conclusion. Taken together, these results suggest 4- to 6-year-old children being raised in a religious home (specifically, Catholic) do not seem to differentiate in their reasoning about *how* and *why* within the domain of the causes of sickness and treatments, and they do not give more supernatural explanations when asked *why*. In fact, similar to parents, some children even explicitly stated, "I already told you!!!" when asked *how* after already having answered *why* – suggesting that they really did not differentiate between the two types of questions.

Additionally, 4- and 5-year-old children tend to provide natural explanations for the causes and treatments of illnesses in open-ended interviews, as also evidenced in other research examining children's explanations of why mundane, improbable, and impossible events happen (Woolley & Cornelius, 2017), why unexpected events occur (Woolley et al., 2011), and even why God cannot do impossible things, such as make someone invisible (Lesage & Richert, under review). On the other hand, for the 6-year-olds, God was salient in children's explanations for *how* someone got better from cancer, suggesting supernatural explanations may begin to emerge around this age for children in this cultural group. This is earlier than what other prior research in other cultures had found for children's explanations for illness (e.g., Legare & Gelman, 2008), suggesting

children endorsed culturally relevant causes, and in this case, as also demonstrated in the parents' salient explanations, God was a relevant causal explanation for the treatment of cancer.

Main Finding 2: Parents should be the primary people to teach children about illness

Parental Ethnotheories

Regarding the parental developmental expectations of child age generally, Hypothesis 4b was also supported as parents in both interview languages reported children should learn about the causes of cold at an earlier age than the causes of cancer – though the specific ages for each depended on the community or social partner. That said, some parents struggled with coming up with a specific age or time-frame to discuss these specific illnesses with children. For example:

> RESEARCHER: How old do you think children in general should be to learn about the causes of cancer?
>
> PARENT: <long pause> I want to say…I mean whenever it arises. I mean…I mean I wish I could talk to my kid about, you know…certain things about health or…you know take care of yourself in certain ways, but I think until they're…like in a scenario where they have to learn about that or you know they see somebody that's sick, "Why is he like that?" Then they're actually curious to know [more] than me just telling him like, "Hey, learn about this just because." So, I don't think they're always...I don't think they...I don't think there's a timeframe where you should be like, "Hey it's time to learn about cancer."

As noted in this example, just the question of asking for a specific age was somewhat of a strange concept for this parent, suggesting that the process of having these conversations with children is not so much bound to a specific age range, but instead is related to

specific circumstances, or, even more so – the age at which the child has the capabilities of understanding, as also noted by several parents. For instance:

RESEARCHER: And how old should a child be to learn about the causes of a co-of a cold from the hospital, or a doctor, or a nurse?

PARENT: Um, well, <pauses> as young as they're able to get it. Right? And understand.

In this example, it is not so much the specific age, but the age of understanding. Future research should consider asking parents what age they think children have the ability to *understand* each illness as well as asking how old the child should be to learn about each illness since the child age for the capability of understanding an illness may be different than the child age for when the parent thinks the child should learn about the illness even if they would not fully understand it.

Regarding the parental developmental expectations, Hypothesis 4a was supported as more parents in both interview languages reported they had already talked to their child about the common cold than cancer, and, in fact, very few parents had spoken to their child about cancer before. Additionally, in examining who initiated the conversation about each illness, the majority of the time the parents themselves were the person who brought up the causes of each illness, suggesting parents in this cultural group do not necessarily have the expectation that the child must initiate these conversations. Rather, parents view themselves not only as the primary source of information, but also control when and who brings up the topic of illness to begin with.

Regarding the appropriate child age to learn about illness from a variety of potential information sources, across the full sample, parents thought that on average,

children should be at least 3.3-years-old to learn about the causes of the common cold but should be at least 8.1-years-old to learn about the causes of cancer. There was also quite a bit of an age range for each illness too, with parents reporting anywhere from newborn to 11-years-old to teach children about the common cold, and anywhere from 1-year to 15-years-old to teach children about cancer. For their own children, parents reported slightly older ages to teach them about the causes of each illness. However, given that the average age that parents though their own child should learn about the common cold was younger than all of the children's ages for the current study (4- to 6-years-old), in theory, based off of these ages, most of the children in the current study should have been at least somewhat familiar with this specific illness, and it supports the theoretical justification for choosing this age range to examine children's reasoning about the common cold. Future research should consider asking children in the 8- to 10-year-old range and their parents about cancer if this is the age range that parents deem as appropriate to teach children about cancer.

Regarding the acceptability of different agents as information sources, all in all, parents thought children should learn about the causes of a cold from older siblings or older cousins, the educational community, and the medical community – but not from friends or from the religious community. Similarly, parents thought children should learn about the causes of cancer from the educational community and the medical community – but not from older siblings or older cousins, friends, or from the religious community. That said, at the end of the day, the majority of parents thought that they themselves should be the primary person to teach children about both illnesses. For example, as one

parent explained, it is not the school's responsibility to be the initial person or community to teach children about cancer:

RESEARCHER: Do you think children should be learning about the causes of cancer from their school or teachers?

PARENT: I think in science classes yes, or biology classes yes, to learn the, the science behind it. Um, but I think at that point, once they're older, cause I believe they do it when they're older, parents should have already had that conversation with their children, but it's not, I don't think it's [the school's] obligation to have to teach the child for the first time.

Importantly, even though all of the parents and children in the current study identified as Catholic, and therefore to some extent, were religious, most parents still did not think that children should be learning about either illness from a religious community. For example, as one parent put it:

RESEARCHER: Do you think children should be learning about the causes of a cold from the church or a priest or religious text?

PARENT: <shakes head no> Mm no.

RESEARCHER: Why not?

PARENT: Because as a child, you take things literally as they're told to you. And the Bible uses more stor- parables, stories and stuff - it's not exactly what it's… and especially because it was written so long ago, it's not exactly what they see, so I think it'll confuse the child more than it will help them. Um, as far as a priest, it's hard for him to get to every child individually and kids like to ask a lot of questions, so I don't think it's what their focus is.

This might also help explain some of the variation in rates of endorsement of supernatural causes. It is not so much that religious communities can*not* teach children about illness,

but instead, parents do not view it as the responsibility of the religious community, and instead place the responsibility on themselves as well as the educational and medical communities. That is, the role of the religious community is to teach about the *religious* aspects, and in this case, health and illness may not considered to be a "religious" domain. If parents who are raising their children in a religious home do not want their children to learn about things like illness from a religious community, it may because parents are really separating out the role of religion and the role of science in this domain.

Main Finding 3: Yes, Catholic, Mexican-American children and adults *do* provide both natural and supernatural explanations for the causes and treatments of illnesses, but there is variation in co-existence and parent-child correspondence

Presence of Natural and Supernatural Causes in Open-Ended Explanations

Open-ended explanations were first globally assessed for the presence of both natural and supernatural causes in either *how* or *why* justifications. That is, across all children and all parents, did anyone even provide supernatural causes in their explanations? Do supernatural and natural explanations even co-exist in the current sample? In Hypothesis 2a, it was hypothesized that there would be both natural and supernatural explanations present at the group level in children's and parents' justifications for how and why someone gets sick or gets better – indicating co-existence explanations of natural + supernatural is present within this cultural group (see Appendix H).

Parent. Parents provided both natural and supernatural explanations when asked *how* or *why* someone gets sick or gets better, but the frequency of occurrence depended

on the illness (supernatural explanations for the common cold < supernatural explanations for cancer) and if the parent was asked about the causal chain or the solution chain (supernatural explanations for causal chain < supernatural explanations for solution chain). That said, there was only 1 supernatural explanation given for the causes of the cold across all 116 parents, suggesting parents do not typically give supernatural justifications for how or why someone gets sick with the common cold.

Child. Across children's open-ended justifications, natural and supernatural explanations were provided when asked how or why someone gets sick or gets better, but the frequency of occurrence depended on the illness (supernatural explanations for the common cold < supernatural explanations for cancer) and if the child was being asked about the causal chain or the solution chain (supernatural explanations for causal chain < supernatural explanations for solution chain).

Conclusion: Hypothesis 2a. Together, these results support Hypothesis 2a and suggest that both natural and supernatural causes ***are*** present in Catholic, Mexican-American children's and parents' open-ended justifications of the causes and treatments of illness (see Appendix H), though there is variation within this cultural group for the extent each type of explanatory reasoning is present. Moreover, the use of supernatural explanations depends on the severity of the illness (cold < cancer) and inference type (causal chain < solution chain) for both children and adults. In summary, parents and children were most likely to point to supernatural explanations for how to treat cancer. This may have to do with the severity of the illness itself, as cancer is often equated with death and dying (e.g., Mosavel & El-Shaarawi, 2007). For instance, one study examining

how Latina and African American adolescent females (average age of 15-years-old) understood the HPV vaccine and cervical cancer noted that the participants from both cultural groups had a lot of fear and anxiety about cancer generally, and several participants explicitly brought up death – and a slow, painful death at that – when talking about cancer. For instance, one Latina female described what cancer meant by saying, "That somebody is going to die soon, that they are going to get so sick that they can't do anything about it'' (Mosavel & El-Shaarawi, 2007, p. 712). Given that unlike the common cold, cancer is a severe, non-contagious illness in which there is not always a clear reason why someone gets sick with it in the first place, it is a little surprising that there was not a higher percentage of supernatural causes listed in the open-ended free-list task for the causes of cancer, especially since some prior research has found adults often give supernatural explanations for what causes cancer (e.g., God's will, chance, fate or destiny) (Taylor, 1995). Instead, supernatural explanations are more common for the *treatments* of this severe illness. This may also be related to the fact that only about 70% of the parents in the current study thought that 'bad' religious agents such as demons and the devil were real, but more parents viewed 'good' religious agents such as angels and saints as real (91%, 82% respectively). Children in the current study overwhelmingly did not think that the 'bad' religious agents such as demons and the devil were real – with only 23% of children judging the devil as real and only 11% of children judging demons as real. In fact, several children made explicit side comments of, "Oh, that is bad so it's not real" alongside their judgments during the reality status task. However, similar to parents, children did view 'good' religious agents such as angels and saints as real (71%,

80% respectively). It may be the case that these 'bad' religious supernatural agents like the devil and demons are equated with monsters more generally within children's minds, and children may also be explicitly told by their parents that monsters do not exist. Although prior research has examined children's beliefs in supernatural and mythical creatures, most of this work has only examined agents that are generally viewed in positive ways, such as Santa Claus who brings presents at Christmas, the Tooth Fairy who brings money after losing a tooth, and the Easter Bunny who brings eggs and chocolates at Easter (e.g., see Kapitány et al., 2020). More research is needed on why children do not think religious agents such as the devil or demons are real and if it is because of the fear and negative connotations of these agents.

Variation in Levels of Co-Existence Using A Cluster Analysis

Another way of analyzing what parents and children endorse as the causes and treatments of illness was the use of a cluster analysis on the proportion of natural and supernatural causes endorsed overall for each individual – split between the causes of the illness and the treatments of the illness. Hypothesis 2d was not supported for children or parents. It had been hypothesized that children and adults would each cluster into three disparate categories: (1) high endorsement of natural causes, but low endorsement of supernatural causes, (2) low endorsement of natural causes, but high endorsement of supernatural causes, and (3) high endorsement of natural causes, and high endorsement of supernatural causes. Instead of a three-cluster group emerging with these patterns, children and parents tended to cluster into two different groups, and there was no group for low endorsement of natural causes, but high endorsement of supernatural causes. This

supports other research that the endorsement of supernatural explanations does not mean a replacement of natural explanations, but instead, they co-exist alongside each other (e.g., Legare & Gelman, 2008).

Causes of Illness. For parents, the biggest difference in the formation of the two clusters of the causes of illness was on how many natural causes the parent endorsed for the causes of the cold, with Cluster 1 endorsing more natural causes of the cold on average (81.5%) than Cluster 2 (50.2%). That is, in Cluster 1, parents tended to endorse natural causes and very few supernatural causes [moderate-high natural + very low supernatural], but in Cluster 2, parents tended to endorse only some natural causes [low-moderate natural + no supernatural]. Additionally, there were no significant difference between the two groups in measures of religiosity or level of education, so it is not necessarily the case that parents who are more religious choose natural causes of illness less often or that parents who are more educated choose natural causes of illness more often. The only significant difference between the two groups of the variables examined was the family yearly income, but there is nothing to suggest *why* these participants varied on yearly income – especially given the many factors related to income (e.g., type of job or how many adults in the home are working and contributing their income towards the family). Other studies in the US examining children's understanding of illness have used family income to predict children's factual knowledge of the illness and found parental income positively predicts children's conceptual understanding of the common cold and asthma, but level of parent education did not predict children's conceptions of either illness (Paterson et al., 1999). On the other hand, a study in China

found that children from high SES families (i.e., higher parent education and higher family income) gave more biological causal explanations of illness than children from low SES families (Zhu et al., 2009). But, again, it is not clear what family income in this context even means; it could be used as a proxy for other SES variables, such as education level or perceived levels of food security (i.e., certainty in being able to obtain enough food in the immediate future or longer term) – in which case, these variables could be examined directly. And, in fact, there was no difference between the two parent clusters for the causes of illness on level of education or perceived levels of food security.

For children, the biggest difference in the formation of the two clusters for the causes of illness was on how many supernatural causes children endorsed for the causes of the cold and cancer. Children in Cluster 1 endorsed some natural causes and a few supernatural causes [moderate natural + low supernatural], and children in Cluster 2 endorsed most natural causes and some supernatural causes [high natural + moderate supernatural].Moreover, children's proportions of endorsements for natural and supernatural causes was similar for cold and cancer within each cluster, suggesting that children's conceptions of cancer may be based more broadly on their conceptions of the common cold. That is, even if children do not know what cancer is, they may make an educated guess based on their understanding of a more familiar illness – the common cold. However, given that children were always asked about the cold first and then cancer, it is not known if this ordering effect influenced children's responses to cancer. That said, children were asked what it meant to be sick with each illness (e.g., what symptoms a person might have) and what they thought of when they heard the phrase

"sick with a cold" and "sick with cancer." Coding this data will be able to provide some insight as to whether or not children even knew what cancer was in the first place, and if not, if their conception of cancer really was based on their conception of the common cold.

Children in the first cluster [moderate natural + low supernatural] were about 6-months older on average compared to children in the second cluster [high natural + moderate supernatural]. It may be that younger children are more likely to say "yes" to more causes generally – even if they are not 100% certain, whereas children become more reserved in their estimation with age. That said, prior research on a "yes" bias in children has found that this bias to say 'yes' usually disappears by the age of 4- to 5-years-old (Fritzley & Lee, 2003), and children in the current study were not necessarily just saying 'yes' to everything.

It had also been hypothesized that children would not differ in biological understanding for these two clusters (high natural, low supernatural and high natural, high supernatural) but that the difference in biological understanding would emerge between children in these two groups and children in a third group of low natural, high supernatural. Given that the 3-cluster solution was not supported, this part of Hypothesis 2d was not able to be tested, but differences in biological understanding was examined for the two clusters that did emerge. Children in the first cluster [moderate natural + low supernatural] had a better understand of human (im)possibility compared to children in the second cluster [high natural + moderate supernatural] – but there was no significant difference between the two groups on understanding of human biology generally. This

difference in understanding of human (im)possibility was somewhat surprising, given that the reason human (im)possibility questions were even included in the first place was as a way to offset the number of questions about human biology with a 'yes' response as the correct answer. It may be related to the fact that children's understanding of human (im)possibility is correlated to their age (i.e., children have a better understanding of what is and is not possible as they get older), and children in the moderate natural + low supernatural group were slightly older on average than children in the high natural + moderate supernatural group.

Similar to the hypothesis on biological understanding, it had been hypothesized that children would not differ in executive functioning (EF) for these two clusters (high natural, low supernatural and high natural, high supernatural) but that the difference in EF would emerge between children in these two groups and children in a third group of low natural, high supernatural – given that EF may be related to children's and adults endorsements of scientific explanations (e.g., Shtulman & Young, 2020). Because the 3-cluster solution was not supported, this part of Hypothesis 2d was also not able to be tested, but differences in EF (inhibition and attention) for the two clusters that did emerge was examined, and as expected, there was no significant difference between the two groups in inhibition and attention. That is, children who endorsed some natural but few supernatural causes of illness did not have a significantly higher EF than children who endorsed most natural and some supernatural causes of illness.

Surprisingly, there was not a significant difference in religious engagement between the two clusters of children. Other research on children's endorsements of

supernatural explanations has found children with high religiosity endorse more religious explanations (e.g., Woolley et al., 2011) – though the effect seems to be stronger for older children. That said, it is not known *how* children in the current study were participating in religious practices. That is, instead of just frequency of engagement, how involved the child is in the religious practices and if they are being told the meaning of these practices or why they are doing them in the first place may be a better indication of exposure and engagement in religiosity.

Treatments of Illness. Regarding the causal treatments of illnesses, once again, two clusters emerged for parents. In Cluster 1, parents tended to endorse some natural causes and a few supernatural causes [moderate natural + low supernatural]. In Cluster 2 (n = 91), parents endorsed most natural causes and some supernatural causes [high natural + low-moderate supernatural]. As expected, parents in the high natural + low-moderate supernatural group did have significantly higher levels of parent religious engagement and high perceived level of religiosity and spirituality than parents in the moderate natural + low supernatural group. That is, parents who endorsed both natural and supernatural causes tended to be more religious than parents who endorsed some natural but very few natural causes. Surprisingly, there was also a difference in English vocabulary skills between the two groups: parents in the moderate natural + low supernatural group had higher English vocabulary skills than parents in the high natural + low-moderate supernatural group. It is not clear why this difference emerged. Nevertheless, the number of parents in each group was quite uneven, spurring some caution at interpreting these significant differences between the two groups.

For children, the biggest difference in the formation of the two clusters for the causal treatments of illness was once again on how many supernatural causes children endorsed for the treatments of the cold and cancer. Children in Cluster 1 endorsed natural causes and some supernatural causes [moderate-high natural + low supernatural], and children in Cluster 2 endorsed children endorsed most natural causes and most supernatural causes [high natural + high supernatural]. Moreover, similar to the cluster analysis on children's perceptions on the causes of illness, children's proportions of endorsements for natural and supernatural causes was similar for cold and cancer within each cluster, suggesting that children's conceptions of the treatments of cancer may also be based more broadly on their conceptions of how to treat the common cold. That is, even if children do not know what cancer is, they may make an educated guess based on their understanding of a more familiar illness – the common cold. However, as highlighted earlier, given that children were always asked about the cold first and then cancer, it is not known if this ordering effect influenced children's responses to cancer.

It had also been hypothesized that children would not differ in biological understanding for these two clusters (high natural, low supernatural and high natural, high supernatural) but that the difference in biological understanding would emerge between children in these two groups and children in a third group of low natural, high supernatural. Given that the 3-cluster solution was not supported, this part of Hypothesis 2d was not able to be tested, but differences in biological understanding for the two clusters that did emerge was examined. Children in the first cluster [moderate-high natural + low supernatural] had a better understand of human (im)possibility compared to

children in the second cluster [high natural + high supernatural] – but there was no significant difference between the two groups on understanding of human biology generally. Once again, this difference in understanding of human (im)possibility was somewhat surprising, given that the reason human (im)possibility questions were even included in the first place was as a way to offset the number of questions about human biology with a 'yes' response as the correct answer. However, given that there was not a significant difference in child age between the two clusters, it is not necessarily the case that for causal treatments, children in the moderate-high natural + low supernatural group were older and therefore had a better understanding of human (im)possibility than children in the high natural + high supernatural group. In fact, children in the moderate-high natural + low supernatural group were actually slightly younger on average than children in the high natural + high supernatural group.

Similar to the hypothesis on biological understanding, it had been hypothesized that children would not differ in executive functioning (EF) for these two clusters (high natural, low supernatural and high natural, high supernatural) but that the difference in EF would emerge between children in these two groups and children in a third group of low natural, high supernatural – given that EF may be related to children's and adults endorsements of scientific explanations (e.g., Shtulman & Young, 2020). Because the 3-cluster solution was not supported, this part of Hypothesis 2d for the treatments of illnesses was also not able to be tested, but differences in EF (inhibition and attention) for the two clusters that did emerge was examined, and as expected, there was no significant difference between the two groups in inhibition and attention. That is, children who

endorsed most natural but few supernatural causal treatments did not have a significantly higher EF than children who endorsed most natural and most supernatural causal treatments.

Surprisingly, similar to the results on the causes of illness, there was not a significant difference in religious engagement between the two clusters of children for the causal treatments of illness. One again, it is not known *how* children in the current study were participating in religious practices. That is, instead of just frequency of engagement, how involved the child is in the religious practices and if they are being told the meaning of these practices or why they are doing them in the first place may be a better indication of exposure and engagement in religiosity.

There was a difference between the two child clusters for how often the child typically visited the doctor every year. Children in the high natural + high supernatural group visited the doctor significantly more often than children in the moderate-high natural + low supernatural group. It is not clear why children who visit the doctor more often would have a higher rate of endorsement of both natural and supernatural causal treatments, given the expectation that a doctor would be more likely to suggest natural causal treatments over supernatural causal treatments. But children's overall level of health was not different between the two groups, suggesting that this result is not just a matter of the number of health issues that a child may have.

Conclusion

Hypothesis 2d was not supported. Although three disparate clusters did not emerge for parents and child, there was varying degrees of preference for only natural

causes and preference for natural + supernatural causes. However, there was not a group of children or parents who preferred only supernatural causes, suggesting that just because an adult or child is religious, they forgo natural explanations. Instead, religious adults and children either focus primarily on the natural explanations and not the supernatural, or they use both natural and supernatural explanations. Additionally, children who preferred most natural + most supernatural causes did not have a higher religious engagement than children who preferred most natural + a few supernatural as was hypothesized. Moreover, children who preferred natural causes only also did not have a better understanding of human biology than children who preferred natural + supernatural causes. On the other hand, levels of religious engagement did differ among parents who chose natural only versus those who endorsed natural + supernatural causes – particularly for the causes and treatments of cancer. Given that there were few differences between the two clusters in terms of child factors (e.g., child age) and parent factors (e.g., parent level of education), one way to unpack the nature of this co-existence is to examine if children and adults think the natural and supernatural causes work together or separate. This could be done using a social network analysis; more information on this type of analysis is below in the future directions section.

Correspondence between Parents and Children

Exploratory analyses examined if a parent-child dyad matched in the specific causal mechanisms they endorsed as well as in the type of cluster membership.

Parent-Child Correspondence in Endorsements of Causal Mechanisms. Parent-child dyads had the highest level of correspondence in their judgments on the

causes of the cold, followed by cancer sick, cold better, and cancer better. The average level of correspondence was not 100% between parents and children, but it was also not 0% – even when examining the parent-child correspondence at the level of natural and supernatural causes and treatments of illness. Overall, this suggests that parents' own explanations might play a role in their own child's explanations, though there is variation depending on the type of illness, if the child and parent were being asked about the causes of the illness or the treatments of the illness, and the interview language. Specifically, parent-child correspondence was higher for the common cold than cancer, correspondence was higher for the causes of illness than the treatments of illness, and correspondence was higher for parents and children interviewed in English compared to those interviewed in Spanish.

Interestingly, child age was only positively related to a higher parent-child correspondence for the causes of the cold, though the lack of relationship between child age and level of parent-child correspondence for the other illness might also be a result of how often the parent and child talk about the causes and treatments to these illnesses (if ever). Moreover, children's understanding of human biology was not significantly related to the levels of parent-child correspondence for the causes or treatments of the cold and cancer. This may be because the measurement of children's understanding of human biology was specifically on the broader bodily functions, and not specifically biological illness. However, children's understanding of human (im)possibility was significantly related to levels of parent-child correspondence for the causes and treatments of the cold and the causes of cancer. More research is needed to unpack why children's

understanding of possibility relates to how well the child matches their own parent's responses, specifically for the supernatural causes and treatments of illness. These correlational analyses only examined the proportion of correspondence, and not the direction of correspondence. Therefore, it might be that children who have a better understanding of possibility are rejecting the supernatural causes and treatments of illness more often – just like their parents. Finally, children's executive functioning (i.e., attention and inhibitory control) was positively related to the level of correspondence between parents and children for the supernatural causes of cancer, the natural and supernatural treatments of the cold, and the natural treatments of cancer. The current study did not examine the actual process of transmission between a parent and child, but it may be that children who are able to pay better attention when the information is being transmitted directly to the child (either in verbal testimony or non-verbal behaviors such as watching a parent wash their hands). Future research should consider the role of executive function and how it affects the transmission process and how much the child incorporates the testimony they receive into their own concepts.

Parent-Child Correspondence in Cluster Group Membership. There was some correspondence (about 50%) between parents and children in the type of cluster membership each parent-child dyad fell into for the causes and treatments of illnesses. For both the causes and treatments of illness, the majority of mis-matches were cases where the child preferred natural causes, but their parent preferred co-existence for the causes of illness. This supports prior work that has found the endorsement of supernatural causes increases with age (e.g., Woolley et al., 2011), and also suggests children may not

be overly fantastical in their reasoning about the causes and treatments of illness but instead tend to prefer natural or biological explanations (e.g., Busch et al., 2016).

Conclusion. In sum, there was some correspondence between parents and children – ranging from an average of 46.5% to 77.2% depending on the specific illness (cold, cancer) and the type of cause (natural, supernatural). That said, there are many factors that might have affected the level of parent-child correspondence. For instance, the current study did not examine the actual process of transmission between parents and children since the parent and child were interviewed separately. Therefore, it is not known what the contexts are in which parents and children discuss these illnesses or illnesses more broadly, and what explanations parents give "in the moment" and not retrospectively, or how much back-and-forth there is between parents and children in these conversations. For example, if the parent says two explanations for the cause of a cold (e.g., germs and cold weather), does the child accept these two explanations or ask for follow-up information? That is, is the child even hearing the full range of explanations that a parent does or does not endorse?

Furthermore, the majority of parents in the current study said that they were the ones who brought up the topic of the causes of each illness during conversation with their child. Children raised in this cultural context might not necessarily be asking their parents a lot of questions all of the time – including the topic of illness – but instead, children may also be using other methods of learning about illness (e.g., observation) that was not captured in the current study. Additionally, for cancer specifically, the majority of parents said they had not yet discussed the causes of that illness with their child, which might

explain some of the variation in correspondence between parents and children for cancer.

Third, relatedly, the parent who participated in the study may not be the only child's caregiver. As noted previously, a majority of parents reported either being married or having a live-in domestic partner in the home, and the child may also be interacting with other social partners on a regular basis (e.g., siblings, grandparents). Therefore, it is not known how well each of these caregivers' and social partners' responses corresponded with each other, and if the child might be told conflicting explanations in some cases.

Finally, parents were only asked if they had discussed the causes of these two illnesses with their child. It is not known how much the parent had discussed the treatments of the illnesses with their child, or parents' belief systems about the involvement of the different socializing agents and communities or the parental expectations about the appropriate age for children to learn about the treatments of the illnesses. Future research should also examine the parental ethnotheories on the treatments of illnesses in addition to the parental ethnotheories on the causes of illnesses.

Main Finding 4: What Specific Causes do Children and Adults Endorse? It Depends

Cultural Consensus on the Causes and Treatments of Illnesses

Hypothesis 2b was partially supported. It was expected children and adults would endorse both natural and supernatural causes for the causes and treatments of illnesses in the direct prompt task, and that the number and type of specific causes would vary by the severity of the illness, with children and adults endorsing more supernatural causes for the more severe illness (cancer) than the less severe illness (cold). Parents and children

alike did not highly endorse any supernatural causes as being able to cause the common cold or cancer in the direct prompt task, but both natural and supernatural causes were endorsed for the treatments of each illness. This supports prior research on Latino adults' views on the causes and treatments of the common cold (Baer et al., 1999). Specifically, adults in Baer et al.'s (1999) study also did not endorse the two supernatural causes they were asked about for causing the cold: witchcraft and *mal de ojo* (evil eye). But adults in that study also did not endorse the two religious causes they were asked about for treating a cold: burning prayer candles or putting water on the body in the shape of a cross.

For children, the number of supernatural causes endorsed for the causes of treatments varied widely by the language the child was interviewed in: children interviewed in English did not endorse any supernatural causes for treatments of the common cold, but did endorsed three of the four natural causes to treat the cold (eating healthy, medicine, doctor). However, children interviewed in Spanish endorsed all four natural causes as well as 12 of the 16 supernatural causes (all but miracles, karma, ghosts or spirits, and witchcraft). Similarly, for the causal treatments of cancer, children interviewed in English endorsed only 1 of the 16 supernatural causes (positive immanent justice) whereas children interviewed in Spanish endorsed 14 out of the 16 supernatural causes (all but ghosts or spirits and witchcraft). These findings indicate children cull in their judgments about the causal treatments of illness and do not just say "yes" to everything – even if they do not necessarily know a lot about the illness (e.g., cancer). Additionally, in the initial reality status judgment task, there was less agreement among children about if miracles, karma, ghosts or spirits, witchcraft, destiny/fate, and magic

were real or not real, and in some way, the results of the consensus analysis on the causal treatments of illness reflect these uncertainties as four of these causes were judged as not being able to treat a cold.

Parents interviewed in Spanish endorsed one supernatural cause (God) alongside the four natural causes (herbal remedies, eating healthy, medicine, doctor) as being able to cause someone to get better from the common cold, but parents interviewed in English only endorsed the four natural causal treatment of the cold. That said, it should be noted that a "No" to God in this instance does not mean that the parents in this study did *not* think that God was *not* capable of healing an individual from the cold. Instead, in saying "No", a parent may have been referring to the belief that God does not need to be involved in a non-serious illness such as the common cold. In fact, there was variation in beliefs even among the parents who were interviewed in Spanish, with some parents giving the following explanation alongside their "No" response for the causal treatment of a cold:

RESEARCHER:	[¿Cree que] Dios [causó que se mejorara del resfriado?]
PARENT:	Um, pues Dios no está en cosas así tan chiquitas… No.
RESEARCHER:	*[Do you think that] God [caused her to get better from the cold?]*
PARENT:	*Um, well God isn't involved in such small things… No.*

Once again, this view of God caring more about serious illnesses like cancer than something non-severe and often short-lasting like a cold suggests a view of God as a moral agent that is different than what Gray and Wegner (2010) found. That is, God is high in agency, as God *is* able to cure someone from cancer, but, unlike what Gray and

Wegner (2010) claim, God is not necessarily low in experience as there does seem to be variation in what God cares about and feels motivated to act on.

The number of supernatural causes endorsed by parents increased when asked about possible treatments of cancer, with parents interviewed in Spanish endorsing 5 of the 12 supernatural causal mechanisms (God, Jesus, miracles, prayer, and praying the rosary), and parents interviewed in English endorsing 6 of the 12 supernatural causal mechanisms (God, Jesus, miracles, prayer, praying the rosary, and destiny/fate). All four natural causes were also endorsed as treatments of cancer for parents interviewed in both languages.

Conclusion. Taken together, these results suggest that how adults and 4- to 6-year-old children reason about the causal treatments of an illness when asked directly about different types of causes depends not only on the illness (more supernatural causes endorsed for more severe illnesses than less severe illnesses), but for bilingual children, it may also vary depending on the language in which they reason about these causal mechanisms during a direct prompt task. This also supports Hypothesis 3b for children but not adults. It was expected that bilingual individuals who were presented the causal mechanisms in Spanish would endorse more religious supernatural causal mechanisms than the individuals presented with the causal mechanism in English during the directed prompting task. This was indeed the case for children regarding the causal treatments in the solution chain tasks. However, it is not clear why the difference in interview language emerged for the directed prompting task but not the open-ended recall task (see Hypothesis 3a discussed above). As previously mentioned, the initial reason for

examining possible differences between interview language was because phrases such as *si Dios quiere* are common in Spanish, and, subsequently, if children hear supernatural causal mechanisms more frequently in Spanish (e.g., *si Dios quiere*) than English, they may be more likely to use that type of causal mechanism in that language. Indeed, both parents and children interviewed in Spanish endorsed God as a causal treatment of the common cold, whereas parents and children interviewed in English did not. But for the causal treatments of cancer, parents interviewed in both languages both endorsed God whereas children interviewed in Spanish endorsed God, but children interviewed in English did not. One possible way to examine the difference in rate of endorsements of supernatural explanations by interview language is to see if children interviewed in Spanish typically said that God was the ultimate cause behind everything, thus it really is God's will if something does or does not occur, but children interviewed in English do not use this type of reasoning. That is, this additional analysis could explore if part of the reason why children interviewed in Spanish also say "yes" to a whole host of supernatural causes is because they connect these other supernatural causes to God whereas children interviewed in English do not. As previously highlighted in the introduction, the reason for examining differences by interview language was precisely because phrases invoking God as a being a causal force are common in Spanish but not in English. However, given that the language of the interview was not done with random assignment, no causal claims may be made about the differences between the two interview-language groups. Although it appears that the language of the interview does matter, for children in particular, the exact nature as to why is not able to be uncovered in

the current study.

Additionally, it should be noted that endorsement of supernatural causes is not done in place of the endorsement of natural causes, but instead, alongside natural causes, as also evidence in other prior work on co-existence of natural and supernatural causal explanations of illness (e.g., Legare & Gelman, 2008). Finally, explanatory systems for any given individual are somewhat dependent on the context of what is being explained. As demonstrated above, how an individual explains the causal treatment of a non-serious illness such as a cold might be very different than how they explain the causal treatment of a serious illness that is often associated with death. As previously highlighted, when assessing what causes individuals in any given culture endorse for the causes and treatments of illness, it is important to consider what illness is being discussed, as a more severe illness such as cancer is more often associated with death and dying, whereas non-severe common illnesses such as the common cold are not.

The Method of How you Ask It: Free-List vs. Directed Prompt

Both methodologies (recall, direct prompt) together give a broader understanding of what explanatory systems look like for children and parents. Hypothesis 2c was that type of specific causes children and adults endorse would also depend on the task: recall (coming up with their own list of causes freely) vs. direct prompt (being asked yes/no directly for each cause). Specifically, it was expected that natural explanations (including folk and scientific) would be more prominent in the recall task than supernatural explanations (religious and non-religious), but endorsement of supernatural explanations would increase for the direct prompt task. This hypothesis was partially supported.

Parents interviewed in both languages gave natural explanations in the recall task and typically endorsed natural causes in the direct prompt task when asked about the causes of the common cold and cancer, indicating their reasoning about the causes of illness did not vary widely depending on the methodology used. However, when asking parents about the treatments of illnesses, parents did actually endorse supernatural causes in the d task more frequently than what the recall task alone indicated. Specifically, for parents interviewed in Spanish, in the recall task, only natural causes were salient in parents' explanations for the causal treatments of the cold, whereas for the direct prompt task, both natural and supernatural causes were endorsed for the treatments of the cold. For parents interviewed in English, only natural causes were salient in both the recall and the direct prompt task for the causes of the cold. For the causal treatments of cancer, God, prayer, and faith were salient in the recall task but God, Jesus, miracles, prayer, and praying the rosary were often endorsed in the direct prompt task.

Similar to parents, children interviewed in both languages overwhelmingly provided natural explanations in the recall task *and* endorsed the natural causes but not the supernatural causes in the direct prompt task when asked about the causes of each illness. Thus, for children, the endorsement of supernatural explanations did not increase for the direct prompt task for the causes of illness. However, regarding the causal treatments of illness, no supernatural explanations were given often enough for the treatments of cold and cancer to even be considered "salient" in the recall task, but children did actually endorse several supernatural causes in the direct prompt task – the extent to which varied by interview language. Children interviewed in Spanish endorsed

far more supernatural causes for the treatments of cold and cancer than children interviewed in English.

Conclusion

Taken together, these findings suggest that when asking children and adults about the causes of an illness, natural explanations are quite prominent, with very few (if ever) endorsements of supernatural explanations whether the individual is recalling the cause on their own or explicitly asked about a series of causes. However, when asking children and parents about the causal treatments of an illness, parents and children endorse more supernatural cause when explicitly asked about this type of cause than when they are asked to come up with a list of causes on their own. These findings also support the notion that children are not necessarily always thinking in fantastical ways, and providing wild explanations for everything, but instead focus on reality-based explanations (Weisberg et al., 2013; Woolley & Cornelius, 2017).

These findings may also not just be because of the demand characteristics of the task at hand, but also because of the stigma surrounding some supernatural beliefs. For example, there is range in both the extent of belief in and practice of non-religious supernatural phenomena, such as witchcraft (see Appendix F). The Catholic Church has made it very clear that it does not condone the practice or belief in witchcraft (e.g., see Allen, 2009), yet for many practicing Catholics around the world – Latinos included – witchcraft (*brujería*) or black magic is believed in or even practiced. Yet, because of the condemnation, admitting belief in these supernatural phenomena can carry a negative stigma. For instance, one parent admitted that they know they should not believe in it

when asked how magic can cause cancer:

RESEARCHER:	…Um ¿me puedes explicar cómo estas cosas pueden causar cáncer? ¿Cómo- cómo trabaja la magia?
PARENT:	<clears throat> Pues yo- yo no debo de creer en la magia por mi religión… Okay, pero yo sé que sí existe. Entonces muchas veces la gente hace magia para causarle mal a la gente- a las demás personas
RESEARCHER:	¿Y eso trabaja con la brujería o-
PARENT:	Sí.
RESEARCHER:	¿Con los dos?
PARENT:	Sí. <nodded head yes>
RESEARCHER:	*…Um, can you explain to me how these things can cause cancer? How- how does magic work?*
PARENT:	*<clears throat> Well I- I shouldn't believe in magic due to my religion… Okay, but I know that it does exist. So many times, people do magic to cause harm to people – to other people.*
RESEARCHER:	*And does that work with the witchcraft or-*
PARENT:	*Yes.*
RESEARCHER:	*The two of them?*
PARENT:	*Yes. <nodded head yes>*

Future research should consider ways of assessing belief in these more stigmatized causes, such as witchcraft, without potentially causing the participant to feel shame or guilt for admitting these beliefs.

Effects of Interview Language: Hypothesis 3a. For Hypothesis 3a, it was expected children and adults interviewed in Spanish would provide more supernatural causal mechanisms overall when listing *how* and *why* someone gets sick from or better

from an illness than children and adults interviewed in English because of the common usage of phrases in Spanish that specifically invoke supernatural causality (e.g., *si Dios quiere*, or it's God's will). This hypothesis was not supported for children or parents as somewhat similar rates were given across both interview languages for the causes and treatments of the common cold and the causes of cancer. Interestingly, both parents and children interviewed in English actually gave slightly more supernatural explanations for *how* and *why* someone gets better from cancer than the parents interviewed in Spanish, which is the opposite of what had been hypothesized in Hypothesis 3a. On average, parents interviewed in English gave supernatural explanations 6.2% more often than parents interviewed in Spanish (when collapsing across *how* and *why*); for children, those interviewed in English gave supernatural explanations 3.6% more often than children interviewed in Spanish (when collapsing across *how* and *why*). This is also surprising given that both parents and children interviewed in Spanish had significantly higher religious engagement than the parents and children interviewed in English. More research is needed to examine what the underlying mechanism is that might help to explain this difference. For example, these results suggest that the extent to which children and adults engage in religious practices (e.g., church attendance) may not alone be a good predictor for how they explain everyday events, such as the causes and treatments of illness. Instead, it may have to do more with *how* they engage in these religious practices that transfers to what explanations are readily available in their repertoire of explanatory systems.

In addition to the manner of religious engagement, another explanation for why

parents and children interviewed in English provided more supernatural causes in the open-ended justifications for treating cancer might be because they also did not highly endorse folk treatments, such as herbal remedies (*remedios naturales*), as also demonstrated in the cultural consensus analyses on the directed prompt task. For instance, for parents interviewed in Spanish, the mention of using home remedies (*remedios caseros*) or herbal remedies (*remedios naturales*) was slightly more salient in their open-ended explanations of *how* (*Smith's S* = 0.043) and *why* (*Smith's S* = 0.028) someone could get better from cancer than the parents who were interviewed in English (*how Smith's S* = 0.015; *why Smith's S* = 0.022). Moreover, the results from the cultural consensus analysis from the directed prompt task also indicated that both parents and children interviewed in English did not endorse herbal remedies as a treatment of cancer, but parents and parents interviewed in Spanish did endorse it. Therefore, it could be that the reason the parents and children interviewed in English listed slightly more supernatural causes for the cure of cancer during the initial free-list task is precisely because they were not focused folk remedy treatment, but the parents and children interviewed in Spanish were providing this type of causes. Both groups also endorsed the scientific treatments for cancer as well (e.g., medicine, medical treatment, doctors, following doctor's orders) – so providing more supernatural causal explanations was not done in place of scientific explanations. Instead, supernatural causal explanations may be given in place of *folk* explanations. However, given that the language of the interview was not done with random assignment, no causal claims may be made about the differences between the two interview-language groups.

Limitations

As is typical with any research study, there were some limitations for the current study. First and foremost, the initial goal of collecting 144 parent-child dyads (72 per interview-language group) was not achieved because of having to stop data collection in the beginning of March 2020 due to the world-wide COVID-19 pandemic. Because of this, there was not an even number of participants within each interview-language group (English n = 49; Spanish n = 56), and there were far more 4-year-olds (n = 42) represented in the current study than 5-year-olds (n = 36) and 6-year-olds (n = 27). The 4- to 6-year-old age range was specifically chosen to test how children's explanatory systems of the causes and treatments of illness emerge within this age range, but this lack of children on the older end of this age range means some caution should be used in interpreting the findings.

Second, the initial study design included randomizing the interview language among participants and using both bilingual parents and bilingual children. However, after the first four months of data collection, there was a total of only 16 [usable] participants. During that timeframe, there were several families who were interested in participating in which the parent was not bilingual (i.e., Spanish-preferred), but the child was bilingual. Because of this, the inclusion and exclusion criteria was altered to allow these families to participate, and therefore, any differences in interview language may be more of a result of other familial characteristics (e.g., biculturalism between Mexican and US culture, frequency of each language use, family SES) and not just the interview language itself. For instance, there were differences between the English-interview and

Spanish-interview groups in terms of parent immigration generation, parent employment, family yearly income, the primary language spoken in the home, and how bilingual the parent and child was broadly (e.g., vocabulary measures or self-report of understanding of each language).

Third, the specific methodology employed for the child interview affected what type of statistical analyses could be done. Specifically, because children were not asked about the causal mechanisms that they judged to not be real, there was a varying amount of planned missingness within each child's set of data. Although conceptually it makes sense to not ask children about the causal mechanisms that they do not think are real, it did limit the ability to do more standardized statistical analyses (e.g., linear or logistic regression) on the outcome variables.

Fourth, it is not known what parents' and children's conceptions were for each of the causal mechanisms chosen in the current study. For instance, one child gave the following explanation for how Clara got better from the cold: "And she ate this <points to luck card> so she can feel better." However, luck is not usually talked about in terms of something that you "eat." In this instance, it appears the child might have been referring to the four-leaf clover drawing as possibly being a medicinal herbal remedy (e.g., a tea) – and not a supernatural force of some kind. Future research should consider asking children and parents alike to give a more specific definition of what they consider each of these causal mechanisms to entail so that it can be clear if there is consensus among the group on the definitions.

Fifth, the current study involved only one parent – most of whom were the child's

mother. Out of the full sample, 82% of parents reported either being married or having a live-in domestic partner. For these children living in a two-parent household, presumably they are also receiving testimony about health and illness concepts from the other parent as well – though this testimony could be similar or different to the parent who participated. For example, during one parent interview, the parent's spouse was in the room during the interview, and even though the spouse had been instructed not to interject or try to influence the responses of the parent participating in the interview, there was one moment in which the following exchange took place:

RESEARCHER:	¿Cree que no comer saludable causó que Javier se enfermara?
PARENT:	¿De cáncer? <long pause> No estoy segura que comidas causan cáncer. <laughs>
PARENT'S PARTNER:	<Look of surprise. Begins nodding head yes> *Whispers* All the meat.
PARENT:	Ay no tanto. <shakes head no and laughs>
RESEARCHER:	Entonces, ¿diría un sí o un no?
PARENT:	Sí. <laughs>
RESEARCHER:	*Do you think that not eating healthy caused Javier to get sick?*
PARENT:	*From cancer? <long pause> I'm not sure what foods cause cancer. <laughs>*
PARENT'S PARTNER:	*<Look of surprise. Begins nodding head yes> *Whispers* All the meat.*
PARENT:	*Ah not really. <shakes head no and laughs>*
RESEARCHER:	*So, would you say yes or no?*

PARENT: *Yes. <laughs>*

In this example, both parents seem surprised at the other parent's response. As such, it is not known if part of the reason in the current study that child responses to some of the questions show different patterns than the parent responses because the child has multiple informants on these subject matters.

Sixth, one of the cognitive measures used to measure analytic reasoning, the CRT-D, did not end up being usable for the current sample. Three of the seven questions elicited more "other" responses from children than intuitive responses, and there was very low reliability for the remaining four questions. It may be that the questions included in this measure are not appropriate for child in this age range, as the initial studies used to create the scale had children ranging from 5- to 12-years-old, with an average age of 8-years (Young et al., 2018; Young & Shtulman, 2020; in press). In fact, several children explicitly made comments about not being able to do math yet when asked questions such as, "If there are 3 apples and you take away 2, how many do you have?" Interestingly, the incorrect/intuitive response is the one that requires any type of math knowledge (specifically, subtraction), whereas the correct/analytic response does not. Additionally, this set of questions was asked near the end of the child interview, which were on average, 1-hour 22-minutes. Therefore, the number of "other" responses may have also been due to child's cognitive fatigue. That said, the measure also did not work well for the adult sample in the current study, as the reliability was also quite low for the parents.

Future Directions

There are several possible, exciting directions for future work within this line of research – both in running additional planned analyses for the data that was already collected as well as entire new studies.

Planned Future Analyses for Current Study

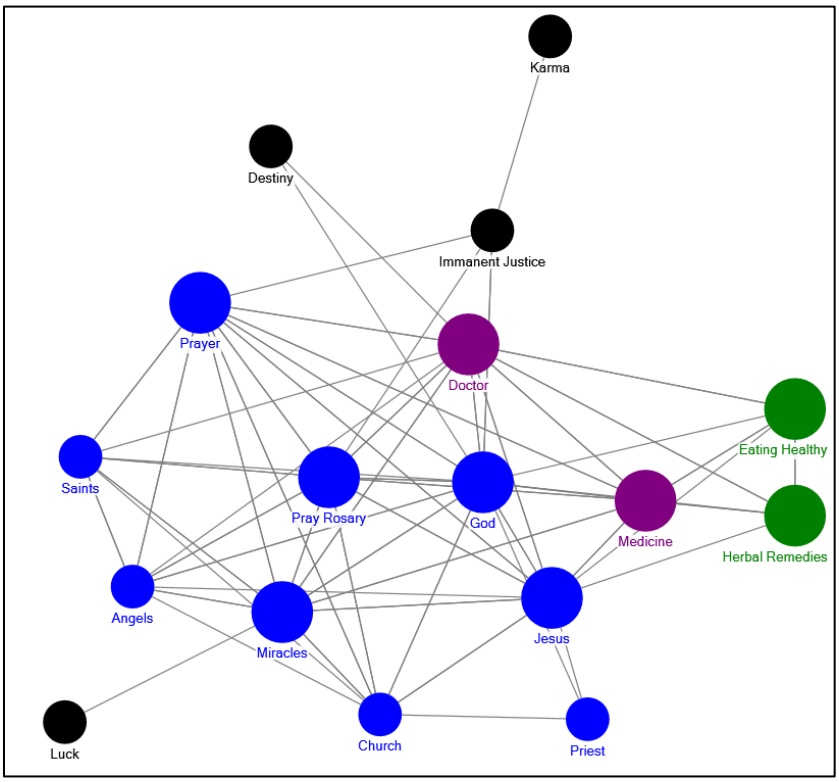
Co-Existence in Causal Explanations – A Bottom-Up Approach. Although the current analyses focused on the individual causes in isolation, as previously highlighted, individuals may entertain the idea of multiple causes as working together suggesting a co-existence in their causal reasoning (e.g., Legare & Shtulman, 2018; Woolley et al., 2011). To test this, children and parents were also each invited to share a narrative story of how the causes worked together or separately to cause each illness. For instance, at the end of each story completion task, the researcher would tell the participant, "So you told me that X, Y, and Z would all cause Clara to get sick with a cold. Can you tell me a story about how these caused Clara to get sick with a cold? Do they all work together or are there some that work together and some that work separately from the others?"

Therefore, one way of assessing the co-existence of the explanatory systems in participants' reasoning about the causes and treatments of illness would be to assess which causes the participant thinks works together and which ones work separately from one another. As previously highlighted, Legare and colleagues (2012) convey three ways in which natural causes may co-exist with supernatural causes: (1) target-dependent, (2) synthetic, or (3) integrative. Alternatively, a different way of assessing co-existence is through building a social network model to analyze if children and parents tend to group

natural causes as separate nodes from supernatural causes, or if there is a connection between the two. For example, see Figure 14 as a sample of what this might look like.

Figure 14

Sample of Using a Social Network Analysis to Analyze Co-Existence in Causal Explanations – Causal Mechanisms for the Treatment of Cancer.



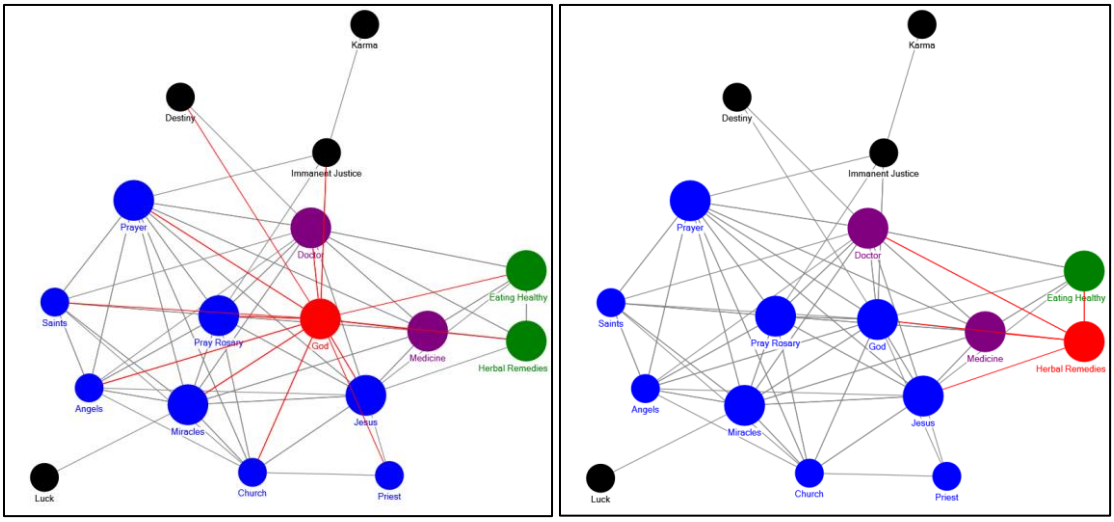
Note. Folk causes are shown in green, scientific causes are shown in purple, religious causes are shown in blue, and supernatural causes are shown in black.

In this example, the individual endorsed the following 17 causes as being able to causally treat cancer: (1) herbal remedies, (2) eating healthy, (3) medicine, (4) a doctor,

(5) God, (6) Jesus, (7) an angel, (8) saints, (9) a priest, (10) miracles, (11) prayer [*orar*], (12) praying the rosary [*rezar el rosario*], (13) attending church, (14) luck, (15) destiny, (16) karma, and (17) immanent justice. However, the relationships among each cause varies. For instance, in Figure 15, the nodes and connections for God and for herbal remedies are highlighted in red, demonstrating that the individual connected God to far more other causes (n = 13) than what they connected herbal remedies to (n = 3).

Figure 15

Sample of Using a Social Network Analysis to Analyze Co-Existence in Causal Explanations – Nodes for God and Herbal Remedies Highlighted.



Note. Folk causes are shown in green, scientific causes are shown in purple, religious causes are shown in blue, and supernatural causes are shown in black. The image on the left shows the node for "God" as well as all of the connections to this node in red. The image on the left shows the node for "Herbal Remedies" as well as all of the connections to this node in red.

Instead of taking a top-down factor analysis type of approach to assess the structure of the data (e.g., using structural equation modeling or coding participant explanations into target-dependent, synthetic, or integrative), a social network analysis would allow the relationships between each specific causal mechanism to be done from the participant's perspective. This could allow analyses on if individuals judge all natural causes as working together and all supernatural causes as working together, or if there are also sub-groups within a given domain.

Source Monitoring of Testimony. Source monitoring refers to the ability to correctly identify the source from which an individual received the information. For example, as highlighted above, children rely on some sort of testimony to receive information about invisible, non-observable concepts, such as God, Santa Clause, or the Tooth Fairy (Harris & Koenig, 2006; Harris et al., 2006). However, just because the child receives information from a source about an intangible agent and then assimilates the information into their current mental representation (i.e., concept) of the intangible agent, that does not mean children will remember where they received the original information. In fact, research indicates young children are quite bad at source monitoring. For example, one study found that only 25% of 4- to 5-year-olds and 45% of 7- to 9-year-olds were able to correctly cite how they factual knowledge on science, math, and history materials (Bemis et al., 2011), and in another study in which children were asked what "learning" meant, only about 40% of 4- to 5-year-olds said that it was a process resulting in a change of knowledge and they mostly just described what types of things could be learned (like math) and not how they learned it (Sobel & Letourneau, 2015).

Similarly, a study examining if children cite sources for how they know about different attributes of God found that children only cited any type of source 12.99% of the time, with self being the most frequent source (7.65%) (Lesage & Richert, 2017a). Because of this, further exploratory analyses were done to investigate if children who passed a Theory of Mind (ToM) task cited more sources of knowledge than children who failed. ToM refers to the ability to distinguish one's own thoughts, feelings, goals, motivations, and desires from another individual's (Wellman & Liu, 2004). Results indicated children who failed ToM (i.e., the child attributed infallible knowledge to naïve individuals) did cite themselves slightly more frequently than children who passed ToM (i.e., the child attributed limited knowledge to naïve individuals). Moreover, children who passed ToM tended to cite persons (family members and non-family members) as a source of knowledge, whereas children who failed ToM tended to cite religion or other types of sources (e.g., read it in a book) (Lesage & Richert, 2017b). This may be because 3- to 7-year-old children might judge the ability to describe a concept as more important than the ability to state the source for how they learned a concept (Sobel & Letourneau, 2015).

That being said, in thinking about the role of source monitoring with causal reasoning, children's ability to correctly identify potential sources of information – both past or previous sources (e.g., my mom told me that) and when thinking about sources to go when information is needed (e.g., I would ask my mom) – might relate to whether or not they endorse specific causal mechanisms. For example, Medin and Bang (2014) reviewed the results from an intervention study with Native American children in which

the children were provided with a culturally-based science education. Specifically, the intervention focused on providing the children with a combination of indigenous science materials and scientific-based materials. For example, research on what is considered to be “alive” (e.g., rocks, water, plants, animals) has shown that Native American children shift their categorization, depending on the context. Specifically, if the children are asked what an elder would say is alive, they report that rocks and water are alive (as taught within the indigenous community) as well as plants and animals; but if the children are asked what a science teacher would say is alive, they report only plants and animals. This demonstrates not only the role of cultural context in shaping cognitive development, but also children’s ability to successfully navigate and respond with what is considered the “correct” response, depending on the context.

Because of this, Medin and Bang (2014) developed a summer science program that provided Native American children with both types of explanations. Before beginning the program, children were given a pre-test that included questions such as, “How do you learn about science?” Children’s responded that they learned about science from textbooks, their science teacher was the one who taught them science, and an individual could learn some scientific information from TV, but a science textbook at school was better. There was no mention of the indigenous culture as a source for learning about science. At the end of the summer program, children were interviewed once again. However, this time, children reported that they learned about science from their elders, mom, and teachers. There was a change from thinking that science could only be learned in the classroom at school to now identifying several possible sources of

that could teach them about science (Medin & Bang, 2014).

Therefore, it might be that children who cite several sources of knowledge for knowing if different causal mechanisms would/would not work are more likely to endorse co-existing causal mechanisms because they connect several different sources of information. For example, for possible of causes of colds, it might be that the teacher told the child germs cause colds, the parent told the child cold weather causes colds, and the Bible told the child demons cause illnesses (and a common cold is one type of illness). If the child trusts these sources of information and decides to endorse them all, then the child might give a co-existing explanation for the causes of colds. However, research on causal reasoning (generally) and causal reasoning on biological illnesses (specifically) has not focused on source monitoring as a potential factor.

Even though studies indicate young children are not very good at it, if children (and adults) are able to cite sources, are they more likely to endorse multiple types of causes? Parent and child open-ended responses from the recall task, as well as off-handed remarks during the directed prompt task, will be also coded for citing: a person (parent, family member, self, other), religion (God, religious text), other, don't know, and no source (see Lesage & Richert, 2017a; 2017b). Results will be reported as descriptives of how many sources children cite for each causal mechanism as well as the frequency of each type of source. Additionally, the number of sources cited will be used to predict the number of unique causes endorsed overall, after controlling for child age and executive function skills (inhibition and attention).

Use of Social Cognitive Skills in Causal Reasoning. One additional social-

cognitive skill that was measured in the current study was counterfactual reasoning. This is the ability to imagine an alternative to reality (Guajardo & Turley-Ames, 2004). It may be related to children's endorsement of different causal explanations because children who do well in counterfactual reasoning might also consider more potential causes for an event (Harris et al., 1996). That is, counterfactual reasoning may be related to one's ability to think about causes that would allow for the event to happen as well as causes that would not allow the event to happen. Once this set of data is coded, Independent Samples T-Tests will be done to assess if there are differences in counterfactual reasoning skills for children in the different clusters that emerged.

Things to Consider in Future Study

There are also a number of additional factors that could be manipulated in future studies as well.

Emphasis on Proximity of the Cause. Given that participants in the current study did not really differentiate in their reasoning when asked *how* and *why,* future research should consider really emphasizing the difference between the two questions. For example, researchers could ask, "WHY Violeta – out of everyone in the whole world? Why her??" This may be more likely to prompt the distal causes that have been demonstrated in other research (e.g., Evans-Pritchard, 1973). Alternatively, there are numerous other ways to drive the distinction between *how* and *why*. One way would be to do a rank ordering of the causes. "Which of these is most likely to have caused it?" Or, the participant could be asked what the probability of each cause is to have either caused or treated the illness instead of just a yes/no response. Another way would be to have

participants actually build a causal chain or solution chain with pictures of the causes endorsed, with the ability to stack multiple causes within one step of the process and draw arrows of how causes are connected. Finally, a third way could be to do a counterfactual approach to separate out necessary causes and sufficient causes. That is, "Would Clara still have gotten sick with the cold if she had not gone outside without a jacket on?" If yes, it would be considered a necessary cause, but if no, it would only be sufficient.

Length of Illness. One thing to consider is if changing the length of the illness to very short (e.g., 1 hour) or very long time periods (e.g., having a cold for 5-years) invokes more supernatural explanations. For example, some studies have indicated that the longer that an illness lasts, the more likely it is that it might be diagnosed as being a result of a supernatural cause (Schreiber & Homiak, 1981).

Use of [Other] Social Cognitive Skills in Causal Reasoning. Theory of Mind (ToM) is the ability to attribute mental states (knowledge, motivation, emotions) to others (Wellman & Liu, 2004). Because linguistic input is not always reliable, children also have to use social-cognitive tools, such as ToM (Sabbagh & Baldwin, 2001), to inform their decision of whether or not to incorporate the testimony into their concepts or to be skeptical of the testimony and not use it. Moreover, ToM may be related to the ability of assigning causal responsibility. If children can attribute goals and desires to other agents, they may be also able to attribute cause to those agents as well.

Social Learning Processes. Testimony (verbal and written) is just one way of transmitting cultural information between individuals. Observation, sharing, and

participating are three additional ways in which causal reasoning, and explanatory systems (folk, scientific, and supernatural causal reasoning), can be transmitted from parents and other community members to children (Gauvain & Nicolaides, 2015). According to Gauvain and Nicolaides (2015), observing involves the act of attending to another individual, sharing involves purposefully passing information from one individual to another, transmitting involves a more experienced or knowledgeable individual teaching a less experienced or novice individual, and participating involves purposefully partaking in a cultural activity to learn something.

Gauvain and Nicolaides' (2015) framework of social learning processes (i.e., observing, sharing, transmitting, and participating) is similar to the three traditions of learning Rogoff and colleagues (2015) proposed: (1) Learning by Observing and Pitching In (LOPI), (2) Assembly-Line Instruction, and (3) Guided Repetition, or Recitation. For instance, LOPI is a form of learning in which children can learn by just "being there" and observing daily routines and practices. That is, children active observe and "listen in" during ongoing community activities and then later contributing when they are ready. For example, in Rogoff's work with the Mayan population in Guatemala, young girls used this method to learn how to weave. This form of transmission of explanatory systems might be more appropriate for cultures that do not encourage the type of parent-child interactions that are common in the U.S. (e.g., children frequently asking their parents questions), and instead, children participate in their parents' daily community life (e.g., helping out with child care from a young age). Future studies should consider these forms of transmission in addition to the more traditional, testimony-based approaches.

Closing Remarks

To summarize the main findings of this dissertation study, first, children and adults do not seem to differentiate between *how* and *why* when reasoning causally about the causes and treatments of illnesses, and they do not provide more distal and supernatural causes when asked *why* (e.g., why me??) compared to *how*. Second, Catholic, Mexican-American children and adults tend to endorse primarily natural causes (folk, scientific) as the causes of illnesses, but they endorse both natural (folk, scientific) and supernatural (religious, non-religious) causes to treat illnesses – with more supernatural causes endorsed for cancer than the common cold. Importantly, supernatural causes are endorsed alongside natural cause, and not necessarily in place of them. Third, children do not just endorse any cause of an illness – even if they do not know what the illness is (e.g., cancer). Instead, the causes children do endorse are the ones that are relevant to their cultural upbringing. Fourth, bilingual, Mexican-American children endorse different explanations for the treatments of illness depending on the language they are interviewed in, with children interviewed in Spanish endorsing both natural and supernatural causes to treat the common cold and cancer, but children interviewed in English primarily endorsing natural causes to treat both illnesses. But there was no difference in interview language for children's endorsements of the causes of illness in the directed prompt task, and there was no difference in interview language for parents' and children's open-ended explanations in the recall task.

Finally, parents matter and help actively shape the child's environment by choosing the appropriate social partners or communities for children to learn from and by

transmitting the culturally relevant information in their own explanations. The majority of parents in both interview languages thought that they themselves should be the primary person to teach children about both illnesses. However, parents thought children should also learn about the causes of the common cold from older siblings or older cousins, the educational community, and the medical community – but not from friends or from the religious community. Similarly, parents thought children should learn about the causes of cancer from the educational community and the medical community – but not from older siblings or older cousins, friends, or from the religious community. Finally, on average, parents said that children in general should be at least around the age of 3.3-years-old to learn about the common cold, but children should wait until about 8.1-years-old to learn about cancer.

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Appendix A: Child Interview Survey

English Version

Section A: Real/Not Real Sorting Task for Causal Mechanisms

First I have an activity for us to do.

Bring out large sheets of paper title "Real" and "Not Real" and place them beside each other, in front of the child.

I am going to show you some pictures and I want to know if you think the things in the pictures are real or not real.

If you think it is real, we are going to place it on this paper (*point/tap on Blue sheet "Real"*)**.**

If you think it is Not Real, we are going to place it on this paper (*point/tap on Red sheet "Not Real"*)**.**

There's no right or wrong answer. I just want to know what you think! Are you ready?"

Do Sorting Task

Clear off table. Move the items in the "Not Real" pile out of site. Move the items in the "Real" pile off to side. Will use only the "real" ones in the vignettes/story task.

Section B: Counterfactual Reasoning – Part 1

Note: The iPad will randomize the order of these two questions

1	**Now, imagine that your family is having a party. For the special event, you put on your really nice clothes. At the party, you eat ice cream, drink red punch, and play games. You are very careful to keep your clothes nice and clean. What could you have done so your clothes would have gotten dirty?** [*Prompt*: ***Is there anything else you could have done so that your clothes would have gotten dirty?*** *until they say "No"*]
2	**Now I want you to imagine that you are playing outside in a muddy yard. You are thirsty, so you go inside to the kitchen to get a drink of juice. You walk through the mud, you step over the door mat, and you keep your shoes on. Because your shoes are muddy, you get dirt all over the floor. What could you have done so the kitchen floor would not have gotten dirty?** [*Prompt*: ***Is there anything else you could have done so that the kitchen floor would not have gotten dirty?*** *until they say "No"*]

Section C: Flanker

Now, we are going to play a game on an iPad!

Follow instructions from the NIH Toolbox for the Flanker Task.

Section D: Why vs How people get Sick

Note: The iPad will randomize the order of how and why

Now I have a few questions for you about sickness.

3	**Why do people get sick?** [*Prompt*: ***Is there any other reason why people get sick?*** *until they say "No"*]
4	**How do people get sick?** [*Prompt*: ***Is there any other way in which people get sick?*** *until they say "No"*]

Now I'm going to tell you some stories and ask you a few more questions.

Section E: Sickness 1: Cold

5	**First, what do you think it means to be sick with a cold?** [*If child doesn't know how to answer, say, "If someone is sick with a cold, what does that mean? What types of things are they sick with?"*] [*Prompt with "**Anything else?**" until they say "No"*] **Have you ever heard of someone being sick with a cold before?** [*If child says no, ask, "When I say the word "cold," what does that mean? What do you think of?"*]

*****Bring out Picture of Character Sick with Cold – Gender Match to Child (Martin = Boy, Clara = Girl)*****

Well this is Martin/Clara. Clara is sick with a cold. Clara has a runny nose and blows her nose a lot. (*Point out on picture*) **Do you see here that Clara is sick with a cold?** (*Point to picture*)
Set picture down in front of child

Note: The iPad will randomize the order of how and why

6	**How do you think Clara got sick with a cold?** [*If the answer is one of the causal mechanism drawings, place it beside the picture. Otherwise, write answer down on blank note card and place beside the*

	picture] AND [*Prompt with "***Is there any other <u>way</u> Clara could have gotten a cold?***" until they say "No"*]
7	**<u>Why</u> do you think Clara got sick with a cold?** [*If the answer is one of the causal mechanism drawings, place it beside the picture. Otherwise, write answer down on blank note card and place beside the picture*] AND [*Prompt with "***Is there any other <u>reason</u> Clara could have gotten a cold?***" until they say "No"*]

*Then, take *only* the causes that were placed in the "Real" pile, and hold up the illustration of the cause, one at a time, and ask the following:*

8	**Do you think _____ caused Clara to get sick with a cold?** [*Place the "yes's" beside the picture of Clara; place the "no's" off to the side.*]

Once you have finished going through all of the causes, tell the child:

9	**Okay. You told me that _____ would make Clara get a cold. Can you tell me a story of HOW these cause a cold?** [*If child doesn't understand or is struggling, prompt them with:* "**For example, do each of these work together or separate to cause a cold? There's no right or wrong answer. I just want to know what you think. Can you tell me a story of how they cause a cold?**" "***Can you tell me another story?***" (*Child can tell more than 1 story*)]

*After child is done telling stories, if there are any causes the child has NOT mentioned, ask about each, individually, by saying, "**So how does X cause a cold? Does it work with A, B, C, ...?**" and ask if it works with any of the other causes on the table.*

While the picture of the vignette and each of the pictures of the causes are still laid out in front of the child, ask the following:

We just talked about how Clara has a cold and how she got sick with the cold. *Point to picture.*

<u>**Bring out Picture of Character BETTER from the Cold**</u>

Well now, Martin/Clara is all better! Her nose is no longer runny, and she does NOT blow her nose anymore. Clara is no longer sick! Do you see here she is no longer sick?

Set picture down to the right of the first picture, leaving space in-between them.

Note: The iPad will randomize the order of how and why

10	**<u>How</u> do you think Clara got better?** [*If the answer is one of the causal mechanism drawings, place it beside the picture. Otherwise, write answer down on blank note card and place beside the picture*] AND [*Prompt with "***Is there any other <u>way</u> Clara could have gotten better?***" until they say "No"*]
11	**<u>Why</u> do you think Clara got better?** [*If the answer is one of the causal mechanism drawings, place it beside the picture. Otherwise, write answer down on blank note card and place beside the picture*] AND [*Prompt with "***Is there any other <u>reason</u> Clara could have gotten better?***" until they say "No"*]

*Then, take *only* the causes that were placed in the "Real" pile, and hold up the illustration of the cause, one at a time, and ask the following:*

12	**Do you think _____ caused Clara to get better?** [*Place the "yes's" between the two pictures of Clara; place the "no's" off to the side.*]

Once you have finished going through all of the causes, tell the child:

13	**Okay. You told me that _____ would make Clara better. Can you tell me a story of HOW these would cause someone to get better from a cold?** [*If child doesn't understand or is struggling, prompt them with:* "**For example, do each of these work together or separate to cause someone to get better from a cold? There's no right or wrong answer. I just want to know what you think. Can you tell me a story of how they cause someone to get better from a a cold?**" "***Can you tell me another story?***" (*Child can tell more than 1 story*)]

*After child is done telling stories, if there are any causes the child has NOT mentioned, ask about each, individually, by saying, "**So how does X cause someone to get better from a cold? Does it work with A, B, C, ...?**" and ask if it works with any of the other causes on the table.*

Section F: Vocab – English

Now, we are going to play another game on the iPad!

Follow instructions from the NIH Toolbox for the Vocab Test in English.

Section G: Sickness 2: Cancer

Now I'm going to tell you some more stories and ask you a few more questions.

14	**First, what do you think it means to be sick with cancer?** [*If they don't know how to answer, say, "If someone is sick with cancer, what does that mean? What types of things are they sick with?"*] [*Prompt with "**Anything else?**" until they say "No"*] **Have you ever heard of someone being sick with cancer before?** [*If child says no, ask, "When I say the word "cancer," what does that mean? What do you think of"*]

*****Bring out Picture of Character Sick with Cancer*****

Gender Match to Child (Javier = Boy, Violeta = Girl)**

Well this is Javier/Violeta. Violeta is sick with cancer. Violeta has a lot of pain, and she can't eat very much food. (*Point out on picture*) **Do you see here that Violeta is sick with cancer?** (*Point to picture*)

Set picture down in front of child

Note: The iPad will randomize the order of how and why

15	**<u>Why</u> do you think Violeta got sick with cancer?** [*If the answer is one of the causal mechanism drawings, place it beside the picture. Otherwise, write answer down on blank note card and place beside the picture*] AND [*Prompt with "***Is there any other <u>reason</u> Violeta could have gotten cancer?***" until they say "No"*]
16	**<u>How</u> do you think Violeta got sick with cancer?** [*If the answer is one of the causal mechanism drawings, place it beside the picture. Otherwise, write answer down on blank note card and place beside the picture*] AND [*Prompt with "***Is there any other <u>way</u> Violeta could have gotten cancer?***" until they say "No"*]

*Then, take *only* the causes that were placed in the "Real" pile, and hold up the illustration of the cause, one at a time, and ask the following:*

17	**Do you think _____ caused Violeta to get sick with a cold?** [*Place the "yes's" beside the picture of Violeta; place the "no's" off to the side.*]

Once you have finished going through all of the causes, tell the child:

18	**Okay. You told me that _____ would make Violeta get cancer. Can you tell me a story of HOW these cause cancer?** [*If child doesn't understand or is struggling, prompt them with:* "**For example, do each of these work together or separate to cause cancer? There's no right or wrong answer. I just want to know what you think. Can you tell me a story of how they cause cancer?**" "***Can you tell me another story?***" (*Child can tell more than 1 story*)]

*After child is done telling stories, if there are any causes the child has NOT mentioned, ask about each, individually, by saying, "**So how does X cause cancer? Does it work with A, B, C, ...?**" and ask if it works with any of the other causes on the table.*

While the picture of the vignette and each of the pictures of the causes are still laid out in front of the child, ask the following:

We just talked about how Violeta has cancer and how she got sick with cancer. *Point to picture.*

*****Bring out Picture of Character BETTER from Cancer*****

Well now, Javier/Violeta is all better! The pain is all gone, and now she can eat food again. Violeta is no longer sick! Do you see here she is no longer sick?

Set picture down to the right of the first picture, leaving space in-between them.
Note: The iPad will randomize the order of how and why

19	**<u>Why</u> do you think Violeta got better?** [*If the answer is one of the causal mechanism drawings, place it beside the picture. Otherwise, write answer down on blank note card and place beside the picture*] AND [*Prompt with "***Is there any other <u>reason</u> Violeta could have gotten better?***" until they say "No"*]
20	**<u>How</u> do you think Violeta got better?** [*If the answer is one of the causal mechanism drawings, place it beside the picture. Otherwise, write answer down on blank note card and place beside the picture*] AND [*Prompt with "***Is there any other <u>way</u> Violeta could have gotten better?***" until they say "No"*]

*Then, take *only* the causes that were placed in the "Real" pile, and hold up the*

illustration of the cause, one at a time, and ask the following:

21	**Do you think _____ caused Violeta to get better?** [*Place the "yes's" between the two pictures of Violeta; place the "no's" off to the side.*]

Once you have finished going through all of the causes, tell the child:

22	**Okay. You told me that _____ would make Violeta better. Can you tell me a story of HOW these would cause someone to get better from cancer?** [*If child doesn't understand or is struggling, prompt them with:* "**For example, do each of these work together or separate to cause someone to get better from cancer? There's no right or wrong answer. I just want to know what you think. Can you tell me a story of how they cause someone to get better from a cancer?**" "***Can you tell me another story?***" (*Child can tell more than 1 story*)]

*After child is done telling stories, if there are any causes the child has NOT mentioned, ask about each, individually, by saying, "**So how does X cause someone to get better from cancer? Does it work with A, B, C, ...?**" and ask if it works with any of the other causes on the table.*

Section H: Counterfactual Reasoning – Part 2

Note: The iPad will randomize the order of the two questions

So now I want you to imagine something.

23	**Now, imagine that you are walking down the street and you see your friend on the other side. You want to get your friend's attention, so you yell out their name. Because the street is very busy and loud, your friend doesn't hear you and keeps walking. What could you have done so that you could have gotten your friend's attention?** [*Prompt*: ***Is there anything else you could have done so that you would have gotten your friend's attention?*** *until they say "No"*]
24	**Now, imagine that you are coloring a tree with colored pencils. You need to color the leaves, so you use the green colored pencil. You start coloring the leaves, you press down very hard, and you break the tip of the pencil. Because you pressed so hard, the pencil broke, and you can't finish the picture. What could you have done so you would have colored the rest of the tree?** [*Prompt*: ***Is there anything else you could have done so that you would have colored the rest of the tree?*** *until they say "No"*]

Section I: Understanding of Biological Phenomena

Note: The iPad will randomize the order of the questions

Now I have a few questions for you about humans.

25	**Can a human grow?**	Yes	No	Don't Know
26	**Can a human fly?**	Yes	No	Don't Know
27	**Is a human a living thing?**	Yes	No	Don't Know
28	**Does a human have a heart?**	Yes	No	Don't Know
29	**Is a dog a living thing?**	Yes	No	Don't Know
30	**Can a human feel pain if hit with a stick?**	Yes	No	Don't Know
31	**Is a cloud a living thing?**	Yes	No	Don't Know
32	**Can a human feel bored?**	Yes	No	Don't Know
33	**Can a human turn into a cat?**	Yes	No	Don't Know
34	**Does a human have bones?**	Yes	No	Don't Know
35	**Is a human alive?**	Yes	No	Don't Know
36	**Can a human feel lonely?**	Yes	No	Don't Know
37	**Is a tree a living thing?**	Yes	No	Don't Know
38	**Can a human breathe?**	Yes	No	Don't Know
39	**Does a human have a brain?**	Yes	No	Don't Know
40	**Can a human die?**	Yes	No	Don't Know
41	**Can a human become invisible?**	Yes	No	Don't Know
42	**Can a human feel coldness?**	Yes	No	Don't Know
43	**Can a human lift a house?**	Yes	No	Don't Know

Section J: CRT-D

So now we are going to play a game! I'm going to ask you some questions and you just answer as best as you can. Okay?

Note: The iPad will randomize the order of the questions. Ask each question as an open-ended question and circle the child's response

44	**If you're running a race and you pass the person in second place, what place are you in?**		
	1st Place	2nd Place	Other:

45	**Who makes Christmas presents at the North Pole?**		
	Santa	Elves	Other:

46	**A farmer has 5 sheep. All but 3 run away. How many are left?**		
	2 Sheep	3 Sheep	Other:

47	**If there are 3 apples and you take away 2, how many do you have?**		
	1 Apple	2 Apples	Other:

48	**What do cows drink?**		
	Milk	Water	Other:

49	**What weighs more: One pound of rocks or one pound of feathers?**		
	Rocks	Weigh the Same	Other:

50	**What hatches from a butterfly egg?**		
	Butterfly	Caterpillar	Other:

51	**Emily's father has three daughters. The first two are named Monday and Tuesday. What is the third daughter's name?**		
	Wednesday	Emily	Other:

52	**Anna is playing foursquare with her three friends: Eeny, Meeny, and Miny. Who is the fourth player?**		
	Mo	Anna	

Section K: Prayer

Okay now I have a few questions about prayer and then we are going to play another game!

Note: For each question, ask "Yes/No" first, and then ask child about certainty

53	**Have you ever prayed before?**				
No, Really Sure	No, Little Sure	Don't Know	Yes, Little Sure	Yes, Really Sure	

Only ask the following if child says they HAVE prayed before:

54	**How often do you pray?**
55	**Who do you pray with?**

56	**Do you usually pray alone or with other people?**		
57	**What types of things do you pray for?** [*Prompt with, "Anything else?" until child says "No"*]		
58	**Does God answer your prayers?**		
	No Never	Yes Sometimes	Yes Always
58a	*If YES:* **Why does God answer your prayers?** **How do you know God answers your prayers?**		
58b	*If NO:* **Why doesn't God answer your prayers?** **How do you know God does NOT answer your prayers?**		
59	**Does what you pray for end up happening in real life?**		
	No Never	Yes Sometimes	Yes Always
59a	*If YES:* **Why does what you pray for end up happening in real life?**		
59b	*If NO:* **Why doesn't God answer your prayers?** **Why doesn't what you pray for end up happening in real life?**		

60	**Have you ever prayed the rosary before?**			
No, Really Sure	No, Little Sure	Don't Know	Yes, Little Sure	Yes, Really Sure

Only ask the following if child says they HAVE prayed rosary before:

61	**How often do you pray the rosary or Hail Mary?**		
62	**Who do you pray the rosary or Hail Mary with?**		
63	**Do you usually pray alone or with other people?**		
64	**When praying the rosary, Hail Mary, or structured prayers like the Lord's prayer, do those types of prayers come true?**		
	No Never	Yes Sometimes	Yes Always
64a	*If YES:* **How do you know those types of prayers come true?**		
64b	*If NO:* **How do you know those types of prayers do NOT come true?**		

Ask the following <u>even if child has never prayed before</u>:

65	**Do prayers come true?**		
	No Never	Yes Sometimes	Yes Always
65a	*If YES:* **How do you know prayers come true?**		
65b	*If NO:* **How do you know prayers do NOT come true?**		
66	**Does prayer have an effect on the real world?** (*e.g., the biological or physical world*)		
	No Never	Yes Sometimes	Yes Always
66a	*If YES:* **How does prayer affect the real world?**		
66b	*If NO:* **Why doesn't prayer affect the real world?**		
67	**If you ask someone else, like your family or friends, to pray for you or your family, what types of things do you ask them to pray for?** [*Prompt with "Anything else?" until child says "No"*]		
68	**Do you go to mass or to church?**		
69	**How often do you go to mass or to church?**		

Section L: Vocab – Spanish

Now, we are going to play one last game on the iPad!

<u>Follow instructions from the NIH Toolbox for the Vocab Test in Spanish.</u>

Section M: Conclusion

Guess what? We are all done!! Thank you so much for answering all of my questions!! Do you have any questions for me?

This was the child interview for [#_____] on [*Date* _____].
This interview was done by [*Name* _____].

Spanish Version

Section A: Real/Not Real Sorting Task for Causal Mechanisms

"Ahora tengo una actividad para que hagamos."
Bring out large sheets of paper title "Real" and "Not Real" and place them beside each other, in front of the child.
"Te voy a mostrar unas fotos y quiero saber si tú crees que las cosas en las fotos son reales o no son reales.

Si crees que es real, vamos a ponerlo en este papel (apunta/toca en "real").

Si crees que no es real, vamos a ponerlo en este papel (apunta/toca "no es real").

No hay respuesta incorrecta. ¡Sólo quiero saber qué crees! ¿Estás lista?
Do Sorting Task

Clear off table. Move the items in the "Not Real" pile out of site. Move the items in the "Real" pile off to side. Will use only the "real" ones in the vignettes/story task.

Section B: Counterfactual Reasoning – Part 1

Note: The iPad will randomize the order of these two questions

1	**"Ahora imagina que tu familia está teniendo una fiesta. Para el evento especial, te pones tu ropa buena. En la fiesta, comes helado, tomas jugo rojo, y juegas. Tienes mucho cuidado para mantener tu ropa buena y limpia. ¿Qué pudieras haber hecho para que tu ropa se hubiera ensuciado?** [*Prompt*: "**¿Qué más pudieras haber hecho para que tu ropa se hubiera ensuciado?"** después de cada respuesta, hasta que el niño/a diga "no."]
2	**"Ahora quiero que imagines que estás jugando afuera. Tienes sed, entonces entras a la cocina para tomar jugo. Caminas entre el lodo, no pisas el tapete, y te dejas los zapatos puestos cuando entras a la casa. Porque tus zapatos están lodosos, dejas tierra por todo el piso. ¿Qué pudieras haber hecho para que no se ensuciara el piso?"** [*Prompt*: ***"¿Qué más pudieras haber hecho para que no se ensuciara el piso?"*** *después de la respuesta inicial, hasta que el niño/a diga "no."*]

Section C: Flanker

Pause recording on iPad (Turns off when doing NIH Toolbox)

Ahora, ¡vamos a jugar con el iPad!

Follow instructions from the NIH Toolbox for the Flanker Task.

Section D: Why vs How people get Sick

Note: The iPad will randomize the order of how and why

"Ahora, tengo unas preguntas acerca de enfermedades."

3	**"¿Por qué se enferman las personas?"** [*Prompt**: "¿Hay alguna otra razón por la cual una persona se enferma**?" until they say "No"*]
4	**"¿Cómo se enferman las personas?"** [*Prompt*: ***"¿Hay alguna otra manera en la cual una persona se enferma?"*** *until they say "No"*]

"Ahora, te voy a contar unos cuentos y hacerte más preguntas."

Section E: Sickness 1: Cold

5	**Primero, ¿qué significa tener un resfriado?** [*If they don't know how to answer, say, "¿Si alguien tiene un resfriado, eso ¿qué significa? ¿Que tipo de síntomas tiene?"*] [*Prompt with **"¿Algo más?"** until they say "No"*] **"Has escuchado de alguien enfermarse de un resfriado antes?"** [*If child says no, ask, "Cuando te digo la palabra 'resfridao,' ¿qué significa? ¿de qué piensas?"*]

*****Bring out Picture of Clara Sick with Cold*****
Gender Match to Child (Martín = Boy, Clara = Girl)**

Esta es Clara/Martín. Clara tiene un resfriado. La nariz le moquea y se la suena mucho. (*Point out on picture*) **¿Puedes ver aquí que Clara tiene un resfriado?** (*Point to picture*)
Set picture down in front of child

Note: The iPad will randomize the order of how and why

6	**¿Cómo crees que Clara se enfermó de un resfriado?** [*If the answer is one of the causal mechanism drawings, place it beside the picture. Otherwise, write answer down on blank note card and place beside the picture*] AND [*Prompt with, **"¿Hay alguna otra manera en que Clara se pudo haber enfermada de un resfriado?"** until they say "No"*]

7	**¿<u>Por qué</u> crees que Clara se enfermó de un resfriado?** [*If the answer is one of the causal mechanism drawings, place it beside the picture. Otherwise, write answer down on blank note card and place beside the picture*] AND [*Prompt with* ***"¿Hay alguna otra <u>razón</u> por qué Clara se pudo haber enfermada de un resfriado?"*** *until they say "No"*]

*Then, take *only* the causes that were placed in the "Real" pile, and hold up the illustration of the cause, one at a time, and ask the following:*

8	**¿Crees que _____ causó que Clara se enfermara de un resfriado?** [*Place the "yes's" beside the picture of Clara; place the "no's" off to the side.*]

Once you have finished going through all of the causes, tell the child:

9	**Me dijiste que ___ podría causar que Clara se enfermara de un resfriado. ¿<u>Me puedes contar un cuento</u> sobre <u>CÓMO</u> estas cosas pueden causar un resfriado?** [*If child doesn't understand or is struggling, prompt them with:* **"¿Por ejemplo, cada uno de estos trabajan juntos o por separado para causar un resfriado? No hay respuesta incorrecta. Sólo quiero saber lo que piensas. ¿Me puedes contar un cuento sobre cómo causan un resfriado?"** ***"¿Me puedes contar otro cuento?"*** (*Child can tell more than 1 story*)

*After child is done telling stories, if there are any causes the child has NOT mentioned, ask about each, individually, by saying, "**Exactmente, ¿CÓMO puede XX causar que alguien se enfermara de un resfriado?** ¿Trabaja con A, B, C, ...?" and ask if it works with any of the other causes on the table.*

While the picture of the vignette and each of the pictures of the causes are still laid out in front of the child, ask the following:

"Acabamos de platicar sobre Clara, que tenía un resfriado y cómo se enfermó de ese resfriado" *Point to picture.*

<u>**Bring out Picture of Clara BETTER from the Cold**</u>

"Bueno, ahora, ¡Clara/Martín ya está mejor! La nariz ya no le moquea, y no se la suena. ¡Clara ya no está enferma! ¿Puedes ver aquí que Clara ya no tiene un resfriado?"

Set picture down to the right of the first picture, leaving space in-between them.
Note: The iPad will randomize the order of how and why

10	**<u>¿Cómo</u> crees que Clara se mejoró?** [*If the answer is one of the causal mechanism drawings, place it beside the picture. Otherwise, write answer down on blank note card and place beside the picture*] AND [*Prompt with* ***"¿Hay alguna otra <u>manera</u> en que Clara se pudo haber mejorada?"*** *until they say "No"*]
11	**<u>¿Por qué</u> crees que Clara se mejoró?** [*If the answer is one of the causal mechanism drawings, place it beside the picture. Otherwise, write answer down on blank note card and place beside the picture*] AND [*Prompt with* **"¿Hay alguna otra <u>razón</u> por qué Clara se pudo haber mejorada?"** *until they say "No"*]

*Then, take *only* the causes that were placed in the "Real" pile, and hold up the illustration of the cause, one at a time, and ask the following:*

12	**¿Crees que _____ causó que Clara se mejorara de un resfriado?** [*Place the "yes's" between the two pictures of Clara; place the "no's" off to the side.*]

Once you have finished going through all of the causes, tell the child:

13	**Bueno. Me dijiste que ___ podría causar que Clara se mejorara de un resfriado.** **¿<u>Me puedes contar un cuento</u> sobre <u>CÓMO</u> estas cosas pueden causar que Clara se mejorara de un resfriado?"** [*If child doesn't understand or is struggling, prompt them with: "*¿Por ejemplo, cada uno de estos trabajan juntos o por separado para causar que una persona se mejorara de un resfriado? No hay respuesta incorrecta. Sólo quiero saber lo que piensas. ¿Me puedes contar un cuento sobre cómo causan que alguien se mejorara de un resfriado?" ***"¿Me puedes contar otro cuento?"*** (*Child can tell more than 1 story*)]

*After child is done telling stories, if there are any causes the child has NOT mentioned, ask about each, individually, by saying, **"Exactmente, ¿CÓMO puede XX causar que alguien se mejorara de un resfriado? ¿Trabaja con A, B, C, ... ?"** and ask if it works with any of the other causes on the table.*

<u>Section F: Vocab – Spanish</u>

¡Ahora, vamos a jugar con el iPad otra vez!

Follow instructions from the NIH Toolbox for the Vocab Test in Spanish.

Section G: Sickness 2: Cancer

Ahora voy a contarte otro cuento y hacerte más preguntas.

14	**¿Qué significa estar enfermo de cáncer?** [*If they don't know how to answer, say, "Si alguien está enfermo de cáncer, eso ¿qué significa? ¿Qué tipo de síntomas tiene?*] [*Prompt with* ***"¿Algo más?"*** *until they say "No"*] **"Has escuchado de alguien enfermarse de cáncer antes?"** [*If child says no, ask, "Cuando te digo la palabra 'cáncer,' ¿qué significa? ¿de qué piensas?"*]

*****Bring out Picture of Character Sick with Cancer*****
Gender Match to Child (Javier = Boy, Violeta = Girl)**

Esta es Violeta/Javier. Violeta está enferma con cáncer. Ella tiene mucho dolor, y no puede comer mucho. (*Point out on picture*) **¿Puedes ver aquí que Violeta está enferma con cáncer?** (*Point to picture*)
Set picture down in front of child

Note: The iPad will randomize the order of how and why

15	**¿Cómo crees que Violeta se enfermó de cáncer?** [*If the answer is one of the causal mechanism drawings, place it beside the picture. Otherwise, write answer down on blank note card and place beside the picture*] AND [*Prompt with "¿Hay alguna otra* ***manera*** *en que Violeta se pudo haber enfermada de cáncer?" until they say "No"*]
16	**¿Por qué crees que Violeta se enfermó de cáncer?** [*If the answer is one of the causal mechanism drawings, place it beside the picture. Otherwise, write answer down on blank note card and place beside the picture*] AND [*Prompt with "¿****Hay alguna otra razón por qué*** *Violeta se pudo haber enfermada de cáncer?" until they say "No"*]

*Then, take *only* the causes that were placed in the "Real" pile, and hold up the illustration of the cause, one at a time, and ask the following:*

17	**¿Crees que _____ causó que Violeta se enfermara de cáncer?** [*Place the "yes's" beside the picture of Violeta; place the "no's" off to the side.*]

Once you have finished going through all of the causes, tell the child:

18	**Me dijiste que ___ podría causar que Violeta se enfermara de cáncer. ¿<u>Me puedes contar un cuento</u> sobre <u>CÓMO</u> estas cosas pueden causar cáncer?"** [*If child doesn't understand or is struggling, prompt them with: "***¿Por ejemplo, cada uno de estos trabajan juntos o por separado para causar cáncer?** ***No hay respuesta incorrecta. Sólo quiero saber lo que piensas. ¿Me puedes contar un cuento sobre cómo causan* cáncer*?"****"*** ***"¿Me puedes contar otro cuento?"*** (*Child can tell more than 1 story*)]

*After child is done telling stories, if there are any causes the child has NOT mentioned, ask about each, individually, by saying, "**Exactmente, ¿CÓMO puede XX causar que alguien se enfermara de cáncer? ¿Trabaja con A, B, C, ...** ?"and ask if it works with any of the other causes on the table.*

While the picture of the vignette and each of the pictures of the causes are still laid out in front of the child, ask the following:

Acabamos de platicar de Violeta, que tenía cáncer y cómo se enfermó de cáncer. *Point to picture.*

<u>**Bring out Picture of Character BETTER from Cancer**</u>

"Bueno, ahora, ¡Javier/Violeta ya está mejor! Ya no tiene dolor, y ahora puede comer otra vez. ¡Violeta ya no está enferma! ¿Puedes ver aquí que Violeta ya no tiene cáncer?

Set picture down to the right of the first picture, leaving space in-between them.
Note: The iPad will randomize the order of how and why

19	**<u>¿Cómo</u> crees que Violeta se mejoró?** [*If the answer is one of the causal mechanism drawings, place it beside the picture. Otherwise, write answer down on blank note card and place beside the picture*] AND [*Prompt with* ***"¿Hay alguna otra <u>manera</u> en que Violeta se pudo haber mejorada?"*** *until they say "No"*]
20	**<u>¿Por qué</u> crees que Violeta se mejoró?** [*If the answer is one of the causal mechanism drawings, place it beside the picture. Otherwise, write answer down on blank note card and place beside the picture*] AND [*Prompt with "****¿Hay alguna otra <u>razón</u> por qué Violeta se pudo haber mejorada?****" until they say "No"*]

*Then, take *only* the causes that were placed in the "Real" pile, and hold up the illustration of the cause, one at a time, and ask the following:*

21	**¿Crees que _____ causó que Violeta se mejorara de cáncer?** [*Place the "yes's" between the two pictures of Violeta; place the "no's" off to the side.*]

Once you have finished going through all of the causes, tell the child:

22	**Bueno. Me dijiste que ___ podría causar que Violeta se mejorara de cáncer. 26. ¿Me puedes contar un cuento sobre CÓMO estas cosas pueden causar que Violeta se mejorara de cáncer?"** [*If child doesn't understand or is struggling, prompt them with:* "**"¿Por ejemplo, cada uno de estos trabajan juntos o por separado para causar que una persona se mejorara de cáncer? No hay respuesta incorrecta. Sólo quiero saber lo que piensas. ¿Me puedes contar un cuento sobre cómo causan que alguien se mejorara de cáncer?** ***"¿Me puedes contar otro cuento?"*** (*Child can tell more than 1 story*)]

*After child is done telling stories, if there are any causes the child has NOT mentioned, ask about each, individually, by saying, "**So how does X cause someone to get better from cancer? Does it work with A, B, C, ...?**" and ask if it works with any of the other causes on the table.*

Section H: Counterfactual Reasoning – Part 2

Note: The iPad will randomize the order of the two questions

Ahora quiero que imaginas algo.

23	**"Bueno. Ahora imagina que vas caminando por la calle y ves a tu amigo/a al otro lado. Quieres saludarlo/a, entonces gritas su nombre. Como la calle está muy llena y hay mucho ruido, tu amigo/a no te escucha y sigue caminando. ¿Qué pudieras haber hecho para llamar la atención de tu amigo/a?"** [*Prompt*: ***"¿Qué más pudieras haber hecho para llamar la atención de tu amigo/a?"*** *until they say "No"*]
24	**Ahora imagina que estas pintando un árbol con colores. Tienes que pintar las hojas del árbol entonces usas el verde. Empiezas a pintar, presionas demasiado, y el color se quiebra. Como presionaste mucho, el color se quebró, y no puedes terminar de pintar. ¿Qué hubieras podido hacer para terminar de pintar el resto del árbol?** [*Prompt*: ***"¿Qué más hubieras podido hacer para terminar de pintar el resto del árbol?*** *until they say "No"*]

Section I: Understanding of Biological Phenomena

Ahora tengo unas preguntas sobre humanos.

Note: The iPad will randomize the order of the questions

25	**¿Un humano puede crecer?**	Sí	No	No sé
26	**¿Un humano puede volar?**	Sí	No	No sé
27	**¿Un humano es una cosa viviente?**	Sí	No	No sé
28	**¿Un humano tiene corazón?**	Sí	No	No sé
29	**¿Un perro es una cosa viviente?**	Sí	No	No sé
30	**¿Un humano puede sentir dolor si le pegan con un palo?**	Sí	No	No sé
31	**¿Una nube es una cosa viviente?**	Sí	No	No sé
32	**¿Un humano puede sentirse aburrido?**	Sí	No	No sé
33	**¿Un humano se puede convertir en un gato?**	Sí	No	No sé
34	**¿Un humano tiene huesos?**	Sí	No	No sé
35	**¿Un humano está vivo?**	Sí	No	No sé
36	**¿Un humano puede sentirse solo?**	Sí	No	No sé
37	**¿Un árbol es una cosa viviente?**	Sí	No	No sé
38	**¿Un humano puede respirar?**	Sí	No	No sé
39	**¿Un humano tiene cerebro?**	Sí	No	No sé
40	**¿Un humano puede morir?**	Sí	No	No sé
41	**¿Un humano se puede volver invisible?**	Sí	No	No sé
42	**¿Un humano puede sentir frío?**	Sí	No	No sé
43	**¿Un humano puede levantar una casa?**	Sí	No	No sé

Section J: CRT-D

Voy a hacerte unas preguntas y respóndeme lo mejor que puedas. ¿Bueno?

Note: The iPad will randomize the order of the questions. Ask each question as an open-ended question and circle the child's response

44	**¿Si estas en una carrera y pasas a la persona en segundo lugar, ¿en qué lugar estás?**		
	Primer Lugar	Segundo Lugar	Other:

45	**¿Quién hace los regalos de navidad en el polo norte?**		
	Santa	Elfos	Other:

46	**Un granjero tiene 5 ovejas. Todas menos 3 se van. ¿Cuántas quedan?**		
	2 Ovejas	3 Ovejas	Other:

47	**Si hay 3 manzanas y tomas 2, ¿cuántas tienes?**		
	1 Manzana	2 Manzanas	Other:

48	**¿Qué toman las vacas?**		
	Leche	Agua	Other:

49	**¿Qué pesa más – un kilo de piedras o un kilo de plumas?**		
	Piedras	El Mismo	Other:

50	**¿Qué nace de un huevo de mariposa?**		
	Mariposa	Oruga	Other:

Section K: Prayer

Bueno, tengo algunas preguntas acerca de orar, antes de que juguemos otra vez.
Note: For each question, ask "Yes/No" first, and then ask child about certainty

53	**¿Has orado antes?**				
No – Muy Seguro	No – Un Poco Seguro	No Sé	Sí – Un Poco Seguro	Sí – Muy Seguro	

Only ask the following if child says they HAVE prayed before:

54	**¿Con qué frecuencia oras?**		
55	**¿Con quién oras?**		
56	**Normalmente, ¿oras solo u oras con otras personas?**		
57	**Cuando oras, ¿qué tipo de cosas pides?** [*Prompt with "¿Algo más?" until they say "No"*]		
58	**¿Dios responde tus oraciones?**		
	No – Nunca	Sí – A veces	Sí – Siempre
58a	*IF YES*: **¿Por qué las responde Dios?**		

	¿Cómo sabes que Dios las responde?		
58b	*IF NO:* **¿Por qué no las responde Dios?** **¿Cómo sabes que Dios no las responde?**		
59	**¿Lo que pides cuando oras pasa en la vida real?**		
	No – Nunca	Sí – A veces	Sí – Siempre
59a	*If YES:* **¿Por qué?**		
59b	*If NO:* **¿Por qué no?**		

60	**¿Has rezado antes?**				
No – Muy Seguro	No – Un Poco Seguro	No Sé	Sí – Un Poco Seguro	Sí – Muy Seguro	

Only ask the following if child says they HAVE prayed rosary before:

61	**¿Con qué frecuencia rezas el rosario?**		
62	**¿Con quién rezas?**		
63	**Normalmente, ¿rezas solo o rezas con otras personas?**		
64	**Cuando rezas el rosario, el Ave María, u otras oraciones como el Padre Nuestro, ¿esas oraciones se hacen realidad?**		
	No – Nunca	Sí – A veces	Sí – Siempre
64a	*If YES:* **¿Cómo sabes?**		
64b	*If NO:* **¿Cómo sabes?**		

Ask the following <u>even if child has never prayed before</u>:

65	**¿Las oraciones se hacen realidad?**		
	No – Nunca	Sí – A veces	Sí – Siempre
65a	*If YES:* **¿Cómo sabes?**		
65b	*If NO:* **¿Cómo sabes?**		

66	**¿Orar tiene efecto en el mundo real?** (e.j. ¿el mundo físico o biológico?)		
	No – Nunca	Sí – A veces	Sí – Siempre
66a	*IF YES:* **¿Cómo tiene efecto en el mundo real (orar)?**		
66b	*IF NO:* **¿Por qué no tiene efecto en el mundo real (orar)?**		
67	**Si le pides a alguien, como a tu familia o amigos, que oren por ti, ¿qué tipo de cosas les pides?** [*Prompt with "¿Algo más?" until they say "No"*]		
68	**¿Asistes a la misa?**		
69	**¿Con qué frecuencia asistes a la misa?**		

Section L: Vocab – English

¡Ahora vamos a jugar con el iPad una vez más!

Follow instructions from the NIH Toolbox for the Vocab Test in English.

Section M: Conclusion

¡Ya acabamos! ¡Gracias por responder mis preguntas! ¿Tienes preguntas para mí?

Esta fue la entrevista de la niña por número _____.
el [Fecha de la Entrevista] _____ Esta entrevista fue conducida por [First & Last Name] _____.

Appendix B: Parent Online Survey

English Version

Note: This was completed online using a Qualtrics survey. Parents were also able to skip any questions they did not want to answer.

Section A: Child Demographics

We would like to get some basic information about your child.

1	**What is your child's gender?**	Male	Female	Other:
2	**When was your child born? [Month/Day/Year]**			
3	**How would you describe your child's ethnic background or race?** *Please check all that apply and specify any specific county if applicable.*			

Hispanic:	White	Black:	Asian:	Pacific Islander or Native American:	Middle Eastern:	Other:	Decline to Answer

4	**Does your child speak and understand more than 1 language?**	Yes	No
4a	**If your child speaks other language, which languages are they?**		
5	**What is the primary language your child speaks?**		
	English	Spanish	Other: _____

6	**At what age did <u>your child</u> start learning <u>English</u>?**													
0 (since Birth)	6-months	1-year	1.5-years	2-years	3-years	3.5-years	4-years	4.5-years	5-years	5.5-years	6-years	6.5-years	7-years	Not Applicable – My Child has not starts learning English
7	**At what age did <u>your child</u> start learning <u>Spanish</u>?**													
0 (since Birth)	6-months	1-year	1.5-years	2-years	3-years	3.5-years	4-years	4.5-years	5-years	5.5-years	6-years	6.5-years	7-years	Not Applicable – My Child has not starts learning Spanish

8	**How well does your child <u>understand</u> <u>English</u>?**						
	Not well at all 0	1	2	3	4	5	Very Well 6

9	**How well does your child <u>understand</u> <u>Spanish</u>?**						
	Not well at all 0	1	2	3	4	5	Very Well 6

10	**How well does your child <u>speak</u> <u>English</u>?**						
	Not well at all 0	1	2	3	4	5	Very Well 6
11	**How well does your child <u>speak</u> <u>Spanish</u>?**						
	Not well at all 0	1	2	3	4	5	Very Well 6

12	**Does your child read on their own?**					Yes	No
13	*If Yes:* **How well does your child <u>read</u> in <u>English</u>?**						
	Not well at all 0	1	2	3	4	5	Very Well 6
14	*If Yes:* **How well does your child <u>read</u> in <u>Spanish</u>?**						
	Not well at all 0	1	2	3	4	5	Very Well 6

15	**How well does your child <u>write</u> in <u>English</u>?**							
	My child cannot write in English	Not well at all 0	1	2	3	4	5	Very Well 6
16	**How well does your child <u>write</u> in <u>Spanish</u>?**							
	My child cannot write in Spanish	Not well at all 0	1	2	3	4	5	Very Well 6

17	**Typically, what is the % of time your child speaks in <u>English</u>?**									
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
18	**Typically, what is the % of time your child speaks in <u>Spanish</u>?**									
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

19	**Typically, what is the % of time YOU speak to your child in <u>English</u>?**									
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
20	**Typically, what is the % of time YOU speak to your child in <u>Spanish</u>?**									
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

21	**Typically, what is the % of time your child uses <u>English</u> during religious practices (e.g., in home at mass, during religious events)?**									
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

22	**Typically, what is the % of time your child uses <u>Spanish</u> during religious practices (e.g., in home at mass, during religious events)?**										
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

23	**Does your child currently attend school? (Headstart, Preschool, TK (Transitional Kindergarten), Kindergarten, Elementary School)**						
	Yes		No		Other: _____		
23a	*YES:* **What grade is your child currently in?**						
	Headstart	Preschool	TK (Transitional Kindergarten)	Kindergarten	First Grade	Second Grade	Other (*Fill in*)
23b	**Typically, what is the % of time your child uses <u>English</u> at school?**						
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
23c	**Typically, what is the % of time your child uses <u>Spanish</u> at school?**						
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
23d	**Does your child attend a school that is affiliated with a religious organization?**						
	Yes		No		Other: _____		
23e	*YES:* **What type of religious organization is the school?**						
	Catholic	Protestant Christian	Other religious affiliation (*please indicate what*):				

24	**Does your child currently attend day care?**		
	Yes	No	Other: _____

25	**Does your family have pet(s) in the home?**	Yes	No
25b	*YES:* **What types of pet(s) do you have, and how long have you had each of them?**		

26	**How often does your child <u>see a doctor</u> in any given year?**							
	Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day
27	**How often does your child <u>take medication</u> on a regular basis?**							
	Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day

28	**How would you rate your child's health, overall?**				
	Excellent – No Problems	Great – Very Few Problems	Sometimes Good, Sometimes Bad	Bad – Several Problems	Very Poor – Lots of Problems

29	**What is your child's religious affiliation (if any)?**

30	**Are there any family members or caretakers in your child's life who have a religious affiliation other than your child's?**		
	Yes	No	
30a	*YES:* **Who are they and what is their religious affiliation?**		
31	**Are there differences in religiosity among the family members or caretakers in your child's life?**		
	No – All very religious	Yes – there are differences	No – All Not Very Religious
32	**Typically, do you and other family members or caretakers in your child's life agree or disagree about religious issues?**		
	Always Disagree	Sometimes Disagree	Always Agree

33	**Has your child had exposure to other religious affiliations?**	
	Yes	No
33a	*YES:* **Which other religious affiliations has your child been exposed to?**	

34	**Has your child completed their first communion?**	
	Yes	No
34a	*YES:* **At what age (in years) did your child complete their first communion?**	

35	**Has your child completed their confirmation?**	
	Yes	No
35a	*YES:* **At what age (in years) did your child complete their confirmation?**	

36	**How often does your child participate in confession (formal or informal)?**							
Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day	Multiple Times a Day
37	**How often does your child participate in adoration (formal or informal)?**							
Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day	Multiple Times a Day

38	**How often does your child attend <u>retreats</u> sponsored by your religious organization?**							
Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day	Multiple Times a Day
39	**How often does your child attend <u>events</u> sponsored by your religious organization?**							
Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day	Multiple Times a Day
40	**How often does your child participate in <u>public</u> religious practices (i.e., at a religious institution)?**							
Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day	Multiple Times a Day
41	**How often does your child attend religious services (e.g., mass)?**							
Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day	Multiple Times a Day
42	**How often does your child participate in <u>private</u> religious practices (i.e., at home)?**							
Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day	Multiple Times a Day
43	**How often does your child receive any sort of formal religious education or training?**							
Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day	Multiple Times a Day

Section B: General Beliefs

We would like to get some information about your beliefs in the following.
Remember, there is no right or wrong answer - we just want to know what you think.

44	**Fate**	Real	Not Real	Don't Know
45	**Angels**	Real	Not Real	Don't Know
46	**The Devil**	Real	Not Real	Don't Know
47	**The Evil-Eye**	Real	Not Real	Don't Know
48	**Germs**	Real	Not Real	Don't Know
49	**A Priest**	Real	Not Real	Don't Know

50	**Demons**	Real	Not Real	Don't Know
51	**Medicine**	Real	Not Real	Don't Know
52	**Prayer**	Real	Not Real	Don't Know
53	**God**	Real	Not Real	Don't Know
54	**Herbal Remedies**	Real	Not Real	Don't Know
55	**Magic**	Real	Not Real	Don't Know
56	**Jesus**	Real	Not Real	Don't Know
57	**Karma**	Real	Not Real	Don't Know
58	**A Doctor**	Real	Not Real	Don't Know
59	**Luck**	Real	Not Real	Don't Know
60	**Miracles**	Real	Not Real	Don't Know
61	**Saints**	Real	Not Real	Don't Know
62	**Ghosts or Spirits**	Real	Not Real	Don't Know
63	**Praying the Rosary or other Structured Prayers**	Real	Not Real	Don't Know
64	**Witchcraft**	Real	Not Real	Don't Know

Section C: Parent Demographics

We would like to get some basic information about you.

65	**What is your relationship to the child in this survey?**						
	Mother	Father	Aunt	Uncle	Grandmother	Grandfather	Other: (*Fill in*)
66	**What is your gender?**			Male	Female	Other:	
67	**What is your age (in years)?**						
68	**How would you describe your ethnic background or race?** *Please check all that apply and specify any specific county if applicable.*						
Hispanic	White	Black:	Asian:	Pacific Islander or Native American:	Middle Eastern:	Other:	Decline to Answer
69	**What is your cultural identity?**						
70a	**We would like to ask you about your cultural/ethnic identity (the culture you feel the most sense of belonging to). Please rate the strength of your cultural identification with the following cultures:** **(1) US American (North American)**						
	Very Weak	Weak	Somewhat weak	Somewhat Strong	Strong	Very Strong	

70b	**(2) Hispanic/Latino**					
	Very Weak	Weak	Somewhat weak	Somewhat Strong	Strong	Very Strong
70c	**Please specify the specific Hispanic/Latino country you identify with:**					

71	**How would you describe your immigration generation?** (*Note: We are <u>not</u> asking about your current legal immigration status or the circumstances of how you immigrated to the US if you are a first-generation immigrant. This question is solely for the purposes of better understanding cultural identity*)		
	<u>First Generation</u>: I came to live in the United States from another country	<u>Second Generation</u>: I am a U.S. native with at least one first-generation parent	<u>Third Generation</u>: I am a U.S. native whose parents are also U.S. natives
71a	*If First Generation:* **At what age did you immigrate to the US? (If you are unsure of the exact age, give your best estimate)**		

72	**What is the primary/main language spoken in your household?**		
	English	Spanish	Other (*fill in*)

73	**What is the primary language you speak/read/write in?**		
	English	Spanish	Other (*fill in*)

74	**At what age did <u>you</u> start learning <u>English</u>?**										
0 (since Birth)	1-year	2-years	3-years	4-years	5-years	6-years	7-years	8-years	9-years	10-years	11-years
12-years	13-years	14-years	15-years	16-years	17-years	18-years	19-years	20-years +	Not Applicable – I don't know English		

74	**At what age did <u>you</u> start learning <u>Spanish</u>?**										
0 (since Birth)	1-year	2-years	3-years	4-years	5-years	6-years	7-years	8-years	9-years	10-years	11-years
12-years	13-years	14-years	15-years	16-years	17-years	18-years	19-years	20-years +	Not Applicable – I don't know Spanish		

76	**How many years of <u>science classes</u> have you had in <u>English</u> (primary school through university)?**										
0	1	2	3	4	5	6	7	8	9	10	
11	12	13	14	15	16	17	18	19	20+		

77	**How many years of <u>science classes</u> have you had in <u>Spanish</u> (primary school through university)?**									
0	1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20+	

78	**How many years have <u>you</u> spent in a country/region where <u>English</u> is spoken?**									
0	1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20+	

79	**How many years have <u>you</u> spent in a country/region where <u>Spanish</u> is spoken?**									
0	1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20+	

80	**How well do you <u>understand</u> <u>English</u>?**						
	Not well at all 0	1	2	3	4	5	Very Well 6

81	**How well do you <u>understand</u> <u>Spanish</u>?**						
	Not well at all 0	1	2	3	4	5	Very Well 6

82	**How well do you <u>speak</u> <u>English</u>?**						
	Not well at all 0	1	2	3	4	5	Very Well 6

83	**How well do you <u>speak</u> <u>Spanish</u>?**						
	Not well at all 0	1	2	3	4	5	Very Well 6

84	**How well do you <u>read</u> in <u>English</u>?**						
	Not well at all 0	1	2	3	4	5	Very Well 6

85	**How well do you <u>read</u> in <u>Spanish</u>?**						
	Not well at all 0	1	2	3	4	5	Very Well 6

86	**How well do you <u>write</u> in <u>English</u>?**						
	Not well at all 0	1	2	3	4	5	Very Well 6

87	**How well do you <u>write</u> in <u>Spanish</u>?**						
	Not well at all 0	1	2	3	4	5	Very Well 6

88	**Typically, what is the % of time you speak in <u>English</u>?**										
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
89	**Typically, what is the % of time you speak in <u>Spanish</u>?**										
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

90	**Typically, what is the % of time you use <u>English</u> during <u>religious practices</u> (e.g., in home, at mass, during religious events)**										
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
91	**Typically, what is the % of time you use <u>Spanish</u> during <u>religious practices</u> (e.g., in home, at mass, during religious events)**										
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

92	**What is your religious affiliation (if any)?**
93	**What is <u>your family's</u> religious affiliation (if any)?**

94	**Have you had exposure to other religious affiliations?**	
	Yes	No
94a	*YES:* **Which other religious affiliations have you been exposed to?**	

95	**Have you completed your first communion?**	
	Yes	No
95a	*YES:* **At what age (in years) did you complete your first communion?**	

96	**Have you completed your confirmation?**	
	Yes	No
96a	*YES:* **At what age (in years) did you complete your confirmation?**	

97	**How often do you attend <u>events</u> sponsored by your religious organization (alone or with others)?**								
Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day	Multiple Times a Day	

98a	**How often do you participate in <u>public</u> religious practices (i.e., at a religious institution)?**							
Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day	Multiple Times a Day
98b	**How often do you attend religious services (e.g., mass)?**							
Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day	Multiple Times a Day
99	**How often do you participate in <u>private</u> religious practices (i.e., at home)?**							
Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day	Multiple Times a Day
100	**How often do you receive any sort of formal religious education or training?**							
Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day	Multiple Times a Day
101	**How often do you participate in <u>confession</u> (formal or informal)?**							
Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day	Multiple Times a Day
102	**How often do you participate in <u>adoration</u> (formal or informal)?**							
Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day	Multiple Times a Day
103	**How often do you attend <u>retreats</u> sponsored by your religious organization?**							
Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day	Multiple Times a Day

104	**In the past year which of the following Holy Days of Obligation did you attend?** (*select all that apply*)	
	Feist of the Mother of God (January 1st)	Ascension of the Lord (40 days after Easter Sunday)
	The Epiphany of the Lord / Three Kings Day (January 6th)	Ascension of the Virgin Mary (August 15th)
	San José (March 19th)	All Saints Day (November 1st)
	Ash Wednesday and Lent	Immaculate Conception (December 8th)
	Holy Week	Christmas (December 25th)
	Easter	Other (*fill in*):

105	**Did you attend a religiously affiliated school when you were young?**		
	Yes	No	

105b	*YES:* **What type of religious organization was the school?**		
	Catholic	Protestant Christian	Other religious affiliation (*please indicate what*):

106	**How certain are you that God exists?**				
	God definitely does <u>not</u> exist	God probably does <u>not</u> exist	I'm not sure if God exists	God probably <u>does</u> exist	God definitely <u>does</u> exist
107	**When I am in trouble, I find myself <u>wanting to ask</u> God for help.**				
	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
108	**When I am in trouble, I find myself <u>asking</u> God for help.**				
	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
109	**When people <u>pray</u>, they are only talking to themselves.**				
	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
110	**When people <u>pray the rosary or other structured prayers</u> (e.g., the Lord's Prayer), they are only talking to themselves.**				
	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
111	**I spend a lot of time thinking about my religious beliefs.**				
	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree

112	**How <u>religious</u> do you consider the <u>typical Catholic</u> to be?**				
	Not at all Religious	Below Average	Average	Above Average	Very Religious
113	**How <u>religious</u> do you consider <u>yourself</u> to be?**				
	Not at all Religious	Below Average	Average	Above Average	Very Religious

114	**How <u>spiritual</u> do you consider the <u>typical Catholic</u> to be?**				
	Not at all Spiritual	Below Average	Average	Above Average	Very Spiritual
115	**How <u>spiritual</u> do you consider <u>yourself</u> to be?**				
	Not at all Spiritual	Below Average	Average	Above Average	Very Spiritual

116	**What is the last grade you completed in school / highest degree of education you have received?**	
None	7th Grade	1 or more years of college (No Degree)
Preschool	8th Grade	2 or more years of college (No Degree)
Kindergarten	9th Grade	3 or more years of college (No Degree)
1st Grade	10th Grade	Associates Degree (*e.g., AA, AS*)
2nd Grade	11th Grade	Bachelor's Degree (*e.g., BA, BS, AB*)
3rd Grade	High School Graduate	Masters Degree (*e.g., MA, MS, Meng, Med, MSW, MBA*)

4th Grade	GED	Professional Degree (*e.g., MD, DDS, DVM, LLB, JD*)
5th Grade		Doctorate Degree (e.g., PhD, EdD)
6th Grade		Other (*fill in*):

117	**Please check the option(s) that most accurately reflects your current employment:**						
Full-Time Work	Part-Time Work	Student	Homemaker	Retired	Disabled	Not Employed	Decline to Answer
117a	**If you work outside of the home, what is the name of your profession?**						

118	**What is your relationship status?** *Check all that apply*						
Single	In a Relationship	Engaged	Live-In Partner	Married	Divorced	Separated	Decline to Answer

118a	*If married:* **Are you married through the Catholic Church or through Civil Union?**		
	Married through Church	Married through the Civil Union	Both

Please answer questions 119 – 122 if you have a partner:

119	**What is the last grade your husband/wife/partner completed in school / the highest degree of education they have received?**	
None	7th Grade	1 or more years of college (No Degree)
Preschool	8th Grade	2 or more years of college (No Degree)
Kindergarten	9th Grade	3 or more years of college (No Degree)
1st Grade	10th Grade	Associates Degree (*e.g., AA, AS*)
2nd Grade	11th Grade	Bachelor's Degree (*e.g., BA, BS, AB*)
3rd Grade	High School Graduate	Masters Degree (*e.g., MA, MS, Meng, Med, MSW, MBA*)
4th Grade	GED	Professional Degree (*e.g., MD, DDS, DVM, LLB, JD*)
5th Grade		Doctorate Degree (e.g., PhD, EdD)
6th Grade		Other (*fill in*):

120	**Please check the option(s) that most accurately reflects your <u>husband/wife/partner's</u> current employment:**						
Full-Time Work	Part-Time Work	Student	Homemaker	Retired	Disabled	Not Employed	Decline to Answer
120	**If your husband/wife/partner work outside of the home, what is the name of their profession?**						

121	**How would you describe your husband/wife/partner's ethnic background or race?** *Please check all that apply*						
Hispanic	White	Black:	Asian:	Pacific Islander or Native American:	Middle Eastern:	Other:	Decline to Answer

121a	**Please specify the specific Hispanic/Latino country your husband/wife/partner identifies with:**

122	**How would you describe your husband/wife/partner's immigration generation?** (*Note: We are <u>not</u> asking about their current legal immigration status or the circumstances of how they immigrated to the US if they are a first-generation immigrant. This question is solely for the purposes of better understanding cultural identity*)		
	<u>First Generation</u>: They came to live in the United States from another country	<u>Second Generation</u>: They are a U.S. native with at least one first-generation parent	<u>Third Generation</u>: They are a U.S. native whose parents are also U.S. natives

122a	*If First Generation:* **At what age did they immigrate to the US? (If you are unsure of the exact age, give your best estimate)**

123	**How many people currently live in your home (including yourself)?**

124	**What is your average household income in a <u>month</u> before taxes? (in US $)**

125	**What is your average household income in a <u>year</u> before taxes? (in US $)**	
	Less than $10,000	$60,000 - $69,999
	$10,000 - $19,999	$70,000 - $79,999
	$20,000 - $29,999	$80,000 - $89,999
	$30,000 - $39,999	$100,000 - $149,999
	$40,000 - $49,999	More than $150,000
	$50,000 - $59,999	Decline to Answer

126	**How certain are you that you <u>will</u> be able to buy or produce enough food to eat in the <u>next month</u>?**				
	Very Uncertain	A Little Uncertain	I Don't Know	A Little Certain	Very Certain
127	**How certain are you that you <u>will</u> be able to buy or produce enough food to eat in the <u>next 6-months</u>?**				
	Very Uncertain	A Little Uncertain	I Don't Know	A Little Certain	Very Certain

128	**How certain are you that you <u>will</u> be able to buy or produce enough food to eat in the <u>next year</u>?**				
	Very Uncertain	A Little Uncertain	I Don't Know	A Little Certain	Very Certain
128	**How certain are you that you <u>will</u> be able to buy or produce enough food to eat in the <u>next 5-years</u>?**				
	Very Uncertain	A Little Uncertain	I Don't Know	A Little Certain	Very Certain

130	**Do you and your immediate family rent a home/apartment or own a home?**		
	Rent	Own	Other (*fill in*):
131	**Do you and your immediate family own any cars/vehicles?**		
	Yes	No	Decline to Answer
131a	*If Yes:* **How many cars/vehicles do you and your immediate family own?**		

Section D: Health Information – Parent

We would like to get some basic information about your health and your views on health in general.

Remember, there is no right or wrong answer - we just want to know what you think.

132	**How often do you <u>see a doctor</u> in any given year?**							
	Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day
133	**How often do you <u>take medication</u> on a regular basis?**							
	Never	Once a Year	Multiple Times a Year	Once a Month	Twice a Month	Once a Week	Multiple Times a Week	Once a Day
134	**How would you rate your health, overall?**							
	Excellent – No Problems	Great – Very Few Problems	Sometimes Good, Sometimes Bad	Bad – Several Problems	Very Poor – Lots of Problems			

Please select your level of agreement for the following statements.

135	**Whether or not I stay healthy is up to me.**				
	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree
136	**I am healthy because I am very spiritual.**				
	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree
137	**I will get sick, no matter what I do.**				
	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree
138	**I am in charge of my own health.**				
	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree

139	**I have no control over my health.**				
	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree
140	**I am healthy because of my own behaviors and habits.**				
	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree
141	**If I lead a good spiritual life, I will stay healthy.**				
	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree
142	**My health is protected through a higher being.**				
	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree
143	**I stay healthy because it was meant to be.**				
	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree
144	**Being healthy depends on a healthy lifestyle.**				
	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree
145	**I rely on my faith to keep myself healthy.**				
	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree

Section E: CRT

Please answer the following questions as best as you can.

146	**If you're running a race and you pass the person in second place, what place are you in?**
147	**Who makes Christmas presents at the North Pole?**
148	**A farmer has 5 sheep. All but 3 run away. How many are left?**
149	**If there are 3 apples and you take away 2, how many do you have?**
150	**What do cows drink?**
151	**What weighs more: One pound of rocks or one pound of feathers?**
152	**What hatches from a butterfly egg?**
153	**Emily's father has three daughters. The first two are named Monday and Tuesday. What is the third daughter's name?**

154	**Anna is playing foursquare with her three friends: Eeny, Meeny, and Miny. Who is the fourth player?**

Thank you for completing the survey and answering our questions!
Please let the researcher know that you have completed the survey so that you can do a game on the iPad and then complete the one-on-one interview.

Parent Online Survey – Spanish Version

Note: This was completed online using a Qualtrics survey. Parents were also able to skip any questions they did not want to answer.

Sección A: Información General

Primero, nos gustaría obtener información básica de su hijo/a.

1	**¿Cuál es el sexo de su hijo/a?**	Niño	Niña	Otro (*llenar respuesta*):
2	**¿Cuál es la fecha de nacimiento de su hijo/a?** (mes / día / año)			

3	**¿Cómo describirías el origen étnico o la raza de su hijo/a?** *Marque todos los que apliquen y el país si aplica*						
Hispano/ Latino	Blanco	Negro	Asiático	Isleño del pacífico o Americano Nativo	Medio Oriente	Otro:	Negarse a Contestar

4	**¿Su hijo/a habla y entiende más de un idioma?**	Sí	No
4a	**Si su hijo/a habla otros idiomas, ¿cuáles son?**		
5	**¿Cuál es el idioma principal que habla su hijo/a?**		
	Español	Inglés	Otro: _____

6	**¿A qué edad empezó su hijo/a aprender <u>inglés</u>?**													
0 (Desde Nacimiento)	6-meses	1-año	1.5-años	2-años	3-años	3.5-años	4-años	4.5-años	5-años	5.5-años	6-años	6.5-años	7-años	Todavía no ha empezado a aprender inglés
7	**¿A qué edad empezó su hijo/a aprender <u>español</u>?**													
0 (Desde Nacimiento)	6-meses	1-año	1.5-años	2-años	3-años	3.5-años	4-años	4.5-años	5-años	5.5-años	6-años	6.5-años	7-años	Todavía no ha empezado a aprender español

8	**Yo diría que <u>la comprensión lingüística</u> de <u>inglés</u> de mi hijo/a está _____ para su edad:**						
	No muy bien 0	1	2	Promedio 3	4	5	Muy Bien 6
9	**Yo diría que <u>la comprensión lingüística</u> de <u>español</u> de mi hijo/a está _____ para su edad:**						
	No muy bien 0	1	2	Promedio 3	4	5	Muy Bien 6

10	**Yo diría que <u>la habilidad verbal</u> de <u>inglés</u> de mi hijo/a está _____ para su edad:**						
	No muy bien 0	1	2	Promedio 3	4	5	Muy Bien 6
11	**Yo diría que <u>la habilidad verbal</u> de <u>español</u> de mi hijo/a está _____ para su edad:**						
	No muy bien 0	1	2	Promedio 3	4	5	Muy Bien 6

12	**¿Su hijo/a puede leer solo/a?**					Sí	No
13	*Sí:* **¿Qué tan bien <u>lee</u> su hijo/a en <u>inglés</u>?**						
	No muy bien 0	1	2	Promedio 3	4	5	Muy Bien 6
14	*Sí:* **¿Qué tan bien <u>lee</u> su hijo/a en <u>español</u>?**						
	No muy bien 0	1	2	Promedio 3	4	5	Muy Bien 6

15	**¿Qué tan bien <u>escribe</u> su hijo/a en <u>inglés</u>?**							
	Mi hijo/a no puede escribir en inglés	No muy bien 0	1	2	Promedio 3	4	5	Muy Bien 6
16	**¿Qué tan bien <u>escribe</u> su hijo/a en <u>español</u>?**							
	Mi hijo/a no puede escribir en español	No muy bien 0	1	2	Promedio 3	4	5	Muy Bien 6

17	**Normalmente, ¿cuál es el % de tiempo que su hijo/a <u>habla</u> en <u>inglés</u>?**										
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
18	**Normalmente, ¿cuál es el % de tiempo que su hijo/a <u>habla</u> en <u>español</u>?**										
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

19	**Normalmente, ¿cuál es el % de tiempo que usted le habla a su hijo/a en <u>inglés</u>?**										
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
20	**Normalmente, ¿cuál es el % de tiempo que usted le habla a su hijo/a en <u>español</u>?**										
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

21	**Normalmente, ¿cuál es el % de tiempo que <u>su hijo/a</u> usa <u>inglés</u> durante <u>prácticas religiosas</u> (en la casa, misa, o eventos religiosos)**										
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

22	**Normalmente, ¿cuál es el % de tiempo que <u>su hijo/a</u> usa <u>español</u> durante <u>prácticas religiosas</u> (en la casa, misa, o eventos religiosos)**										
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

23	**Actualmente, ¿su hijo/a asiste a la escuela? (e.j., Headstart, pre-escolar, kínder, primaria)?**						
	Sí		No		Otro (*llenar respuesta*):		
23a	*SÍ:* **What grade is your child currently in?**						
	Headstart	Pre-escolar	TK (Transitional Kindergarten)	Kínder	Primero	Segundo	Otro:
23b	**Normalmente, ¿cuál es el % de tiempo que su hijo/a usa <u>inglés</u> cuando está en escuela?**						
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
23c	**Normalmente, ¿cuál es el % de tiempo que su hijo/a usa <u>español</u> cuando está en escuela?**						
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
23d	**¿Su hijo/a asiste a una escuela afiliada con alguna organización religiosa?**						
	Sí		No		Otro: _____		
23e	*SÍ:* **¿Con que organización religiosa se afilia la escuela?**						
	Católica	Cristiana		Otro (*llenar respuesta*):			

24	**¿Su hijo/a asiste a una guardería?**		
	Sí	No	Otro: _____

25	**¿Tiene su familia mascota(s) en la casa?**	Sí	No
25b	*SÍ:* **¿qué tipo, y por cuánto tiempo ha tenido cada uno?**		

26	**¿Cuántas veces al año va su niño/a al <u>doctor</u>?**							
	Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día
27	**¿Qué tan frecuente toma <u>medicamentos</u> su niño/a?**							
	Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día

28	**¿Cómo clasificaría la salud de su hijo/a en general?**				
	Excelente – Sin Problemas	Bien - Pocos Problemas	A veces bien, a veces mal	Mal - Muchos Problemas	Muy Mal - Muchos Problemas

29	**¿Cuál es la afiliación religiosa de su hijo/a?**		
30	**¿Hay miembros de la familia (adultos), u otras personas, que cuiden a su hijo/a que tengan afiliación religiosa diferente a la de su hijo/a?**		
	Sí	No	
30a	*SÍ:* **¿quién y cuál es su afiliación?**		
31	**¿Hay diferencias en el nivel de religiosidad entre los familiares o personas que cuiden a su hijo/a?**		
	No- Todos muy religiosos	Sí, hay diferencias	No – Todos no son muy religiosos
32	**Normalmente, usted, los otros miembros de familia, o personas que cuiden a su hijo/a ¿tienen perspectivas diferentes sobre los problemas religiosos?**		
	Siempre en desacuerdo	A veces en desacuerdo	Siempre de Acuerdo

33	**¿Su hijo/a ha sido expuesto a otras afiliaciones religiosas?**	
	Sí	No
33a	*SÍ:* **¿cuáles afiliaciones religiosas?**	

34	**¿Ha completado su hijo/a su primera comunión?**	
	Sí	No
34a	*SÍ:* **Si sí, ¿a qué edad?**	

35	**¿Ha completado su hijo/a su confirmación?**	
	Sí	No
35a	*SÍ:* **Si sí, ¿a qué edad?**	

36	**¿Qué tan seguido participa su hijo/a en confesión (formal o informal)?**							
Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día	Varias veces al día
37	**¿Qué tan seguido asiste su hijo/a en <u>adoración</u> (formal o informal)?**							
Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día	Varias veces al día
38	**¿Qué tan seguido asiste su hijo/a a <u>retiros</u> religiosos patrocinados por su afiliación religiosa?**							
Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día	Varias veces al día

39	**¿Qué tan seguido asiste su hijo/a a un <u>evento</u> patrocinado por su organización religiosa?**							
Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día	Varias veces al día
40	**¿Qué tan seguido participa su hijo/a en una práctica religiosa en <u>público</u>? (por ejemplo, en una institución religiosa)**							
Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día	Varias veces al día
41	**¿Qué tan seguido asiste su hijo/a a <u>servicios religiosos</u> (e.j., misa)?**							
Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día	Varias veces al día
42	**¿Qué tan seguido participa su hijo/a en una práctica religiosa <u>privada</u>? (por ejemplo, en la casa)**							
Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día	Varias veces al día
43	**¿Qué tan seguido recibe su hijo/a <u>educación o entrenamiento formal</u> religioso?**							
Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día	Varias veces al día

Section B: General Beliefs

We would like to get some information about your beliefs in the following.
Remember, there is no right or wrong answer - we just want to know what you think.

44	**El Destino**	Real	Not Real	Don't Know
45	**Un Ángel**	Real	Not Real	Don't Know
46	**El Diablo**	Real	Not Real	Don't Know
47	**Mal de Ojo**	Real	Not Real	Don't Know
48	**Gérmenes**	Real	Not Real	Don't Know
49	**Un Sacerdote / Padre**	Real	Not Real	Don't Know
50	**Demonios**	Real	Not Real	Don't Know
51	**Medicina**	Real	Not Real	Don't Know
52	**Orar**	Real	Not Real	Don't Know
53	**Dios**	Real	Not Real	Don't Know
54	**Remedios Naturales**	Real	Not Real	Don't Know
55	**Magia**	Real	Not Real	Don't Know
56	**Jesús**	Real	Not Real	Don't Know
57	**Karma**	Real	Not Real	Don't Know

58	**Un Doctor**	Real	Not Real	Don't Know
59	**Suerte**	Real	Not Real	Don't Know
60	**Milagros**	Real	Not Real	Don't Know
61	**Santos**	Real	Not Real	Don't Know
62	**Fantasmas o Espíritus**	Real	Not Real	Don't Know
63	**Rezar el Rosario**	Real	Not Real	Don't Know
64	**Brujería**	Real	Not Real	Don't Know

Sección C: Preguntas sobre usted

Tenemos unas preguntas sobre <u>usted</u>.

65	**¿Cuál es su relación con el niño/a en esta encuesta?**						
	Madre	Padre	Tía	Tío	Abuela	Abuelo	Otro:
66	**¿Cuál es su sexo?**				Hombre	Mujer	Otro:
67	**¿Qué edad tiene usted?**						

68	**¿Cómo describirías el origen étnico o la raza de usted?** *Marque todos los que apliquen y el país si aplica*						
Hispano/ Latino	Blanco	Negro	Asiático	Isleño del pacífico o Americano Nativo	Medio Oriente	Otro:	Negarse a Contestar

69	**¿Cuál es su identidad cultural/étnica (la cultura con la cual tiene más sentido de pertenencia)?**

70a	**Nos gustaría preguntarle acerca de su identidad cultural/étnica (la cultura con la cual tiene más sentido de pertenencia). Por favor marque cuánto se identifica con las siguientes culturas:** **(1) Los EE. UU. Americano (Norte Americano)**					
	Muy Débil	Débil	Más o menos Débil	Más o menos Fuerte	Fuerte	Muy Fuerte
70b	**(2) Hispano/Latino**					
	Muy Débil	Débil	Más o menos Débil	Más o menos Fuerte	Fuerte	Muy Fuerte
70c	**Por favor especifique el especifico país Hispano/Latino con el cual usted se identifica:**					

71	**¿Cómo describiría su generación de inmigración?** (*Nota: **No** estamos preguntando sobre su información legal o las circunstancias sobre como usted inmigro a los Estados Unidos si usted es un inmigrante de primera generación. Esta pregunta es solamente para el propósito de entender mejor su identidad cultural.*)		
	Primera Generación: Yo vine a vivir a los Estados Unidos de otro país	Segunda Generación: Soy un nativo de los Estados Unidos con al menos un padre de primera generación	Tercera Generación: Soy un nativo de los Estados Unidos cuyos padres también son nativos de los Estados Unidos
71a	*Si Primera Generación:* **¿A qué edad inmigraste a los Estados Unidos? (Si no está seguro/a de la edad exacta de su mejor estimación)**		

72	**¿Cuál es el idioma principal que habla en casa?**		
	Español	Inglés	Otro (*llenar respuesta*):

73	**¿Cuál es el idioma principal que habla usted?**		
	Español	Inglés	Otro (*llenar respuesta*):

74	**¿A qué edad empezó usted aprender inglés?**										
0 Desde Nacimiento	1- año	2- años	3- años	4- años	5- años	6- años	7- años	8- años	9- años	10- años	11- años
12- años	13- años	14- años	15- años	16- años	17- años	18- años	19- años	20- años +	N/A – No sé inglés		
74	**¿A qué edad empezó usted aprender español?**										
0 Desde Nacimiento	1- año	2- años	3- años	4- años	5- años	6- años	7- años	8- años	9- años	10- años	11- años
12- años	13- años	14- años	15- años	16- años	17- años	18- años	19- años	20- años +	N/A – No sé español		

76	**¿Cuántas clases de ciencias ha tenido en inglés (entre primaria y la universidad)?**									
0	1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20+	
77	**¿Cuántas clases de ciencias ha tenido en español (entre primaria y la universidad)?**									
0	1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20+	

78	**¿Cuántos años ha vivido usted en un país donde se habla inglés?**									
0	1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20+	

79	**¿Cuántos años ha vivido <u>usted</u> en un país donde se habla <u>español</u>?**									
0	1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20+	

80	**¿Qué tan bien <u>comprende</u> usted <u>inglés</u>?**						
	No muy bien 0	1	2	Promedio 3	4	5	Muy Bien 6
81	**¿Qué tan bien <u>comprende</u> usted <u>español</u>?**						
	No muy bien 0	1	2	Promedio 3	4	5	Muy Bien 6

82	**¿Qué tan bien <u>habla</u> usted <u>inglés</u>?**						
	No muy bien 0	1	2	Promedio 3	4	5	Muy Bien 6
83	**¿Qué tan bien <u>habla</u> usted <u>español</u>?**						
	No muy bien 0	1	2	Promedio 3	4	5	Muy Bien 6

84	**¿Qué tan bien <u>lee</u> usted <u>inglés</u>?**						
	No muy bien 0	1	2	Promedio 3	4	5	Muy Bien 6
85	**¿Qué tan bien <u>lee</u> usted <u>español</u>?**						
	No muy bien 0	1	2	Promedio 3	4	5	Muy Bien 6

86	**¿Qué tan bien <u>escribe</u> usted <u>inglés</u>?**						
	No muy bien 0	1	2	Promedio 3	4	5	Muy Bien 6
87	**¿Qué tan bien <u>escribe</u> usted <u>español</u>?**						
	No muy bien 0	1	2	Promedio 3	4	5	Muy Bien 6

88	**Normalmente, ¿cuál es el % de tiempo que <u>habla</u> usted en <u>inglés</u>?**									
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
89	**Normalmente, ¿cuál es el % de tiempo que <u>habla</u> usted en <u>español</u>?**									
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

90	**Normalmente, ¿cuál es el % de tiempo que usa usted <u>inglés</u> durante <u>prácticas religiosas</u> (en la casa, misa, o eventos religiosos)**									
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

91	**Normalmente, ¿cuál es el % de tiempo que usa usted <u>español</u> durante <u>prácticas religiosas</u> (en la casa, misa, o eventos religiosos)**										
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

92	**¿Cuál es su afiliación religiosa?**
93	**¿Cuál es la afiliación religiosa de su familia?**

94	**¿Ha sido expuesto a otras afiliaciones religiosas?**	
	Sí	No
94a	*SÍ:* **¿cuáles afiliaciones religiosas?**	

95	**¿Ha completado usted su primera comunión?**	
	Sí	No
95a	*SÍ:* **¿a qué edad?**	

96	**¿Ha completado usted su confirmación?**	
	Sí	No
96a	*SÍ:* **¿a qué edad?**	

97	**¿Qué tan seguido asiste a un <u>evento patrocinado</u> por su organización religiosa (solo o con otros)?**							
Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día	Varias veces al día
98a	**¿Qué tan seguido participa en una práctica religiosa <u>en público</u>? (por ejemplo, en una institución religiosa)**							
Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día	Varias veces al día
98b	**¿Qué tan seguido asiste usted a <u>servicios religiosos</u> (e.j., misa)?**							
Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día	Varias veces al día
99	**¿Qué tan seguido participa en una práctica religiosa <u>privada</u>? (por ejemplo, en la casa)**							
Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día	Varias veces al día

100	**¿Qué tan seguido recibe <u>educación</u> o entrenamiento formal religioso?**							
Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día	Varias veces al día
101	**¿Qué tan seguido toma parte en <u>confesión</u> (formal o informal)?**							
Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día	Varias veces al día
102	**¿Qué tan seguido toma parte en <u>adoración</u> (formal o informal)?**							
Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día	Varias veces al día
103	**¿Qué tan seguido toma parte en <u>retiros</u> religiosos patrocinados por su afiliación religiosa?**							
Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día	Varias veces al día

104	**¿El año pasado cuál de los siguientes días de obligación asistió??** (*Seleccione todos los que apliquen*)	
	Solemnidad de Santa María, Madre de Dios (el 1 de enero)	La Solemnidad de la Ascensión del Señor (el Domingo siguiente al jueves que solía celebrarse)
	El Día de los 3 Reyes Magos (el 6 de enero)	La Ascensión de la Virgin María (el 15 de agosto)
	San José (el 19 de marzo)	Día de Todos Los Santos (el 1 de noviembre)
	Miércoles de Ceniza / Cuaresma	Solemnidad de la Inmaculada Concepción de la Santísima Virgen María (el 8 de diciembre)
	La Semana Santa	Solemnidad de la Navidad del Señor (el 25 de diciembre)
	La Pascua	Otro (*llenar respuesta*):

105	**Cuando era joven, ¿asistió a una escuela con afiliación religiosa?**		
	Sí	No	
105b	*SÍ:* **¿Con que organización religiosa se afilia la escuela?**		
	Católica	Cristiana	Otro (*llenar respuesta*):

106	**¿Qué tan seguro está que Dios existe?**				
	Dios definitivamente <u>no</u> existe	Dios probablemente <u>no</u> existe	No estoy seguro si Dios existe	Dios probablemente existe	Dios definitivamente existe
107	**Cuando estoy en problemas, me encuentro queriendo pedirle ayuda a Dios.**				
	Totalmente De Acuerdo	De Acuerdo	No Sé	En Desacuerdo	Totalmente En Desacuerdo
108	**Cuando estoy en problemas, me encuentro pidiéndole ayuda a Dios.**				
	Totalmente De Acuerdo	De Acuerdo	No Sé	En Desacuerdo	Totalmente En Desacuerdo

109	**Cuando alguien <u>ora</u>, simplemente se están hablando a si mismos.**				
	Totalmente De Acuerdo	De Acuerdo	No Sé	En Desacuerdo	Totalmente En Desacuerdo
110	**Cuando alguien <u>reza</u>, simplemente se están hablando a si mismos.**				
	Totalmente De Acuerdo	De Acuerdo	No Sé	En Desacuerdo	Totalmente En Desacuerdo
111	**Paso mucho tiempo pensando en mis creencias religiosas.**				
	Totalmente De Acuerdo	De Acuerdo	No Sé	En Desacuerdo	Totalmente En Desacuerdo

112	**¿Qué tan <u>religioso</u> considera que sea el típico Católico?**				
	Para nada Religioso	Debajo del Promedio	Promedio	Arriba del Promedio	Muy Religiosa
113	**¿Qué tan religioso se considera usted mismo?**				
	Para nada Religioso	Debajo del Promedio	Promedio	Arriba del Promedio	Muy Religiosa

114	**¿Qué tan <u>espiritual</u> considera que sea el típico Católico?**				
	Para nada espiritual	Debajo del Promedio	Promedio	Arriba del Promedio	Muy espiritual
115	**¿Qué tan <u>espiritual</u> se considera usted mismo?**				
	Para nada espiritual	Debajo del Promedio	Promedio	Arriba del Promedio	Muy espiritual

116	**¿Cuál es su nivel más alto de educación?**	
Ninguno	Septimo	1 año en la Universidad - sin graduar
Pre-Escolar	Octavo	2 años en la Universidad - sin graduar
Kinder / Jardín	Noveno	3 años en la Universidad - sin graduar
Primero	Decimo	Un Título Universaitario de Preparación Básica (*e.j., AA, AS*)
Segundo	Onceavo	El Bachillerato (*e.j., BA, BS, AB*)
Tercero	Graduado de la escuela secundaria // Preparitario	Maestria (*e.j., MA, MS, Meng, Med, MSW, MBA*)
Quarto	GED	Un Título Profesional (*e.j., MD, DDS, DVM, LLB, JD*)
Quinto		Doctorado (*e.j., PhD, EdD*)
Sesto		Otro (*llenar respuesta*):

117	**Por favor seleccione la(s) opción(es) que refleje con más precisión su empleo actual:**						
Tiempo Completo	Medio Tiempo	Estudiante	Ama de casa	Retirado	Discapacitado	Desempleado	Negarse a Contestar
117a	**Si trabaja, ¿Cuál es el nombre de su profesión?**						

118	**Por favor seleccione la opción que refleje con más precisión su estado civil.**						
Soltero	Noviazgo	Con Prometido	Pareja Doméstica	Casado	Divorciado	Separados	Viudo/a

118a	*Si Casado/a:* **¿Está casado por la Iglesia Católica o por lo civil?**		
	Casado por la iglesia	Casado por lo civil	Casados por ambos

Favor de responder a 119 – 122 si tiene esposo/pareja:

119	**¿Cuál es el nivel más alto de educación de su esposo/esposa/pareja?**	
Ninguno	Septimo	1 año en la Universidad - sin graduar
Pre-Escolar	Octavo	2 años en la Universidad - sin graduar
Kinder / Jardín	Noveno	3 años en la Universidad - sin graduar
Primero	Decimo	Un Título Universaitario de Preparación Básica (*e.j., AA, AS*)
Segundo	Onceavo	El Bachillerato (*e.j., BA, BS, AB*)
Tercero	Graduado de la escuela secundaria // Preparitario	Maestria (*e.j., MA, MS, Meng, Med, MSW, MBA*)
Quarto	GED	Un Título Profesional (*e.j., MD, DDS, DVM, LLB, JD*)
Quinto		Doctorado (*e.j., PhD, EdD*)
Sesto		Otro (*llenar respuesta*):

120	**Por favor seleccione la(s) opción(es) que refleje con más precisión su empleo actual:**							
Tiempo Completo	Medio Tiempo	Estudiante	Ama de casa	Retirado	Discapacitado	Desempleado	Negarse a Contestar	
120	**Si trabaja, ¿Cuál es el nombre de su profesión?**							

121	**¿Cómo describiría su origen étnico o su raza de su esposo/esposa/pareja?** *Marque todos los que apliquen*						
Hispano/ Latino	Blanco	Negro	Asiático	Isleño del pacífico o Americano Nativo	Medio Oriente	Otro:	Negarse a Contestar
121a	**Por favor especifique el especifico país Hispano/Latino con el cual su esposo/esposa/pareja se identifica.**						

122	**¿Cómo describiría la generación de inmigración de su esposo/esposa/pareja?** (*Nota: **<u>No</u>** estamos preguntando sobre su información legal o las circunstancias sobre como su esposo/pareja inmigró a los Estados Unidos si es un inmigrante de primera generación. Esta pregunta es solamente para el propósito de entender mejor su identidad cultural.*)		
	<u>Primera Generación:</u> Vino a vivir a los Estados Unidos de otro país	<u>Segunda Generación:</u> Es un nativo de los Estados Unidos con al menos un padre de primera generación	<u>Tercera Generación:</u> Es un nativo de los Estados Unidos cuyos padres también son nativos de los Estados Unidos

122a	*Si Primera Generación:* **¿A qué edad su esposo/esposa/pareja inmigró a los Estados Unidos? (Si no está seguro/a de la edad exacta de su mejor estimación)**

123	**Actualmente, ¿cuántas personas viven en su hogar (incluyéndose usted)?**

124	**¿Cuál es el ingreso familiar de su hogar por mes – antes de impuestos? (en $ USD)**

125	**¿Cuál es el ingreso familiar promedio de su hogar por año – antes de impuestos? (in US $)**	
	Menos de $10,000	$60,000 - $69,999
	$10,000 - $19,999	$70,000 - $79,999
	$20,000 - $29,999	$80,000 - $89,999
	$30,000 - $39,999	$90,000 - $99,999
	$40,000 - $49,999	$100,000 - $149,999
	$50,000 - $59,999	More than $150,000
		Negarse a contestar

126	**¿Qué tan seguro esta de que podrá producir o comprar suficiente comida para usted y su familia en <u>el próximo mes</u>?**				
	Muy Inseguro	Un Poco Inseguro	No Sé	Un Poco Seguro	Muy Seguro
127	**¿Qué tan seguro esta de que podrá producir o comprar suficiente comida para usted y su familia en <u>los próximos 6 meses</u>?**				
	Muy Inseguro	Un Poco Inseguro	No Sé	Un Poco Seguro	Muy Seguro
128	**¿Qué tan seguro esta de que podrá producir o comprar suficiente comida para usted y su familia en <u>el próximo año</u>?**				
	Muy Inseguro	Un Poco Inseguro	No Sé	Un Poco Seguro	Muy Seguro
128	**¿Qué tan seguro esta de que podrá producir o comprar suficiente comida para usted y su familia en <u>los próximos 5-años</u>?**				
	Muy Inseguro	Un Poco Inseguro	No Sé	Un Poco Seguro	Muy Seguro

130	**¿Usted y su familia inmediata pagan arriendo o tienen casa propia?**		
	Alquilamos	Casa Propia	Otro (*llenar respuesta*):
131	**¿Su familia inmediata tiene carro u otro vehiculo?**		
	Sí	No	Negarse a contestar

131a	*SÍ:* **¿Cuántos carros o vehículos tiene su familia inmediata?**

Sección D: Salud del padre

Tenemos algunas preguntas sobre usted y su salud.

Recuerde, no hay respuestas incorrectas – solo quiero saber lo que usted piensa.

132	**¿Cuántas veces al año va usted al doctor?**							
	Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día

133	**¿Qué tan frecuente toma medicamentos usted?**							
	Nunca	Una vez al año	Varias veces al año	Una vez al mes	Dos veces al mes	Una vez a la semana	Varias veces a la semana	Una vez al día

134	**¿Cómo clasificaría la salud de usted en general?**				
	Excelente – Sin Problemas	Bien - Pocos Problemas	A veces bien, a veces mal	Mal - Muchos Problemas	Muy Mal - Muchos Problemas

Por favor seleccione que tan de acuerdo está con los siguientes:

135	**El estar saludable o no, está en mis manos.**				
	Totalmente En Desacuerdo	En Desacuerdo	No Sé	De Acuerdo	Totalmente De Acuerdo

136	**Estoy saludable porque soy muy espiritual.**				
	Totalmente En Desacuerdo	En Desacuerdo	No Sé	De Acuerdo	Totalmente De Acuerdo

137	**Me enfermaré, sin importar lo que haga.**				
	Totalmente En Desacuerdo	En Desacuerdo	No Sé	De Acuerdo	Totalmente De Acuerdo

138	**Tengo el control de mi propia salud.**				
	Totalmente En Desacuerdo	En Desacuerdo	No Sé	De Acuerdo	Totalmente De Acuerdo

139	**No tengo control sobre mi salud.**				
	Totalmente En Desacuerdo	En Desacuerdo	No Sé	De Acuerdo	Totalmente De Acuerdo

140	**Estoy saludable gracias a mis propios hábitos y comportamientos.**				
	Totalmente En Desacuerdo	En Desacuerdo	No Sé	De Acuerdo	Totalmente De Acuerdo

141	**Si vivo una vida buena y espiritual, me mantendré saludable.**				
	Totalmente En Desacuerdo	En Desacuerdo	No Sé	De Acuerdo	Totalmente De Acuerdo

142	**Mi salud la protege un ser más alto.**				
	Totalmente En Desacuerdo	En Desacuerdo	No Sé	De Acuerdo	Totalmente De Acuerdo

143	**Estoy saludable porque así tenía que ser.**				
	Totalmente En Desacuerdo	En Desacuerdo	No Sé	De Acuerdo	Totalmente De Acuerdo

144	**Ser saludable depende de un estilo de vida saludable.**				
	Totalmente En Desacuerdo	En Desacuerdo	No Sé	De Acuerdo	Totalmente De Acuerdo

145	**Confío que mi fe me mantendrá saludable.**				
	Totalmente En Desacuerdo	En Desacuerdo	No Sé	De Acuerdo	Totalmente De Acuerdo

Sección E: CRT-D

Por favor, responda a estas preguntas lo mejor que pueda.

146	**¿Si está en una carrera y se pasa a la persona en segundo lugar, ¿en qué lugar está?**
147	**¿Quién hace los regalos de navidad en el polo norte?**
148	**Un granjero tiene 5 ovejas. Todas menos 3 se van. ¿Cuántas quedan?**
149	**Si hay 3 manzanas y toma 2, ¿cuántas tiene?**
150	**¿Qué toman las vacas?**
151	**¿Qué pesa más – un kilo de piedras o un kilo de plumas?**
152	**¿Qué nace de un huevo de mariposa?**

¡Gracias por completar la encuesta y contestar nuestras preguntas!

Por favor déjele saber a la investigadora que ha completado la encuesta para que pueda seguir con el juego del iPad y la entrevista verbal.

Appendix C: Parent Interview (One-on-One)

English Version

Note: The researcher asked these questions using a Qualtrics survey on the iPad. Parents were also able to skip any questions they did not want to answer.

Parent Interview Consent

Note: Verbal consent for the parent interview was completed in addition to the written consent that the parent did prior to participating in the study.

This is the parent interview for [#_____] on [*Date* _____].
This interview is being done by [*Name*_____].

We would like to follow up on some of the responses you gave on the questionnaire. The information you provide will be kept completely confidential. You are welcome to tell me to skip any questions that you do not want to answer.

I'd like to video tape and/or audio record our conversation. Is that okay with you?
(*If no, do NOT continue with the interview.*)
Yes No

Do you have any questions about the questionnaire you just completed?
(*If yes, discuss with parent.*)
Yes No

Is there anything you would like to add or talk about before we begin the interview?
(*If yes, discuss with parent.*)
Yes No

Family

To start off, I have a few quick questions about your family.

1	**Who all lives in your home? (e.g., partner / spouse / other children / grandparents)?**
2	**What is the % of time your child spends with each of the caregivers in the home?**
3	**How many children do you have? And what are their ages and genders?**

Section A: Why vs How people get Sick

Note: The iPad will randomize the order of how and why

Now I have a few questions for you about sickness.

3	**<u>Why</u> do people get sick?** [*Prompt*: ***Is there any other reason why people get sick?*** *until they say "No"*]
4	**<u>How</u> do people get sick?** [*Prompt*: ***Is there any other <u>way</u> in which people get sick?*** *until they say "No"*]

Stories: Description

Now I would like to know your thoughts and beliefs about the causes and treatments of a few illnesses. I'll tell you some really short stories about a character who is sick with some type of illness, and I want to know what you think caused that type of illness. Then I'll ask you what you think are the causes that treat that type of illness so that the character in the story is no longer sick.

Remember, there is no right or wrong answer - I just want to know what you think.

Section B: Sickness #1 – Cold

5	**First, what do you think it means to be sick with a cold?** [*If parent doesn't know how to answer, say, "If someone is sick with a cold, what does that mean? What types of things are they sick with?"*] [*Prompt with "**Anything else?**" until they say "No"*]

*****Gender match to gender of child participating (Martin = Boy, Clara = Girl)*****

MALE CHILD:

Martin is sick with a cold. Martin has a runny nose and blows his nose a lot.

FEMALE CHILD:

Clara is sick with a cold. Clara has a runny nose and blows her nose a lot.

Note: The iPad will randomize the order of how and why

6	**<u>How</u> do you think [Martin | Clara] got sick with a cold?** [*If the answer is one of the causal mechanisms listed in table on next page, check it for "yes". Otherwise, write answer down on spaces at bottom of paper*] AND

	[*Prompt with "***Is there any other <u>way</u> [Martin | Clara] could have gotten a cold?***" until they say "No"*]
7	**<u>Why</u> do you think [Martin | Clara] got sick with a cold?** [*If the answer is one of the causal mechanisms listed in table on next page, check it for "yes". Otherwise, write answer down on spaces at bottom of paper.*] AND [*Prompt with "***Is there any other <u>reason</u> [Martin | Clara] could have gotten a cold?***" until they say "No"*]

8	**Are these the explanations you would give your child as for how/why someone gets sick with a cold?**				
	Yes	No	Don't Know	Participant Requested to Skip (999)	Other:
8a	*If "NO" or "Don't Know":* **What would you tell your child?**				

9-34. Now I want to know, do you think any of the following caused [Martin | Clara] to get sick with a cold?
Ask about each individually. [*Note: causes randomized on iPad*]

Do you think that _____ caused [Martin | Clara] to get sick with a cold?

Germs	**An Angel**	**God**	**Saints**
Going outside with wet hair	**Bad Air / Pollution**	**Magic**	**Witchcraft**
Going outside without a jacket on / going outside without warm clothes	**Demons**	**Eating Unhealthy**	**Not going to mass / church**
Playing with friends who are sick	**The Evil-Eye**	**Jesus**	**Genetics / Heredity**
Cold Air / Cold Weather	**Fate**	**A Priest**	**Doing something bad to someone else**
Eating Cold Food	**Not Praying**	**Ghosts or Spirits**	
Luck	**Karma**	**The Devil**	

Space for any other causes listed during the how/why open-ended questions:

35	**You said that ___(***List everything parent said yes to or listed above***)_____could cause [Martin | Clara] to get sick with a cold. Can you explain to me how these would cause a cold? For example, do they work together or separate? You can explain it with a story if you'd like.** **can tell more than 1 story**

	After parent is done telling stories, if there are any causes the parent has NOT mentioned, ask about each, individually, by saying, "So how does X cause someone to get sick with a cold? Does it work with A, B, C, ...?" and ask if it works with any of the other causes marked as "yes".

36	**Have you ever talked with your child about what causes people to get sick with a cold?**				
	Yes	No *(go to 36f)*			
36a	*IF YES:* (a) **Did your child ask you or did you bring it up in conversation?**				
	Child	Parent	Both Parent & Child		
36b	(b) **How old was your child when you first started talking to them about the causes of a cold?** [*If don't know, ask them to estimate*.]				
36c	(c) **What did you tell your child? / What type of explanations did you give him/her?**				
36d	(d) **Do you still talk about the causes of a cold with your child?**			Yes	No
36e	*IF YES:* (e) **How often do you talk about it?**				
36f	**(f) Why not?**				

37	**How old do you think children (in general) should be to learn about the causes of a cold?**
37a	**Why that age?**

38	**Do you think parents should be the primary people who teach children about the causes of a cold? Or do you think there are other communities / people / outlets that should teach children about the causes of a cold?** *If not parents:* **Who / what are the other communities / people?**

Other than parents,

39	**Do you think children should be learning about the causes of a cold from <u>older siblings or older cousins</u>?**	
	Yes	No *(go to 39e)*
39a	*IF YES:* (a) **What types of things do you think older siblings or older cousins SHOULD be teaching children about the causes of a cold?**	
39b	**Is there anything that you think older siblings or older cousins SHOULD NOT be teaching children about the causes of a cold?**	

39c	**How old should an <u>older sibling or older cousin</u> be to teach a young child about the causes of a cold?**
39d	**How old should the <u>younger child</u> be to learn about causes of a cold from older siblings or cousins?**
39e	*IF <u>NO</u>:* **Why not?**

40	**Do you think children should be learning about the causes of a cold from <u>their friends</u>?**	
	Yes	No *(go to 40e)*
40a	*IF YES:* (a) **What types of things do you think friends SHOULD be teaching children about the causes of a cold?**	
40b	**Is there anything that you think friends SHOULD NOT be teaching children about the causes of a cold?**	
40c	**How old should the <u>friend</u> be to teach a young child about the causes of a cold?**	
40d	**How old should the <u>child</u> be to learn about causes of a cold from friends?**	
40e	*IF <u>NO</u>:* **Why not?**	

41	**Do you think children should be learning about the causes of a cold from <u>their school or teachers</u>?**	
	Yes	No *(go to 41d)*
41a	*IF YES:* (a) **What types of things do you think the teachers / schools SHOULD be teaching children about the causes of a cold?**	
41b	**Is there anything that you think the teachers / schools SHOULD NOT be teaching children about the causes of a cold?**	
41c	**How old should a child be to learn about causes of a cold from the educational community?**	
41d	*IF <u>NO</u>:* **Why not?**	

42	**Do you think children should be learning about the causes of a cold from <u>the hospital or a doctor or nurse</u>?**	
	Yes	No *(go to 42d)*
42a	*IF YES:* (a) **What types of things do you think the medical community SHOULD be teaching children about the causes of a cold?**	
42b	**Is there anything that you think the medical community SHOULD NOT be teaching children about the causes of a cold?**	
42c	**How old should a child be to learn about causes of a cold from the medical community?**	

42d	*IF NO:* **Why not?**

43	**Do you think children should be learning about the causes of a cold from the church or a priest or religious text?**	
	Yes	No *(go to 43d)*
43a	*IF YES:* (a) **What types of things do you think the religious community SHOULD be teaching children about the causes of a cold?**	
43b	**Is there anything that you think the religious community SHOULD NOT be teaching children about the causes of a cold?**	
43c	**How old should a child be to learn about causes of a cold from the religious community?**	
43d	*IF NO:* **Why not?**	

44	**Other than the people and communities we just talked about, is there anyone else / any other community / or any other way in which you think children should learn about the causes of a cold from?**	
	Yes	No
44a	*IF YES:* **Who?**	
44b	*IF YES:* **What should they be teaching children?**	

45	**In what ways do you think these different people or communities should work together to teach children about the causes of a cold?** **For example, does the role of each community/person change as the child gets older? And if so, how?**
46	**Do parents always remain the primary person to talk to their children about the causes of a cold - even when the child is older (e.g., a teenager)? Or, do you believe that other communities should have this responsibility when a child is older?**

Cold Better

*****Gender match to gender of child participating (Martin = Boy, Clara = Girl)*****

MALE CHILD:

I told you earlier about how a boy named Martin had a cold. Well now Martin is all better! His nose is no longer runny, and he doesn't blow his nose anymore. Martin is no longer sick.

FEMALE CHILD:

I told you earlier about how a girl named Clara had a cold. Well now Clara is all better! Her nose is no longer runny, and she doesn't blow her nose anymore. Clara is no longer sick.

Note: The iPad will randomize the order of how and why

47	**<u>Why</u> do you think [Martin | Clara] got better from a cold?** [*If the answer is one of the causal mechanisms listed in table on next page, check it for "yes". Otherwise, write answer down on spaces at bottom of paper.*] AND [*Prompt with "***Is there any other <u>reason</u> [Martin | Clara] could have gotten better from a cold?***" until they say "No"*]
48	**<u>How</u> do you think [Martin | Clara] got better from a cold?** [*If the answer is one of the causal mechanisms listed in table on next page, check it for "yes". Otherwise, write answer down on spaces at bottom of paper*] AND [*Prompt with "***Is there any other <u>way</u> [Martin | Clara] could have gotten better from a cold?***" until they say "No"*]

49	**Are these the explanations you would give your child as for how/why someone gets better from a cold?**				
	Yes	No	Don't Know	Participant Requested to Skip (999)	Other:
49a	*If "NO" or "Don't Know":* **What would you tell your child?**				

50-69. Now I want to know, do you think any of the following caused [Martin | Clara] to get better from a cold?
Ask about each individually. [*Note: causes randomized on iPad*]

Do you think that _____ caused [Martin | Clara] to get better from a cold?

Medicine	**A Miracle**	**Magic**	**Saints**
A Doctor	**Fate**	**Jesus**	**Eating Healthy**
Luck	**Praying**	**A Priest**	**Witchcraft**
An Angel	**Karma**	**Ghosts or Spirits**	**Going to Mass / Church**
Herbal Remedies	**God**	**Praying the Rosary**	**Doing something good to someone else**

Space for any other causes listed during the how/why open-ended questions:

70	**You said that _____could cause [Martin | Clara] to get better from a**

	cold. Can you explain to me how these would cause someone to get better from a cold? For example, do they work together or separate? You can explain it with a story if you'd like. **can tell more than 1 story** *After parent is done telling stories, if there are any causes the parent has NOT mentioned, ask about each, individually, by saying, "So how does X cause someone to get better from a cold? Does it work with A, B, C, ...?" and ask if it works with any of the other causes marked as "yes".*

Section C: Sickness #2 – Cancer

71	**First, what do you think it means to be sick with cancer?** [*If they don't know how to answer, say, "If someone is sick with cancer, what does that mean? What types of things are they sick with?"*] [*Prompt with "**Anything else?**" until they say "No"*]

*****Gender match to gender of child participating (Javier = Boy, Violeta = Girl)*****

MALE CHILD:
Javier is sick with cancer. He has a lot of pain, and he can't eat very much food.

FEMALE CHILD:
Violeta is sick with cancer. She has a lot of pain, and she can't eat very much food.

Note: The iPad will randomize the order of how and why

72	**<u>Why</u> do you think [Javier | Violeta] got sick with cancer?** [*If the answer is one of the causal mechanisms listed in table on next page, check it for "yes". Otherwise, write answer down on spaces at bottom of paper.*] AND [*Prompt with "***Is there any other <u>reason</u> [Javier | Violeta] could have gotten sick with cancer?***" until they say "No"*]
73	**<u>How</u> do you think [Javier | Violeta] got sick with cancer?** [*If the answer is one of the causal mechanisms listed in table on next page, check it for "yes". Otherwise, write answer down on spaces at bottom of paper*] AND [*Prompt with "***Is there any other <u>way</u> [Javier | Violeta] could have gotten sick with cancer?***" until they say "No"*]

74	**Are these the explanations you would give your child as for how/why someone gets sick with cancer?**				
	Yes	No	Don't Know	Participant Requested to Skip (999)	Other:
74a	*If "NO" or "Don't Know":* **What would you tell your child?**				

75-97. Now I want to know, do you think any of the following caused [Javier | Violeta] to get sick with cancer?
Ask about each individually. [*Note: causes randomized on iPad*]

Do you think that _____ caused [Javier | Violeta] to get sick with cancer?

Germs	**An Angel**	**God**	**Saints**
Going outside with wet hair	**Bad Air / Pollution**	**Magic**	**Witchcraft**
Going outside without a jacket on / going outside without warm clothes	**Demons**	**Eating Unhealthy**	**Not going to mass / church**
Playing with friends who are sick	**The Evil-Eye**	**Jesus**	**Genetics / Heredity**
Cold Air / Cold Weather	**Fate**	**A Priest**	**Doing something bad to someone else**
Eating Cold Food	**Not Praying**	**Ghosts or Spirits**	
Luck	**Karma**	**The Devil**	

Space for any other causes listed during the how/why open-ended questions:

98	**You said that _____could cause [Javier | Violeta] to get sick with cancer. Can you explain to me how these would cause cancer? For example, do they work together or separate? You can explain it with a story if you'd like.** **can tell more than 1 story** *After parent is done telling stories, if there are any causes the parent has NOT mentioned, ask about each, individually, by saying, "So how does X cause someone to get sick with cancer? Does it work with A, B, C, ...?" and ask if it works with any of the other causes marked as "yes".*

99	**Have you ever talked with your child about what causes people to get sick with cancer?**	
	Yes	No *(go to 99f)*

99a	*IF YES:* (a) **Did your child ask you or did you bring it up in conversation?**				
	Child	Parent	Both Parent & Child		
99b	(b) **How old was your child when you first started talking to them about the causes of cancer?** [*If don't know, ask them to estimate*.]				
99c	(c) **What did you tell your child? / What type of explanations did you give him/her?**				
99d	(d) **Do you still talk about the causes of cancer with your child?**			Yes	No
99e	*IF YES:* (e) **How often do you talk about it?**				
99f	**(f) Why not?**				

100	**How old do you think children (in general) should be to learn about the causes of a cold?**
100a	**Why that age?**

101	**Do you think parents should be the primary people who teach children about the causes of cancer? Or do you think there are other communities / people / outlets that should teach children about the causes of cancer?** *If not parents:* **Who / what are the other communities / people?**

Other than parents,

102	**Do you think children should be learning about the causes of cancer from <u>older siblings or older cousins</u>?**	
	Yes	No *(go to 102e)*
102a	*IF YES:* (a) **What types of things do you think older siblings or older cousins SHOULD be teaching children about the causes of cancer?**	
102b	**Is there anything that you think older siblings or older cousins SHOULD NOT be teaching children about the causes of cancer?**	
102c	**How old should an <u>older sibling or older cousin</u> be to teach a young child about the causes of cancer?**	
102d	**How old should the <u>younger child</u> be to learn about causes of cancer from older siblings or cousins?**	
102e	*IF <u>NO</u>:* **Why not?**	

103	**Do you think children should be learning about the causes of cancer from <u>their friends</u>?**

	Yes	No *(go to 103e)*
103a	*IF YES:* (a) **What types of things do you think friends SHOULD be teaching children about the causes of cancer?**	
103b	**Is there anything that you think friends SHOULD NOT be teaching children about the causes of cancer?**	
103c	**How old should the <u>friend</u> be to teach a young child about the causes of cancer?**	
103d	**How old should the <u>child</u> be to learn about causes of cancer from friends?**	
103e	*IF <u>NO</u>:* **Why not?**	

104	**Do you think children should be learning about the causes of cancer from <u>their school or teachers</u>?**	
	Yes	No *(go to 104d)*
104a	*IF YES:* (a) **What types of things do you think the teachers / schools SHOULD be teaching children about the causes of cancer?**	
104b	**Is there anything that you think the teachers / schools SHOULD NOT be teaching children about the causes of cancer?**	
104c	**How old should a child be to learn about causes of cancer from the educational community?**	
104d	*IF <u>NO</u>:* **Why not?**	

105	**Do you think children should be learning about the causes of cancer from <u>the hospital or a doctor or nurse</u>?**	
	Yes	No *(go to 105d)*
105a	*IF YES:* (a) **What types of things do you think the medical community SHOULD be teaching children about the causes of cancer?**	
105b	**Is there anything that you think the medical community SHOULD NOT be teaching children about the causes of cancer?**	
105c	**How old should a child be to learn about causes of cancer from the medical community?**	
105d	*IF <u>NO</u>:* **Why not?**	

106	**Do you think children should be learning about the causes of cancer from <u>the church or a priest or religious text</u>?**	
	Yes	No *(go to 106d)*
106a	*IF YES:* (a) **What types of things do you think the religious community SHOULD be teaching children about the causes of cancer?**	
106b	**Is there anything that you think the religious community SHOULD NOT**	

	be teaching children about the causes of cancer?
106c	**How old should a child be to learn about causes of cancer from the religious community?**
106d	*IF NO:* **Why not?**

107	**Other than the people and communities we just talked about, is there anyone else / any other community / or any other way in which you think children should learn about the causes of cancer from?**	
	Yes	No
107a	*IF YES:* **Who?**	
107b	*IF YES:* **What should they be teaching children?**	

108	**In what ways do you think these different people or communities should work together to teach children about the causes of cancer?** **For example, does the role of each community/person change as the child gets older? And if so, how?**
109	**Do parents always remain the primary person to talk to their children about the causes of cancer- even when the child is older (e.g., a teenager)? Or, do you believe that other communities should have this responsibility when a child is older?**

Cancer Better

*****Gender match to gender of child participating (Javier = Boy, Violeta = Girl)*****

MALE CHILD:

I told you earlier about how a boy named Javier had cancer. Well now Javier is all better! The pain is all gone, and he can eat food again. Javier is no longer sick.

FEMALE CHILD:

I told you earlier about how a girl named Violeta had cancer. Well now Violeta is all better! The pain is all gone, and she can eat food again. Violeta is no longer sick.

Note: The iPad will randomize the order of how and why

110	**How do you think [Javier | Violeta] got better from cancer?** [*If the answer is one of the causal mechanisms listed in table on next page, check it for "yes". Otherwise, write answer down on spaces at bottom of paper*] AND [*Prompt with "***Is there any other way [Javier | Violeta] could have gotten**

	better from cancer?*" until they say "No"*]
111	**<u>Why</u> do you think [Javier | Violeta] got better from cancer?** [*If the answer is one of the causal mechanisms listed in table on next page, check it for "yes". Otherwise, write answer down on spaces at bottom of paper.*] AND [*Prompt with "***Is there any other <u>reason</u> [Javier | Violeta] could have gotten better from cancer?***" until they say "No"*]

112	**Are these the explanations you would give your child as for how/why someone gets better from cancer?**				
	Yes	No	Don't Know	Participant Requested to Skip (999)	Other:
112a	*If "NO" or "Don't Know":* **What would you tell your child?**				

113-132. Now I want to know, do you think any of the following caused [Javier | Violeta] to get better from cancer?
Ask about each individually. [*Note: Causes randomized on iPad*]

Do you think that _____ caused [Javier | Violeta] to get better from cancer?

Medicine	**A Miracle**	**Magic**	**Saints**
A Doctor	**Fate**	**Jesus**	**Eating Healthy**
Luck	**Praying**	**A Priest**	**Witchcraft**
An Angel	**Karma**	**Ghosts or Spirits**	**Going to Mass / Church**
Herbal Remedies	**God**	**Praying the Rosary**	**Doing something good to someone else**

Space for any other causes listed during the how/why open-ended questions:

133	**You said that _____could cause [Javier | Violeta] to get better from cancer. Can you explain to me how these would cause someone to get better from cancer? For example, do they work together or separate? You can explain it with a story if you'd like.** **can tell more than 1 story** *After parent is done telling stories, if there are any causes the parent has NOT mentioned, ask about each, individually, by saying, "So how does X cause someone to get better from cancer? Does it work with A, B, C, ...?" and ask if it works with any of the other causes marked as "yes".*

Section D: Ages for Own Child

*Note: *this is for their own child specifically learning about the causes of the cold or the causes of cancer from ANYWHERE (from people/books/movies/etc) – what are the ages their child should learn about each? And why?*

134	**Do you think YOUR child should know about the causes of a cold and the causes of cancer at around the same age? Or should your child wait to learn about the causes of cancer until they are a little bit older?**	
	Same Age for Cold & Cancer	Older to learn about causes of cancer

135	**What would be the best age for your child to learn about causes of a cold?**
135a	**Why that age?**

136	**What would be the best age for your child to learn about causes of cancer?**
136a	**Why that age?**

Section E: Prayer

Okay I have a few questions about prayer before we finish.

137	**Do prayers come true?**			
	No Never	Yes But rarely	Yes Sometimes	Yes Always
137a	*YES* **Why do prayers come true?**			
137b	*YES* **How do you know prayers come true?**			
137c	*NO* **Why don't prayers come true?**			
137d	*NO* **How do you know prayers do NOT come true?**			

138	**When praying the rosary, Hail Mary, or structured prayers such as the Lord's Prayer, do those types of prayers come true?**			
	No Never	Yes But rarely	Yes Sometimes	Yes Always
138a	*YES* **Why?**			
138b	*YES* **How do you know?**			
138c	*NO* **Why not?**			
138d	*NO* **How do you know?**			

139	**Does God answer your prayers?**			
	No Never	Yes But rarely	Yes Sometimes	Yes Always
139a	*YES* **Why?**			
139b	*YES* **How do you know?**			
139c	*NO* **Why not?**			
139d	*NO* **How do you know?**			

140	**Does what you pray for happen in real life?**			
	No Never	Yes But rarely	Yes Sometimes	Yes Always
140a	*YES* **Why?**			
140b	*YES* **How do you know?**			
140c	*NO* **Why not?**			
140d	*NO* **How do you know?**			

141	**Does prayer have an effect on the real world? Such as the biological world or physical world?**			
	No Never	Yes But rarely	Yes Sometimes	Yes Always
141a	*YES* **How does prayer have an effect on the real world?**			
141b	*NO* **Why doesn't prayer have an effect on the real world?**			

142	**What types of things do <u>you</u> pray for?** [*Prompt with "**Anything else?**" until they say "No"*]
143	**What types of things does <u>your child</u> pray for?** [*Prompt with "**Anything else?**" until they say "No"*]
144	**If you ask someone else, like your family or friends, to pray for you or your family, what types of things do you ask them to pray for?** [*Prompt with "**Anything else?**" until they say "No"*]

145	**In general, do people pray for both good and bad things?**		
	Yes		No
146	**Would praying for good things and bad things be called the same thing?**		
	Yes	No – Different Things	It's not possible to pray for bad things
146a	*If NO* **What would each be called?** *Praying for good things =*		

	Praying for bad things =	
147	**In general, do people ever pray for someone else to get sick?**	
	Yes	No
147a	*YES* **Why?**	
147b	*NO* **Why not?**	

148	**What is the difference between *orar* and *rezar*, if any?**

149	**Do you have anything to add/say about your beliefs about prayer that you think would be important for us to know**	
	Yes	No
149a	*YES* **What?**	

Section F: Conclusion

That concludes the parent interview I had for you today. Thank you so much for answering all of our questions!

150	**Do you have any questions for us before we finish everything up?**	
	Yes	No
150a	*YES* **What?**	

This was the parent interview for [#_____] on [*Date*_____].
This interview was done by [*Name*_____].

We will now play our last game on the iPad (Spanish Vocab), and then we are all done.

Parent Interview (One-on-One) – Spanish Version

Note: The researcher asked these questions using a Qualtrics survey on the iPad. Parents were also able to skip any questions they did not want to answer.

Parent Interview Consent

Note: Verbal consent for the parent interview was completed in addition to the written consent that the parent did prior to participating in the study.

This is the parent interview for [#_____] on [*Date*_____].
This interview is being done by [*Name*_____].

Nos gustaría seguir adelante con algunas de las respuestas del cuestionario. La información que usted nos proveerá será completamente confidencial. Si gusta, me puede pedir que omita las preguntas que usted no quiera responder.

Me gustaría grabar nuestra conversación. ¿Está de acuerdo?
(*If no, do NOT continue with the interview.*)
Sí No

¿Tiene alguna pregunta acerca del cuestionario que acaba de completar?
(*If yes, discuss with parent.*)
Sí No

¿Hay algo que quisiera añadir antes que comencemos la entrevista?
(*If yes, discuss with parent.*)
Sí No

Family

Para comenzar, tengo unas preguntas de su familia.

1	**¿Quiénes son las personas que viven en casa? (por ejemplo, pareja, esposo, abuelos)**
2	**¿Cuál es el porcentaje de tiempo que su hijo/a pasa con cada cuidador/a en casa?**
3	**¿Cuántos hijos tiene? ¿Y qué son sus edades y géneros?**

Section A: Why vs How people get Sick

Note: The iPad will randomize the order of how and why

Ahora tengo algunas preguntas acerca de enfermedades.

3	**¿<u>Por qué</u> se enferma una persona?** (*With any type of sickness – in general*) [*Prompt*: ***¿Hay alguna otra <u>razón</u> por qué una persona se enferma?*** *until they say "No"*]
4	**¿<u>Cómo</u> se enferma una persona?** (*With any type of sickness – in general*) [*Prompt*: ***¿Hay alguna otra <u>manera</u> por la cual una persona se enferma?*** *until they say "No"*]

Stories: Description

Ahora me gustaría saber sus pensamientos y creencias acerca de las causas y tratamientos de algunas enfermedades

Recuerde, no hay respuestas incorrectas – solo quiero saber lo que usted piensa.

Section B: Sickness #1 – Cold

5	**Primero, ¿qué significa estar enfermo de un resfriado?** [*If they don't know how to answer, say, "¿Si alguien está enfermo de un resfriado, eso qué significa? ¿Qué tipo de síntomas tiene?"*] [*Prompt with "**¿Algo más?**" until they say "No"*]

*****Gender match to gender of child participating (Martín = Boy, Clara = Girl)*****

MALE CHILD:

Martín tiene un resfriado. La nariz le moquea y se la suena mucho.

FEMALE CHILD:

Clara tiene un resfriado. La nariz le moquea y se la suena mucho.

Note: The iPad will randomize the order of how and why

6	**¿<u>Cómo</u> cree que [Martín | Clara] se enfermó de un resfriado??** [*If the answer is one of the causal mechanisms listed in table on next page, check it for "yes". Otherwise, write answer down on spaces at bottom of paper*] AND [*Prompt with "**¿Hay alguna otra <u>manera</u> por la cual [Martín | Clara] se pudo haber enfermado de un resfriado?**" until they say "No"*]
7	**¿<u>Por qué</u> cree que [Martín | Clara] se enfermó de un resfriado??** [*If the answer is one of the causal mechanisms listed in table on next page, check it for "yes". Otherwise, write answer down on spaces at bottom of paper*] AND

	[*Prompt with "**¿Hay alguna otra <u>razón</u> por qué [Martín | Clara] se pudo haber enfermado de un resfriado?**" until they say "No"*]

8	**¿Esas son las explicaciones que le daría a su hijo/a de por qué alguien se enferma de un resfriado?**				
	Sí	No	No Sé	Participant Requested to Skip (999)	Other:
8a	*If "NO" or "Don't Know":* **¿Cuál sería la explicación que le daría a su hijo/a de por qué alguien se enferma de un resfriado?**				

9-34. Ahora quiero saber si usted cree que algunas de las siguientes causaron que [Martín / Clara] se enfermara de un resfriado?
Ask about each individually. [*Note: causes randomized on iPad*]

¿Cree que _____ causó que [Martín / Clara] se enfermara de un resfriado?

Gérmenes	**Un Ángel**	**Dios**	**Santos**
Salir con el Pelo mojado	**Contaminación del aire**	**Magia**	**Brujería**
Salir sin abrigo	**Demonios**	**No comer saludable**	**No asistir a la Misa**
Jugar con amigos que estén enfermos	**Mal de ojo**	**Jesús**	**Los Genes o Herencia**
Clima Frío	**El Destino**	**Un Sacerdote / Padre**	**Hacerle algo malo a otra persona**
Comer comida fría	**NO orar / rezar**	**Fantasmas o Espíritus**	
La Suerte	**Karma**	**El diablo**	

Space for any other causes listed during the how/why open-ended questions:

35	**Usted dijo que _____ podría causar que [Martín I Clara] se enfermara de un resfriado. ¿Me puede explicar cómo estas cosas pueden causar un resfriado? Por ejemplo, ¿trabajan juntos o por separado? Lo puede explicar en un cuento si quiere.** **can tell more than 1 story** *After parent is done telling stories, if there are any causes the parent has NOT mentioned, ask about each, individually, by saying, "**Exactamente, ¿CÓMO causa X que alguien se enfermara de un resfriado? ¿Trabaja con A, B, C, ...?"** and ask if it works with any of the other causes marked as yes.*

36	**¿Alguna vez ha hablado con su hijo/a acerca de las causas de un resfriado?**				
	Sí	No *(go to 36f)*			
36a	*IF YES:* (a) **¿Su hijo/a le preguntó o fue usted quién lo mencionó?**				
	Hijo/a	Padre	Ambos		
36b	(b) **¿Qué edad tenía su hijo/a cuando usted le habló de las causas de un resfriado por primera vez?** [*If don't know, ask them to estimate*.]				
36c	(c) **¿Qué le dijo a su hijo/a? ¿Qué tipo de explicaciones le dio?**				
36d	(d) **¿Todavía habla con su hijo/a acerca de las causas de un resfriado?**			Sí	No
36e	*IF YES:* (e) **¿Qué tan frecuente hablan de las causas de un resfriado?**				
36f	**(f) ¿Por qué no?**				

37	**En general, ¿a qué edad deben los niños aprender acerca de las causas de un resfriado?**
37a	**¿Por qué esa edad?**

38	**¿Cree que los padres deben ser los principales en enseñarle a los hijos/as acerca de las causas de un resfriado? ¿O cree que hay otras personas/comunidades que deben enseñarles las causas de un resfriado?** *If not parents:* **¿Cuáles son las otras comunidades o personas?**

Además de los padres,

39	**¿Cree que los niños deben aprender las causas de un resfriado, de sus hermanos mayores o primos mayores?**		
	Sí	No *(go to 39e)*	
39a	*SÍ:* (a) **¿Qué tipo de cosas cree que hermanos mayores o primos mayores DEBEN enseñarles a los niños acerca de las causas de un resfriado?**		
39b	**¿Hay alguna cosa que cree que hermanos mayores o primos mayores NO DEBEN enseñarles a los niños acerca de las causas de un resfriado?**		
39c	**¿Qué edad debe tener <u>un hermano mayor o primo mayor</u> para enseñarle a un niño de las causas de un resfriado?**		
39d	**¿Qué edad debe tener <u>el niño menor</u> para aprender de las causas de un resfriado de los hermanos o primos mayores?**		
39e	*IF <u>NO</u>:* **¿Por qué no?**		

40	**¿Cree que los niños deben aprender las causas de un resfriado de los <u>amigos</u>?**	
	Sí	No *(go to 40e)*
40a	*SÍ:* (a) **¿Qué tipo de cosas cree que <u>los amigos</u> DEBEN enseñarles a los niños acerca de las causas de un resfriado?**	
40b	**¿Hay alguna cosa que cree que <u>los amigos</u> NO DEBEN enseñarles a los niños acerca de las causas de un resfriado?**	
40c	**¿Qué edad debe tener <u>un amigo</u> para enseñarle a un niño de las causas de un resfriado?**	
40d	**¿Qué edad debe tener <u>el niño</u> para aprender de las causas de un resfriado de los amigos?**	
40e	*IF <u>NO</u>:* **¿Por qué no?**	

41	**¿Cree que los niños deben aprender las causas de un resfriado de <u>sus maestros o de las escuelas</u>?**	
	Sí	No *(go to 41d)*
41a	*SÍ:* (a) **¿Qué tipo de cosas cree que <u>los maestros o las escuelas</u> DEBEN enseñarles a los niños acerca de las causas de un resfriado?**	
41b	**¿Hay alguna cosa que cree que <u>los maestros o las escuelas</u> NO DEBEN enseñarles a los niños acerca de las causas de un resfriado?**	
41c	**¿Qué edad debe tener <u>el niño</u> para aprender de las causas de un resfriado de los maestros o las escuelas?**	
41d	*IF <u>NO</u>:* **¿Por qué no?**	

42	**¿Cree que los niños deben aprender las causas de un resfriado de <u>los hospitales, doctores, o enfermeras</u>?**	
	Sí	No *(go to 42d)*
42a	*SÍ:* (a) **¿Qué tipo de cosas cree que <u>la comunidad médica</u> DEBE enseñarles a los niños acerca de las causas de un resfriado?**	
42b	**¿Hay alguna cosa que cree que <u>la comunidad médica</u> NO DEBE enseñarles a los niños acerca de las causas de un resfriado?**	
42c	**¿Qué edad debe tener <u>el niño</u> para aprender de las causas de un resfriado de un hospital, doctor, o enfermera?**	
42d	*IF <u>NO</u>:* **¿Por qué no?**	

43	**¿Cree que los niños deben aprender las causas de un resfriado de <u>la iglesia, sacerdotes, o libros religiosos</u>?**

	Sí	No *(go to 43d)*
43a	*SÍ:* (a) **¿Qué tipo de cosas cree que <u>la comunidad religiosa</u> DEBE enseñarles a los niños acerca de las causas de un resfriado?**	
43b	**¿Hay alguna cosa que cree que <u>la comunidad religiosa</u> NO DEBE enseñarles a los niños acerca de las causas de un resfriado?**	
43c	**¿Qué edad debe tener <u>el niño</u> para aprender de las causas de un resfriado de la iglesia, sacerdotes, o libros religiosos?**	
43d	*IF <u>NO</u>:* **¿Por qué no?**	

44	**Además de las personas y comunidades de las que acabamos de hablar, ¿hay alguien más u otra comunidad o manera en la que los niños deben aprender de las causas de un resfriado?**	
	Sí	No
44a	*IF <u>YES</u>:* **¿Quién / cual comunidad debe enseñarles?**	
44b	*IF <u>YES</u>:* **¿Qué deben enseñarles?**	

45	**¿De qué manera deben estas comunidades trabajar juntas para enseñarles a los niños las causas de un resfriado?** **Por ejemplo, ¿el papel de cada persona/comunidad cambia a la medida que el niño va creciendo? Si sí, ¿cómo?**
46	**¿Cree que los padres deben ser las personas principales para hablar con sus hijos sobre las causas de un resfriado – aunque cuando un hijo es más grande (por ejemplo 14-años)? O, ¿cree que las otras comunidades deben tener esta responsabilidad cuando un hijo es más grande?**

Cold Better

*****Gender match to gender of child participating (Martín = Boy, Clara = Girl)*****

MALE CHILD:

Anteriormente le conté que Martín tenía un resfriado. ¡Ya está mejor! La nariz ya no le moquea, y no se la suena. ¡Martín ya no está enfermo!

FEMALE CHILD:

Anteriormente le conté que Clara tenía un resfriado. ¡Ya está mejor! La nariz ya no le moquea, y no se la suena. ¡Clara ya no está enferma!

Note: The iPad will randomize the order of how and why

47	**¿<u>Por qué</u> cree que [Martín | Clara] se mejoró de un resfriado?** [*If the answer is one of the causal mechanisms listed in table on next page, check it for "yes". Otherwise, write answer down on spaces at bottom of paper.*] AND [*Prompt with "*¿**Hay alguna otra <u>razón</u> por qué [Martín | Clara] se pudo haber mejorado de un resfriado?***" *until they say "No"*]
48	**¿<u>Cómo</u> cree que [Martín | Clara] se mejoró de un resfriado?** [*If the answer is one of the causal mechanisms listed in table on next page, check it for "yes". Otherwise, write answer down on spaces at bottom of paper*] AND [*Prompt with "*¿**Hay alguna otra <u>manera</u> por la cual [Martín | Clara] se pudo haber mejorado de un resfriado?***" *until they say "No"*]

49	**¿Esas son las explicaciones que le daría a su hijo/a de cómo alguien se alivia de un resfriado?**				
	Sí	No	No Sé	Participant Requested to Skip (999)	Other:
49a	*If "NO" or "Don't Know":* **¿Cuál sería la explicación que le daría a su hijo/a de por qué alguien se alivia de un resfriado?**				

50-69. Ahora quiero saber si usted cree que las siguientes causaron que [Martín I Clara] se aliviara de un resfriado.
Ask about each individually. [*Note: causes randomized on iPad*]

¿Cree que _____ causó que [Martín I Clara] se aliviara de un resfriado?

Medicina	**Un Milagro**	**Magia**	**Santos**
Un Doctor	**El Destino**	**Jesús**	**Comer saludable**
La Suerte	**Orar**	**Un sacerdote / padre**	**Brujería**
Un Ángel	**Karma**	**Fantasmas o Espíritus**	**Asistir a la misa**
Remedios Naturales	**Dios**	**Rezar el Rosario**	**Hacer algo Bueno por otra persona**

Space for any other causes listed during the how/why open-ended questions:

70	**Usted dijo que _____ podría causar que [Martín I Clara] se mejorara de un resfriado. ¿Me puede explicar cómo estas cosas pueden causar que [Martín I Clara] me mejorara de un resfriado? Por ejemplo, ¿trabajan juntos o por separado? Lo puede explicar en un cuento si quiere.**

	can tell more than 1 story *After parent is done telling stories, if there are any causes the parent has NOT mentioned, ask about each, individually, by saying, " Exactamente, ¿CÓMO causa X que alguien se mejorara de un resfriado? ¿Trabaja con A, B, C, ...?" and ask if it works with any of the other causes marked as "yes".*

Section C: Sickness #2 – Cancer

71	**Primero, ¿qué significa estar enfermo de cáncer?** [*If they don't know how to answer, say, "¿Si alguien está enfermo de cáncer, eso qué significa? ¿Qué tipo de síntomas tiene?"*] [*Prompt with "**¿Algo más?**" until they say "No"*]

*****Gender match to gender of child participating (Javier = Boy, Violeta = Girl)*****

MALE CHILD:
Javier está enfermo con cáncer. Él tiene mucho dolor, y no puede comer mucho.

FEMALE CHILD:
Violeta está enferma con cáncer. Ella tiene mucho dolor, y no puede comer mucho.

Note: The iPad will randomize the order of how and why

72	**¿Por qué cree que [Javier | Violeta] se enfermó de cáncer?** [*If the answer is one of the causal mechanisms listed in table on next page, check it for "yes". Otherwise, write answer down on spaces at bottom of paper.*] AND [*Prompt with "***"¿Hay alguna otra razón por qué [Javier | Violeta] se pudo haber enfermado de cáncer?***" until they say "No"*]
73	**¿Cómo cree que [Javier | Violeta] se enfermó de cáncer?** [*If the answer is one of the causal mechanisms listed in table on next page, check it for "yes". Otherwise, write answer down on spaces at bottom of paper*] AND [*Prompt with "***¿Hay alguna otra manera por la cual [Javier | Violeta] se pudo haber enfermado de cáncer?***" until they say "No"*]

74	**¿Esas son las explicaciones que le daría a su hijo/a de por qué alguien se enferma de cáncer?**				
	Yes	No	Don't Know	Participant Requested to Skip (999)	Other:

74a	*If "NO" or "Don't Know":* **¿Cuál sería la explicación que le daría a su hijo/a de por qué alguien se enferma de cáncer?**

75-97. Ahora quiero saber si usted cree que algunas de las siguientes causaron que [Javier | Violeta] se enfermara de cáncer.
Ask about each individually. [*Note: causes randomized on iPad*]

¿Cree que _____ causó que [Javier | Violeta] se enfermara de cáncer?

Gérmenes	**Un Ángel**	**Dios**	**Santos**
Salir con el Pelo mojado	**Contaminación del aire**	**Magia**	**Brujería**
Salir sin abrigo	**Demonios**	**No comer saludable**	**No asistir a la Misa**
Jugar con amigos que estén enfermos	**Mal de ojo**	**Jesús**	**Los Genes o Herencia**
Clima Frío	**El Destino**	**Un Sacerdote / Padre**	**Hacerle algo malo a otra persona**
Comer comida fría	**NO orar / rezar**	**Fantasmas o Espíritus**	
La Suerte	**Karma**	**El diablo**	

Space for any other causes listed during the how/why open-ended questions:

98	**Usted dijo que _____ podría causar que [Javier I Violeta] se enfermara de cáncer. ¿Me puede explicar cómo estas cosas pueden causar cáncer? Por ejemplo, ¿trabajan juntos o por separado? Lo puede explicar en un cuento si quiere.** **can tell more than 1 story** *After parent is done telling stories, if there are any causes the parent has NOT mentioned, ask about each, individually, by saying, " Exactamente, ¿CÓMO causa X que alguien se enfermara de cáncer? ¿Trabaja con A, B, C, ...?".*

99	**¿Alguna vez ha hablado con su hijo/a acerca de las causas de cáncer?**		
	Sí	No *(go to 99f)*	
99a	*SÍ:* (a) **¿Su hijo/a preguntó o fue usted quién lo mencionó?**		
	Hijo/a	Padre	Ambos
99b	(b) **¿Qué edad tenía su hijo/a cuando usted le habló de las causas de cáncer por primera vez?** [*If don't know, ask them to estimate*.]		

99c	(c) **¿Qué le dijo a su hijo/a? ¿Qué tipo de explicaciones le dio?**		
99d	(e) **¿Todavía habla con su hijo/a acerca de las causas de cáncer?**	Sí	No
99e	*SÍ:* (f) **¿Qué tan frecuente hablan de las causas de cáncer?**		
99f	*NO:* **¿Por qué no?**		

100	**En general, ¿a qué edad deben los niños aprender acerca de las causas de cáncer?**
100a	**¿Por qué esa edad?**

101	**¿Cree que los padres deben ser los principales en enseñarle a los hijos/as acerca de las causas de cáncer? ¿O cree que hay otras personas/comunidades que deben enseñarles las causas de cáncer?** *If not parents:* **¿Cuáles son las otras comunidades o personas?**

Además de los padres,

102	**¿Cree que los niños deben aprender las causas de cáncer, de sus hermanos mayores o primos mayores?**	
	Sí	No *(go to 102e)*
102a	*SÍ:* (a) **¿Qué tipo de cosas cree que hermanos mayores o primos mayores DEBEN enseñarles a los niños acerca de las causas de cáncer?**	
102b	**¿Hay alguna cosa que cree que hermanos mayores o primos mayores NO DEBEN enseñarles a los niños acerca de las causas de cáncer?**	
102c	**¿Qué edad debe tener <u>un hermano mayor o primo mayor</u> para enseñarle a un niño de las causas de cáncer?**	
102d	**¿Qué edad debe tener <u>el niño menor</u> para aprender de las causas de cáncer de los hermanos o primos mayores?**	
102e	*<u>NO</u>:* **¿Por qué no?**	

103	**¿Cree que los niños deben aprender las causas de cáncer de los <u>amigos</u>?**	
	Sí	No *(go to 103e)*
103a	*SÍ:* (a) **¿Qué tipo de cosas cree que <u>los amigos</u> DEBEN enseñarles a los niños acerca de las causas de cáncer?**	
103b	**¿Hay alguna cosa que cree que <u>los amigos</u> NO DEBEN enseñarles a los niños acerca de las causas de cáncer?**	
103c	**¿Qué edad debe tener <u>un amigo</u> para enseñarle a un niño de las causas de cáncer?**	

103d	**¿Qué edad debe tener <u>el niño</u> para aprender de las causas de cáncer de los amigos?**
103e	*<u>NO</u>:* **¿Por qué no?**

104	**¿Cree que los niños deben aprender las causas de cáncer de <u>sus maestros o de las escuelas</u>?**	
	Sí	No *(go to 104d)*
104a	*SÍ:* (a) **¿Qué tipo de cosas cree que <u>los maestros o las escuelas</u> DEBEN enseñarles a los niños acerca de las causas de cáncer?**	
104b	**¿Hay alguna cosa que cree que <u>los maestros o las escuelas</u> NO DEBEN enseñarles a los niños acerca de las causas de cáncer?**	
104c	**¿Qué edad debe tener <u>el niño</u> para aprender de las causas de cáncer de los maestros o las escuelas?**	
104d	*<u>NO</u>:* **¿Por qué no?**	

105	**¿Cree que los niños deben aprender las causas de cáncer de <u>los hospitales, doctores, o enfermeras</u>?**	
	Sí	No *(go to 105d)*
105a	*SÍ:* (a) **¿Qué tipo de cosas cree que <u>la comunidad médica</u> DEBE enseñarles a los niños acerca de las causas de cáncer?**	
105b	**¿Hay alguna cosa que cree que <u>la comunidad médica</u> NO DEBE enseñarles a los niños acerca de las causas de cáncer?**	
105c	**¿Qué edad debe tener <u>el niño</u> para aprender de las causas de cáncer de un hospital, doctor, o enfermera?**	
105d	*<u>NO</u>:* **¿Por qué no?**	

106	**¿Cree que los niños deben aprender las causas de cáncer de <u>la iglesia, sacerdotes, o libros religiosos</u>?**	
	Sí	No *(go to 106d)*
106a	*SÍ:* (a) **¿Qué tipo de cosas cree que <u>la comunidad religiosa</u> DEBE enseñarles a los niños acerca de las causas de cáncer?**	
106b	**¿Hay alguna cosa que cree que <u>la comunidad religiosa</u> NO DEBE enseñarles a los niños acerca de las causas de cáncer?**	
106c	**¿Qué edad debe tener <u>el niño</u> para aprender de las causas de cáncer de la iglesia, sacerdotes, o libros religiosos?**	
106d	*<u>NO</u>:* **¿Por qué no?**	

107	**Además de las personas y comunidades de las que acabamos de hablar, ¿hay alguien más u otra comunidad o manera en la que los niños deben aprender de las causas de cáncer?**	
	Sí	No
107a	*IF <u>YES</u>:* **¿Quién / cual comunidad debe enseñarles?**	
107b	*IF <u>YES</u>:* **¿Qué deben enseñarles?**	

108	**¿De qué manera deben estas comunidades trabajar juntas para enseñarles a los niños las causas de cáncer?** **Por ejemplo, ¿el papel de cada persona/comunidad cambia a la medida que el niño va creciendo? Si sí, ¿cómo?**
109	**¿Cree que los padres deben ser las personas principales para hablar con sus hijos sobre las causas de cáncer – aunque cuando un hijo es más grande (por ejemplo 14-años)? O, ¿cree que las otras comunidades deben tener esta responsabilidad cuando un hijo es más grande?**

Cancer Better

*****Gender match to gender of child participating (Javier = Boy, Violeta = Girl)*****

MALE CHILD:

Anteriormente le conté que Javier tenía cáncer. ¡Ya está mejor! El dolor se le quito, y puede comer otra vez. Javier ya no está enfermo.

FEMALE CHILD:

Anteriormente le conté que Violeta tenía cáncer. ¡Ya está mejor! El dolor se le quito, y puede comer otra vez. Violeta ya no está enferma.

Note: The iPad will randomize the order of how and why

110	**<u>¿Cómo</u> cree que [Javier | Violeta] se mejoró?** [*If the answer is one of the causal mechanisms listed in table on next page, check it for "yes". Otherwise, write answer down on spaces at bottom of paper*] AND [*Prompt with "**¿Hay alguna otra <u>manera</u> por la cual [Javier | Violeta] se pudo haber aliviado de cáncer?** until they say "No"*]
111	**<u>¿Por qué</u> cree que [Javier | Violeta] se mejoró?** [*If the answer is one of the causal mechanisms listed in table on next page, check it for "yes". Otherwise, write answer down on spaces at bottom of paper.*] AND

	[*Prompt with "**¿Hay alguna otra <u>razón</u> por qué [Javier | Violeta] se pudo haber aliviado de cáncer?**" until they say "No"*]

112	**¿Esa es la explicación que le daría a su hijo/a de cómo alguien se alivia de cáncer?**				
	Sí	No	No Sé	Participant Requested to Skip (999)	Other:
112a	*If "NO" or "Don't Know":* **¿Cuál sería la explicación que le daría a su hijo/a de por qué alguien se alivia de cáncer?**				

113-132. Ahora quiero saber si usted cree que algunas de las siguientes causaron que [Javier / Violeta] se aliviara de cáncer.
Ask about each individually. [*Note: Causes randomized on iPad*]

¿Cree que _____ causó que [Javier / Violeta] se aliviara de cáncer?

Medicina	**Un Milagro**	**Magia**	**Santos**
Un Doctor	**El Destino**	**Jesús**	**Comer saludable**
La Suerte	**Orar**	**Un sacerdote / padre**	**Brujería**
Un Ángel	**Karma**	**Fantasmas o Espíritus**	**Asistir a la misa**
Remedios Naturales	**Dios**	**Rezar el Rosario**	**Hacer algo Bueno por otra persona**

Space for any other causes listed during the how/why open-ended questions:

133	**Usted dijo que _____ podría causar que [Javier I Violeta] se mejorara de cáncer. ¿Me puede explicar cómo estas cosas pueden causar que una persona se mejorara de cáncer? Por ejemplo, ¿trabajan juntos o por separado? Lo puede explicar en un cuento si quiere.** **can tell more than 1 story** *After parent is done telling stories, if there are any causes the parent has NOT mentioned, ask about each, individually, by saying, " Exactamente, ¿CÓMO causa X que alguien se mejorara de cáncer? ¿Trabaja con A, B, C, ...?" and ask if it works with any of the other causes marked as "yes".*

Section D: Ages for Own Child

*Note: *this is for their own child specifically learning about the causes of the cold or the causes of cancer from ANYWHERE (from people/books/movies/etc) – what are the ages their child should learn about each? And why?*

134	**¿Piensa que SU HIJO/A debe saber de las causas de un resfriado y del cáncer a la misma edad? O ¿debe estar más grande para aprender del cáncer?**	
	Misma Edad	Más Grande para aprender del cáncer

135	**¿Cuál sería la mejor edad para su hijo/a aprender de las causas de un resfriado?**
135a	**¿Por qué ese edad?**

136	**¿Cuál sería la mejor edad para su hijo/a aprender de las causas de cáncer?**
136a	**¿Por qué ese edad?**

Section E: Prayer

Bueno, tengo algunas preguntas acerca de orar, antes de que terminemos.

137	**¿Las oraciones se hacen realidad?**			
	No Nunca	Sí – Pero Raramente	Sí – A veces	Sí - Siempre
137a	*YES* **¿Por qué se hacen realidad?**			
137b	*YES* **¿Cómo sabe que se hacen realidad?**			
137c	*NO* **¿Por qué NO se hacen realidad?**			
137d	*NO* **¿Cómo sabe que NO se hacen realidad?**			

138	**Cuándo reza el rosario, el Ave María, u otras oraciones como el Padre Nuestro, ¿esas oraciones se hacen realidad?**			
	No Nunca	Sí – Pero Raramente	Sí – A veces	Sí - Siempre
138a	*YES* **¿Por qué?**			
138b	*YES* **¿Cómo sabe?**			
138c	*NO* **¿Por qué no?**			
138d	*NO* **¿Cómo sabe?**			

139	**¿Dios responde sus oraciones?**			
	No Nunca	Sí – Pero Raramente	Sí – A veces	Sí - Siempre
139a	*YES* **¿Por qué?**			
139b	*YES* **¿Cómo sabe?**			

139c	*NO* **¿Por qué no?**
139d	*NO* **¿Cómo sabe?**

140	**¿Lo que usted pide cuando ora pasa en la vida real?**			
	No Nunca	Sí – Pero Raramente	Sí – A veces	Sí - Siempre
140a	*YES* **¿Por qué?**			
140b	*YES* **¿Cómo sabe?**			
140c	*NO* **¿Por qué no?**			
140d	*NO* **¿Cómo sabe?**			

141	**¿Orar tiene efecto en el mundo real? Por ejemplo, ¿el mundo físico o biológico?**			
	No Nunca	Sí – Pero Raramente	Sí – A veces	Sí - Siempre
141a	*YES* **How does prayer have an effect on the real world?**			
141b	*NO* **Why doesn't prayer have an effect on the real world?**			

142	**Cuando usted ora, ¿qué tipo de cosas pide?** [*Prompt with "**¿Algo más?**" until they say "No"*]
143	**Cuando su hijo/a ora, ¿qué tipo de cosas pide?** [*Prompt with "**¿Algo más?**" until they say "No"*]
144	**Si usted le pide a alguien, como a su familia o amigos, que oren por usted, ¿qué tipo de cosas les pide?** [*Prompt with "**¿Algo más?**" until they say "No"*]

145	**En general, ¿las personas oran por cosas buenas y malas**		
	Sí		No
146	**¿Orar por cosas buenas y orar por cosas malas se llamarían lo mismo? / tendrían el mismo nombre?**		
	Sí	No – Se llaman diferentes	No es posible para orar por cosas malas
146a	*If NO* **¿Cómo se llamaría cada uno?** *Orar por cosas buenas se llama =* *Orar por cosas malas se llama =*		
147	**¿Hay personas qué oran para que otros se enfermen?**		
	Sí		No
147a	*YES* **¿Por qué?**		

147b	*NO* **¿Por qué no?**

148	**¿Cuál es la diferencia entre *orar* y *rezar*, si hay una?**

149	**¿Tiene algo más que agregar sobre sus creencias de orar que le gustaría dejarnos saber?**	
	Sí	No
149a	*YES* **¿Qué?**	

Section F: Conclusion

Eso concluye la entrevista suya el día de hoy. ¡Muchas gracias por responder nuestras preguntas!

150	**¿Tiene alguna pregunta antes de que terminemos?**	
	Sí	No
150a	*YES* **¿Qué?**	

This was the parent interview for [#_____] on [*Date*_____].
This interview was done by [*Name*_____].

Ahora vamos a hacer el último juego del iPad (English Vocab), y después, ya terminamos todo.

Appendix D: Vignettes and Drawings Used in Child Interview Survey

Note: The same vignette pictures were used for English interviews and the Spanish interviews.

Cold – Sick

Children were shown a picture of a gender-matched character who was sick (see Figure 1C). Females interviewed in English were told the following vignette: "This is Clara. Clara is sick with a cold. Clara has a runny nose and blows her nose a lot. (*Point out on picture*). Do you see here that Clara is sick with a cold? (*Point to picture*)." Males interviewed in English were told the following vignette: "This is Martin. Martin is sick with a cold. Martin has a runny nose and blows his nose a lot. (*Point out on picture*). Do you see here that Martin is sick with a cold? (*Point to picture*)."

Females interviewed in Spanish were told the following vignette: "Esta es Clara. Clara tiene un resfriado. La nariz le moquea y se la suena mucho. (*Point out on picture*). ¿Puedes ver aquí que Clara tiene un resfriado? (*Point to picture*)." Males interviewed in Spanish were told the following vignette: "Este es Martín. Martín tiene un resfriado. La nariz le moquea y se la suena mucho. (*Point out on picture*). ¿Puedes ver aquí que Martín tiene un resfriado? (*Point to picture*)."

Figure 1C

Drawing of Character Who Was Sick with a Cold – Male and Female.

Note: Martin/Martín [left] was used for males, Clara [right] was used for females. The drawings were on sheets of paper that were 8 inches wide X 11 inches high (20.32 cm wide X 27.94 cm high). The character was approximately 8.5 inches tall (21.59 cm) – from head to toe X 3.5 inches wide (8.89 cm) – from the edge of the tissue on the left to the edge of the tissue on the right.

Cancer – Sick

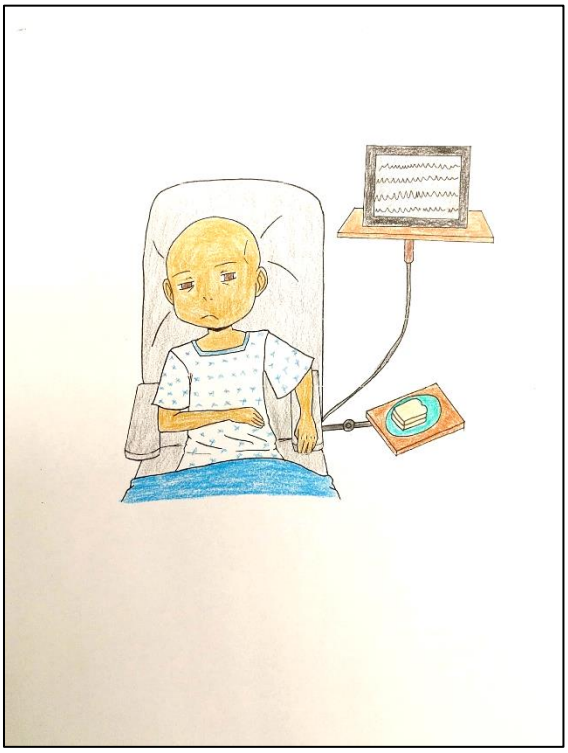
Children were shown a picture of a character who was sick (see Figure 2C). The same drawing was used for males and females. Females interviewed in English were told the following vignette: "This is Violeta. Violeta is sick with cancer. Violeta has a lot of

pain, and she can't eat very much food. (*Point out on picture*). Do you see here that Violeta is sick with cancer? (*Point to picture*)." Males interviewed in English were told the following vignette: "This is Javier. Javier is sick with cancer. Javier has a lot of pain, and he can't eat very much food. (*Point out on picture*). Do you see here that Javier is sick with cancer? (*Point to picture*)."

Females interviewed in Spanish were told the following vignette: "Esta es Violeta. Violeta está enferma con cáncer. Ella tiene mucho dolor, y no puede comer mucho. (*Point out on picture*). ¿Puedes ver aquí que Violeta está enferma con cáncer? (*Point to picture*)." Males interviewed in Spanish were told the following vignette: "Este es Javier. Javier está enfermo con cáncer. Él tiene mucho dolor, y no puede comer mucho. (*Point out on picture*). ¿Puedes ver aquí que Javier está enfermo con cáncer? (*Point to picture*)."

Figure 2C

Drawing of Character Who Was Sick with Cancer.



Note: The same picture was used for males and females. The drawings were on sheets of paper that were 8 inches wide X 11 inches high (20.32 cm wide X 27.94 cm high). The character was approximately 5.25 inches tall (13.34 cm) – from the bottom of the blanket to the top of the medical chair X 5.5 inches wide (13.97 cm) – from the chair's arm on the left to the monitor shelf on the right.

Cold – Better

Children were shown a picture of a gender-matched character who was now better (see Figure 3C). Females interviewed in English were told the following vignette: "We just talked about how Clara has a cold and how she got sick with the cold. Well now,

Clara is all better! Her nose is no longer runny, and she does NOT blow her nose anymore. Clara is no longer sick! Do you see here she is no longer sick?" Males interviewed in English were told the following vignette: ""We just talked about how Martin has a cold and how he got sick with the cold. Well now, Martin is all better! His nose is no longer runny, and he does NOT blow his nose anymore. Martin is no longer sick! Do you see here he is no longer sick?"

Females interviewed in Spanish were told the following vignette: "Acabamos de platicar sobre Clara, que tenía un resfriado y cómo se enfermó de ese resfriado. Bueno, ahora, ¡Clara ya está mejor! La nariz ya no le moquea, y no se la suena. ¡Clara ya no está enferma! ¿Puedes ver aquí que Clara ya no tiene un resfriado?" Males interviewed in Spanish were told the following vignette: "Acabamos de platicar sobre Martín, que tenía un resfriado y cómo se enfermó de ese resfriado. Bueno, ahora, ¡Martín ya está mejor! La nariz ya no le moquea, y no se la suena. ¡Martín ya no está enfermo! ¿Puedes ver aquí que Martín ya no tiene un resfriado?"

Figure 3C

Drawing of Character Who was Better from a Cold – Male and Female.

Note: Martin/Martín [left] was used for males, Clara [right] was used for females. The drawings were on sheets of paper that were 8 inches wide X 11 inches high (20.32 cm wide X 27.94 cm high). The character was approximately 8.5 inches tall (21.59 cm) – from head to toe X 3.5 inches wide (8.89 cm) – from the edge of the tissue on the left to the edge of the tissue on the right.

Cancer – Better

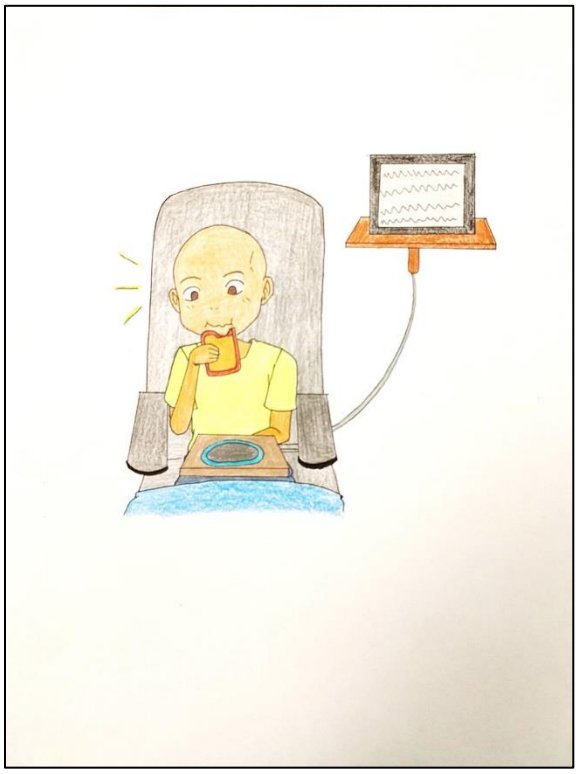
Children were shown a picture of a character who was better from cancer (see Figure 4C). The same drawing was used for males and females. Females interviewed in English were told the following vignette: “We just talked about how Violeta has cancer

and how she got sick with cancer. Well now, Violeta is all better! The pain is all gone, and now she can eat food again. Violeta is no longer sick! Do you see here she is no longer sick?" Males interviewed in English were told the following vignette: "We just talked about how Javier has cancer and how he got sick with cancer. Well now, Javier is all better! The pain is all gone, and now he can eat food again. Javier is no longer sick! Do you see here he is no longer sick?"

Females interviewed in Spanish were told the following vignette: "Acabamos de platicar de Violeta, que tenía cáncer y cómo se enfermó de cáncer. Bueno, ahora, ¡Violeta ya está mejor! Ya no tiene dolor, y ahora puede comer otra vez. ¡Violeta ya no está enferma! ¿Puedes ver aquí que Violeta ya no tiene cáncer?" Males interviewed in Spanish were told the following vignette: "Acabamos de platicar de Javier, que tenía cáncer y cómo se enfermó de cáncer. Bueno, ahora, ¡Javier ya está mejor! Ya no tiene dolor, y ahora puede comer otra vez. ¡Javier ya no está enfermo! ¿Puedes ver aquí que Javier ya no tiene cáncer?"

Figure 4C

Drawing of Character Who Was Better from Cancer.



Note: The same picture was used for males and females. The drawings were on sheets of paper that were 8 inches wide X 11 inches high (20.32 cm wide X 27.94 cm high). The character was approximately 5.25 inches tall (13.34 cm) – from the bottom of the blanket to the top of the medical chair X 5.5 inches wide (13.97 cm) – from the chair's arm on the left to the monitor shelf on the right.

Appendix E

Drawings Used to Depict Each Causal Mechanism in the Child Interview

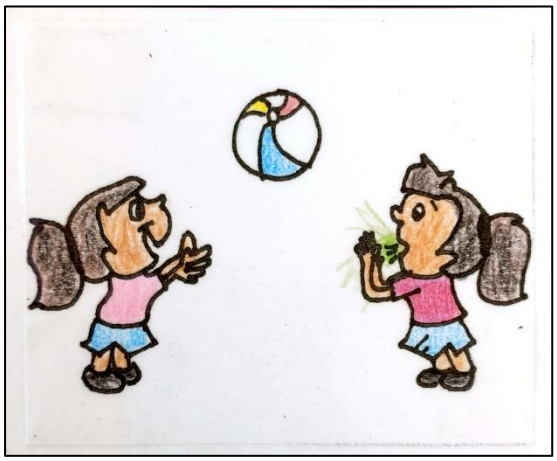
Causes of Sickness

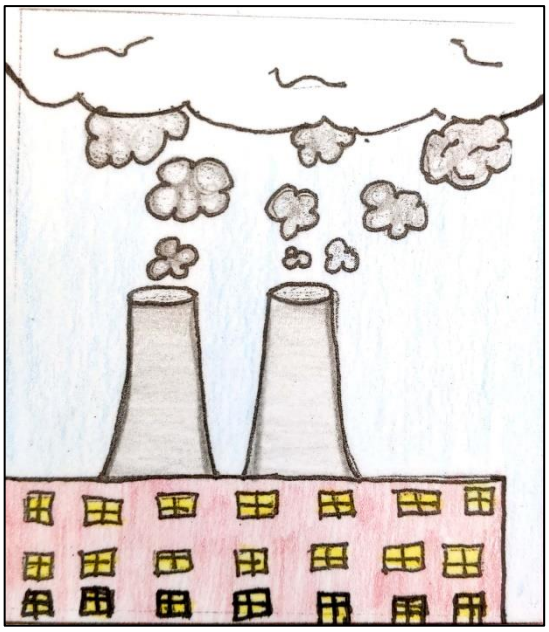
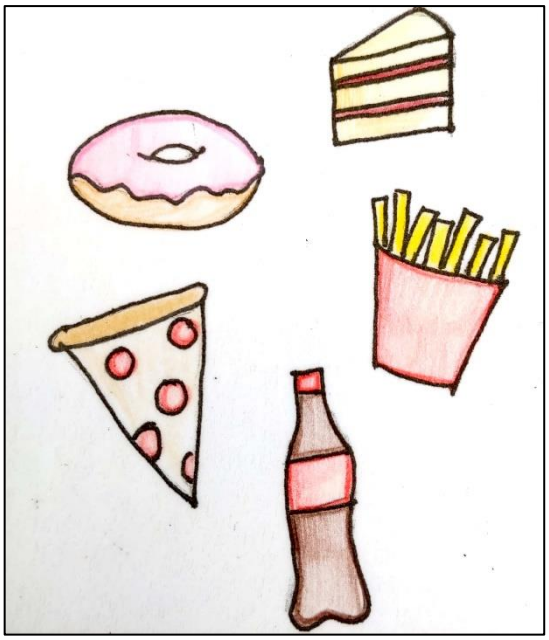
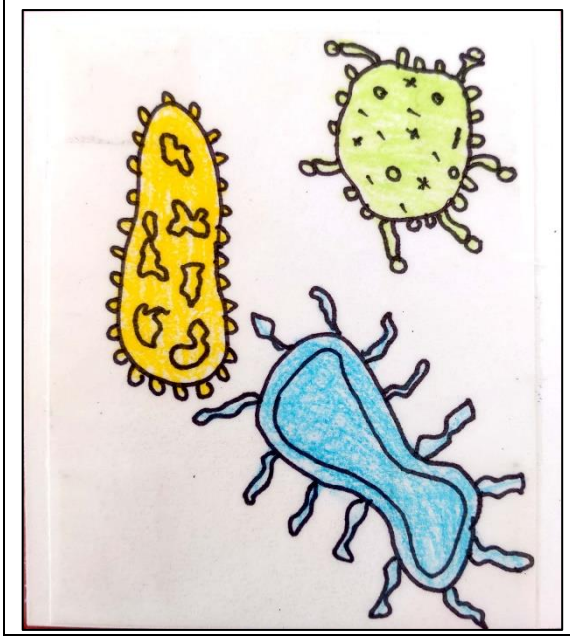
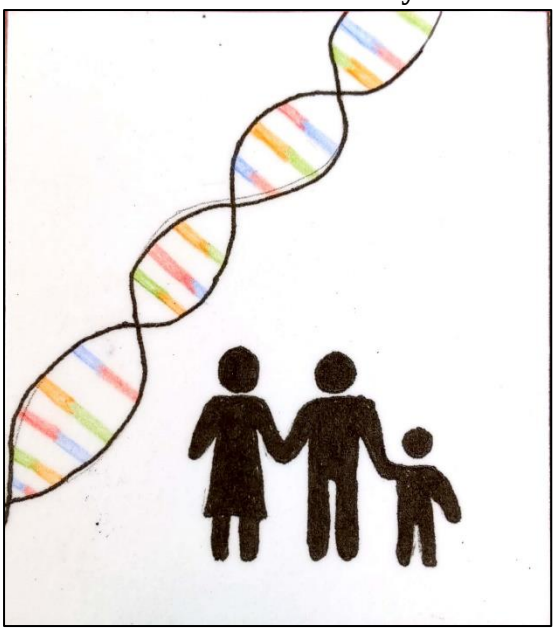
There were a possibility of 26 causes used when asking a child about the causes of each illness (see Table 1E). Children were only asked about some of the causes if they had been judged as "real" in the reality sorting task (marked with * in Table 1E).

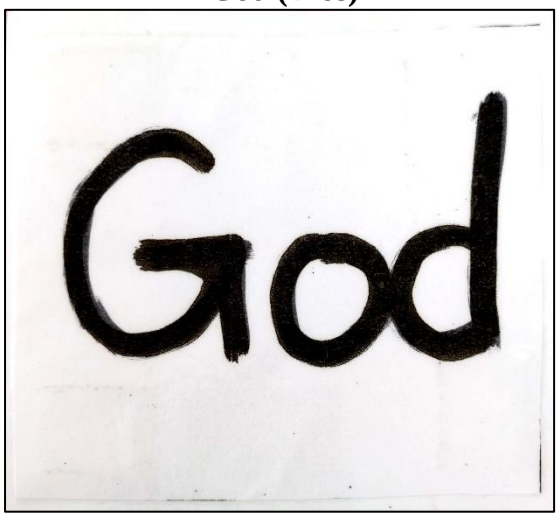
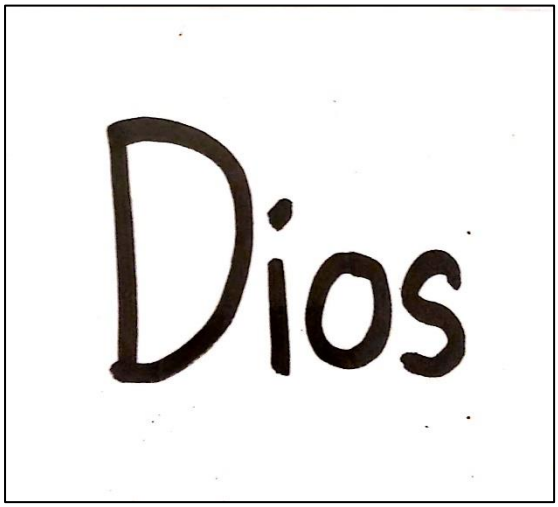
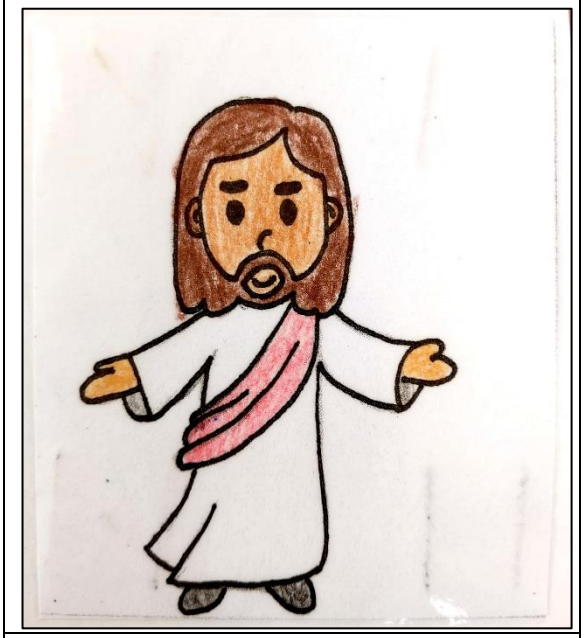
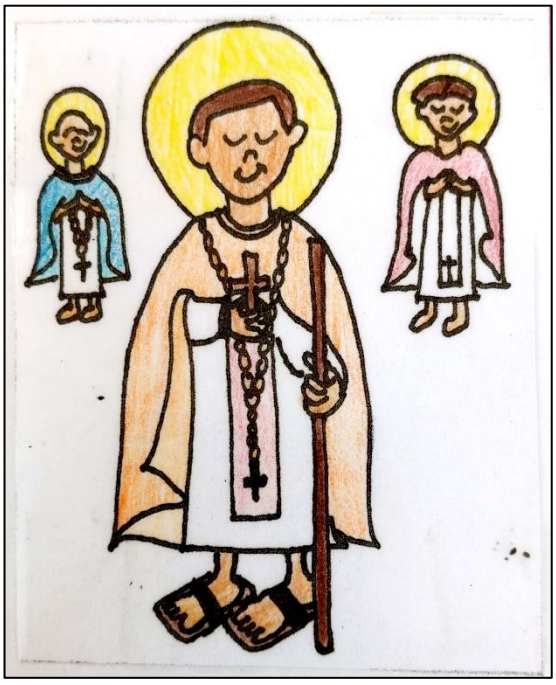
Table 1E

Drawings of the 26 Causal Mechanisms Used When Asking a Child About the Cause of the Sickness – Both Cold and Cancer

Possible Natural Causes of Sickness (*n* = 9)	
Eating Cold Food	**Going Outside without a Jacket On**
	

Possible Natural Causes of Sickness (*n* = 9)	
Playing with friends who are sick [contagion] ***Female:***  ***Male:*** 	**Cold Weather**  **Going Outside with Wet Hair** 

Possible Natural Causes of Sickness (*n* = 9)	
Bad Air or Pollution	**Eating Unhealthy**
	
***Germs**	**Genetics or Heredity**
	

Possible Religious Supernatural Causes of Sickness (*n* = 9)	
***God (Dios)**   	***Jesus**  ***Saints** 

Possible Religious Supernatural Causes of Sickness (*n* = 9)	
***Angel**	***Priest**
	
***The Devil**	***A Demon**
	

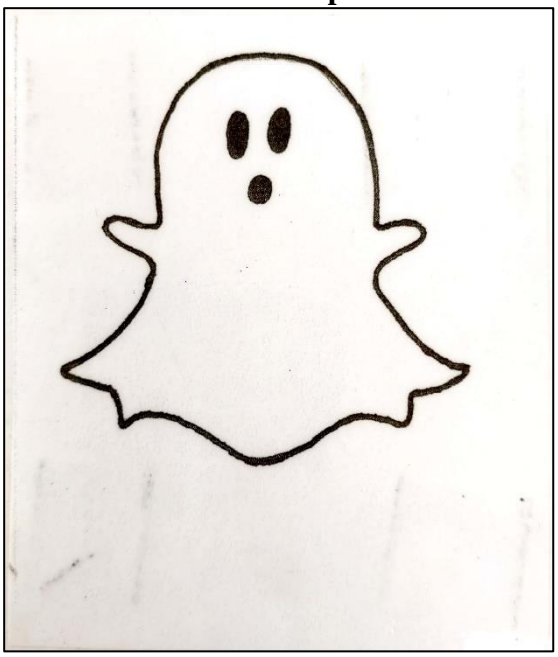
Possible Religious Supernatural Causes of Sickness (*n* = 9)

Not Praying

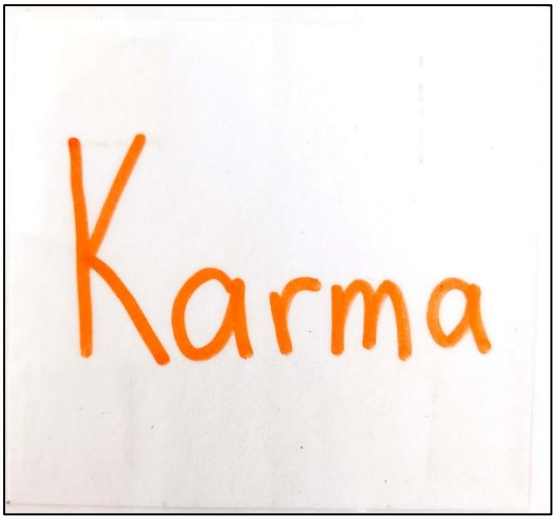
Not Going to Mass or Church

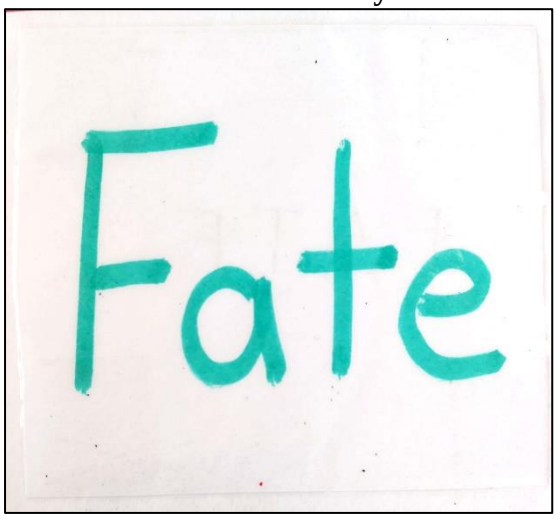
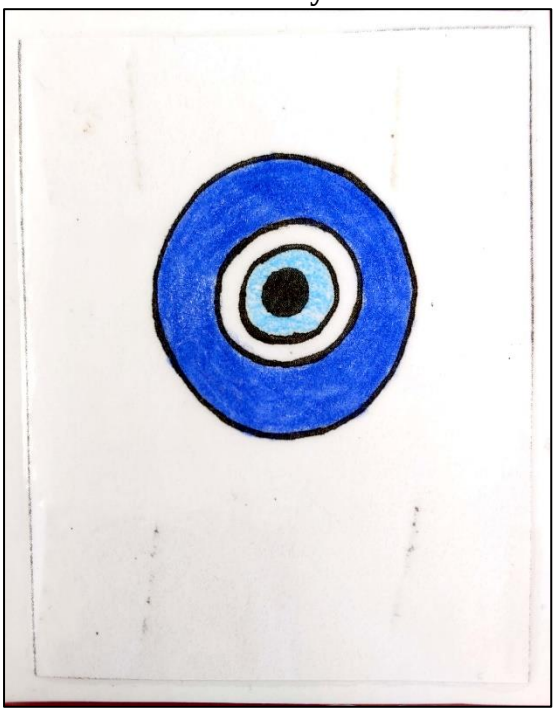
Possible Supernatural Causes of Sickness (*n* = 8)

***Ghosts or Spirits**



***Luck**

Possible Supernatural Causes of Sickness (*n* = 8)	
***Karma** 	***Witchcraft** 
Negative Immanent Justice [e.g., Hurting Someone] 	***Magic** 

Possible Supernatural Causes of Sickness (*n* = 8)	
***Fate or Destiny**	***Evil Eye**
 	

Note: Other than the "drawings" that were words (God and Fate), the same drawings were used for English interviews and the Spanish interviews. Karma is the same in English and Spanish. The drawings were on sheets of paper that were 3.75 inches wide X 3.25 inches high (9.53 cm wide X 8.26 cm high).

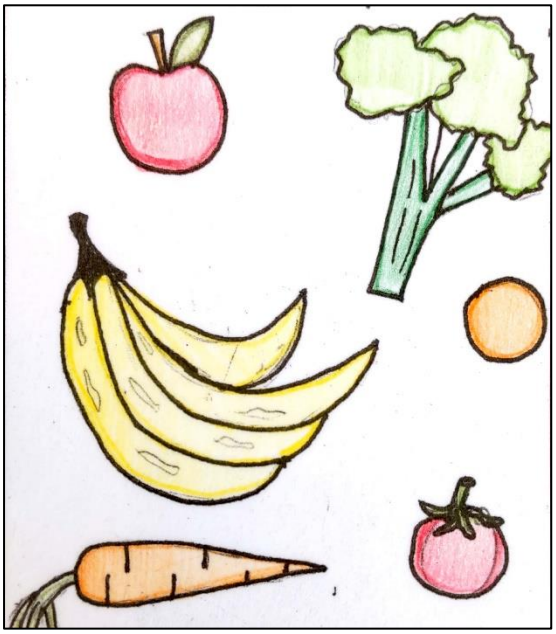
***** = This causal mechanism was part of the reality sorting task for children. If the child said it was not real, the child was not asked if it would cause each illness.

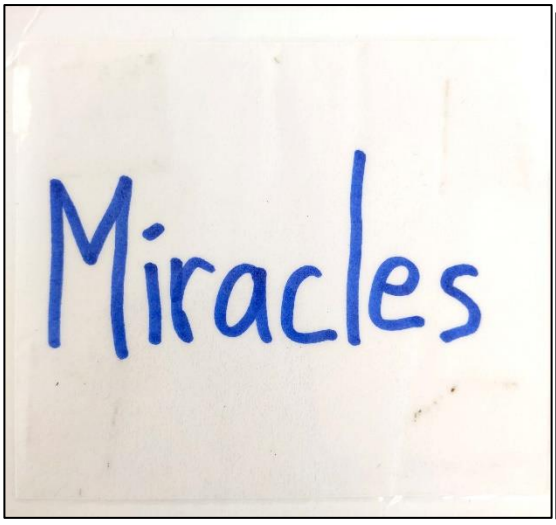
Treatments of Illnesses

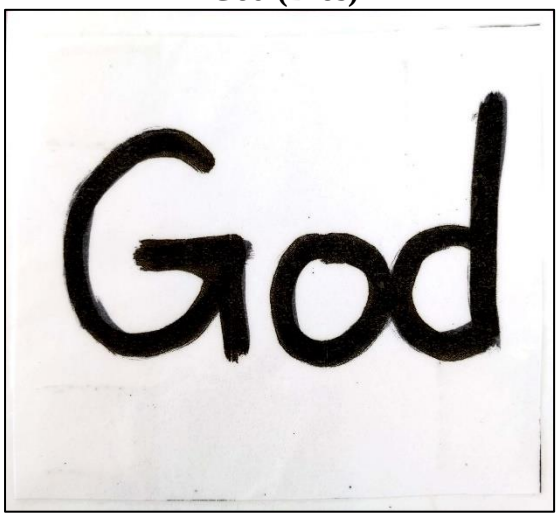
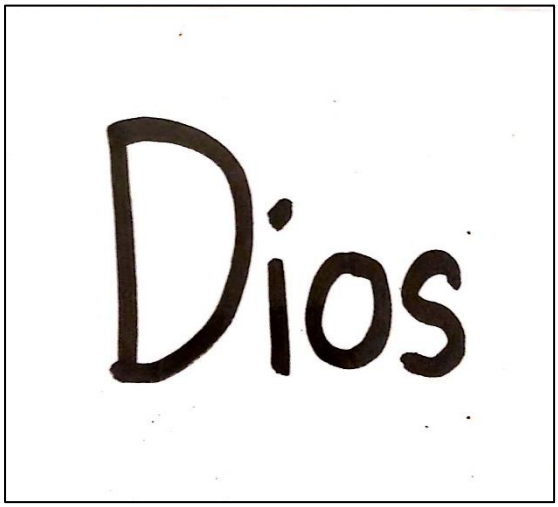
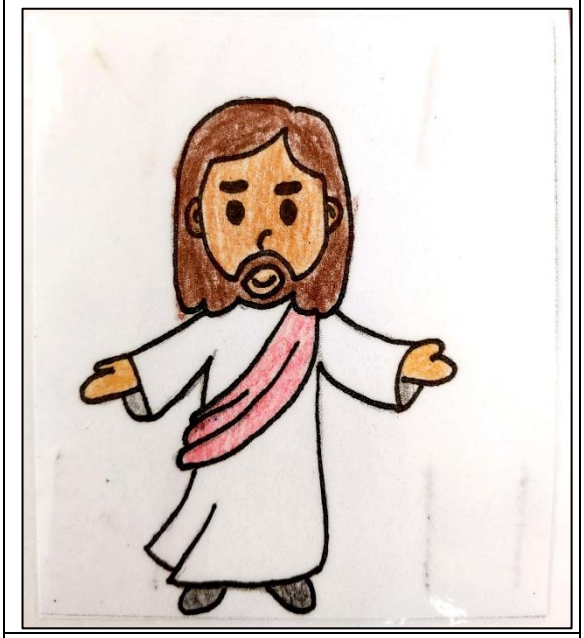
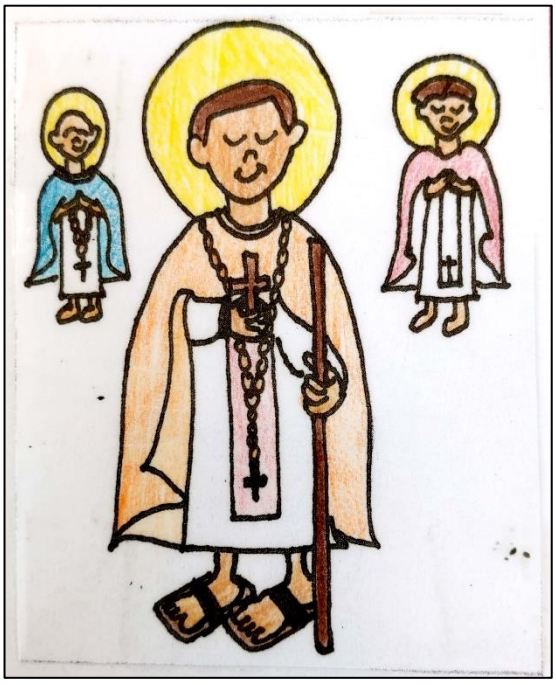
There was a possibility of 20 causes used when asking a child about the causal treatments of each illness (see Table 2E). Children were only asked about some of the causes if they had been judged as "real" in the reality sorting task (marked with * in Table 2E).

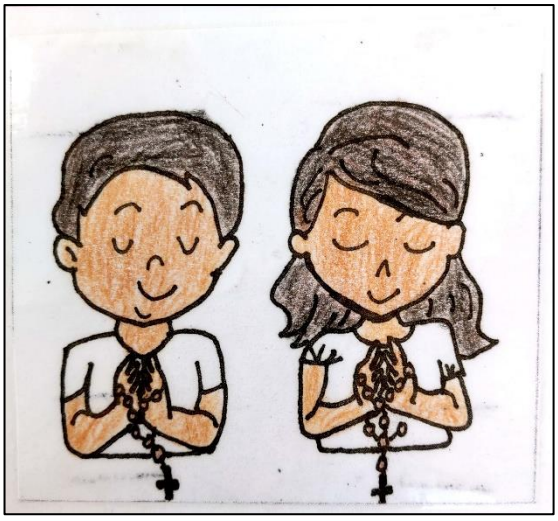
Table 2E

Drawings of the 20 Causal Mechanisms Used When Asking a Child About the Causal Treatments of the Sickness – Both Cold and Cancer

Possible Natural Treatments of Sickness (*n* = 4)	
***Herbal Remedies**	**Eating Healthy**
	

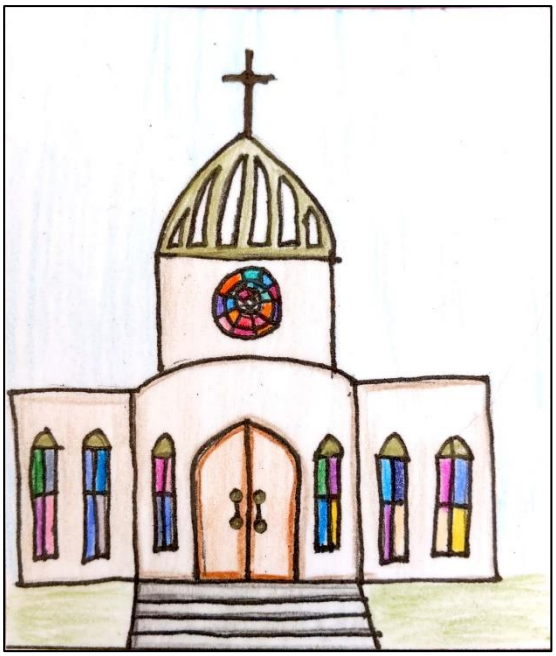
Possible Natural Treatments of Sickness (*n* = 4)	
***Medicine**	***Doctor**
	
Possible Religious Supernatural Treatments of Sickness (*n* = 9)	
***Miracles (Milagros)**	
	

Possible Religious Supernatural Treatments of Sickness (*n* = 9)	
***God (Dios)**  	***Jesus**  ***Saints** 

Possible Religious Supernatural Treatments of Sickness (*n* = 9)	
***Angel**	***Priest**
	
***Prayer**	***Praying the Rosary**
	

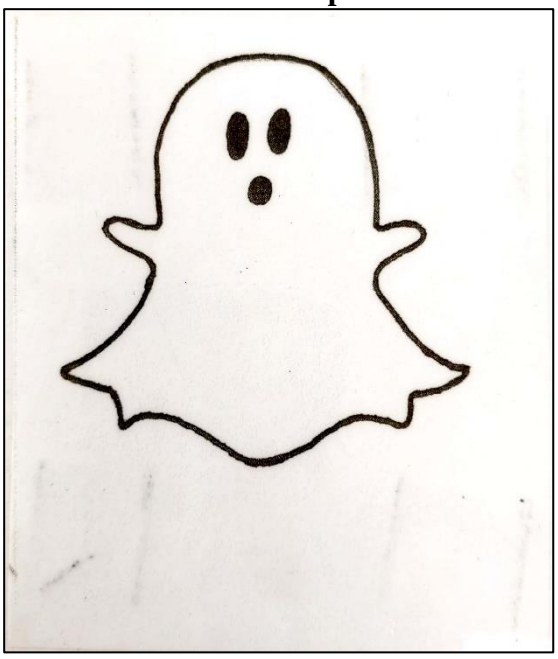
Possible Religious Supernatural Treatments of Sickness (*n* = 9)

Going to Mass or Church

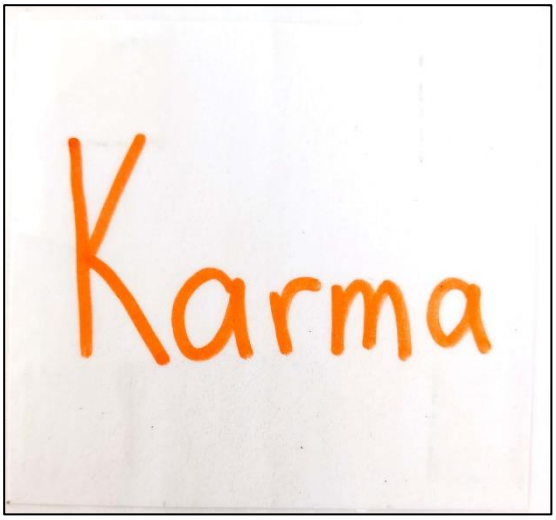


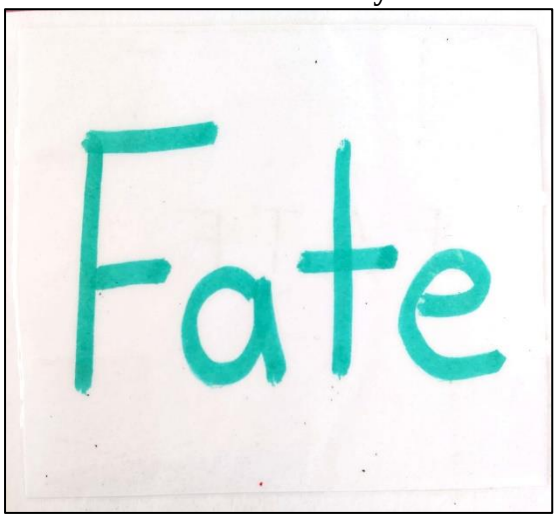
Possible Supernatural Treatments of Sickness (*n* = 7)

***Ghosts or Spirits**



***Luck**

Possible Supernatural Treatments of Sickness (*n* = 7)	
***Karma**	***Witchcraft**
	
Positive Immanent Justice [e.g., Helping someone]	***Magic**
	

Possible Supernatural Treatments of Sickness (*n* = 7)	
***Fate or Destiny**   	

Note: Other than the "drawings" that were words (God, Fate, and Miracles), the same drawings were used for English interviews and the Spanish interviews. Karma is the same in English and Spanish. The drawings were on sheets of paper that were 3.75 inches wide X 3.25 inches high (9.53 cm wide X 8.26 cm high).

***** = This causal mechanism was part of the reality sorting task for children. If the child said it was not real, the child was not asked if it would cause each illness.

Appendix F: Description of Religiosity for Hispanic Catholics in the US and Participants in the Current Study

Table 1F

Frequency of Religious Affiliation, Religious Practices and Exposure, and Religious Beliefs for Catholics in the United States and Participants from the Current Study

Hispanics in the United States (Overall)	
Religious Affiliation	
% of Hispanics who identify as Catholic	55% [b]
% of Catholics who are Female	51% [a]
% Mexican origin group in the US who identify as Catholic	61% [b]
Religious Beliefs	
% of Hispanics who believe in God (collapsed across certainty)	91% [c]
Religious Practices and Exposure	
***Worship Attendance*:** Attend at least once a week/almost every week	44% [d]

	Hispanic Catholics in the United States	**Current Study: *Mexican-American Catholics***
Religious Practices and Exposure		
Worship Attendance		
Attend worship services weekly+	40% [b]	43.6% [e]
Attend worship services monthly/yearly	44% [b]	51.8% [e]
Language of worship services attended in past year		
In Spanish every time	39% [b]	61.2% [e, 1]
In Spanish most times	28% [b]	17.3% [e, 2]
In English every time	12% [b]	3.4% [e, 3]
In English most times	18% [b]	12% [e, 4]

	Hispanic Catholics in the United States	Current Study: *Mexican-American Catholics*
Prayer Practices		
Pray at least daily	61% [b]	*
Pray weekly/monthly	27% [b]	*
Payers to Saints (official or folk) to ask for help in difficult moments	70% [b]	*
Prayers to the Virgin Mary (Mother of Jesus)	81% [b]	*
Prayers to the following Specific Saints Most Often		
Virgin Mary (Mother of Jesus)	16% [b]	*
La Virgen de Guadalupe	17% [b]	*
Saint Jude / San Judas Tadeo (*Saint of desperate causes, desperate situations, lost causes*)	13% [b]	*
Saint Rafael / San Rafael (*Saint of general health*)	< 0.5% [b]	*
God or Jesus	20% [b]	*
Renewalist [5]	52% [b]	*
Received or witnessed divine healing of illness or injury	30% [b]	*
Received direct revelation	31% [b]	*
Witnessed devil/spirits driven out	15% [b]	*
Indigenous Religious Practices		
Have had witchcraft or black magic practiced on them or someone close to them	14% [b]	*
Have sought help from a curandero or shaman	14% [b]	*
Used incense or herbs in ceremony for spiritual cleansing or healing	14% [b]	*
Other Religious Practices		
Have made offerings to spiritual beings / saints	39% [b]	*
Have a crucifix or other religious object in home	84% [b]	*

	Hispanic Catholics in the United States	Current Study: *Mexican-American Catholics*
Religious Beliefs		
Importance of Religion		
Very important	65% [b]	*
Catholic Women	70% [a]	*
Catholic Men	61% [a]	*
Somewhat important	27% [b]	*
Not too / not at all important	7% [b]	*
Biblical Literalism		
Agree Bible should be taken literally	45% [b]	*
Agree Bible should not be taken literally / unsure	33% [b]	*
Belief in Religious Agents		
God	96% [c, 6]	97.4% [e]
Virgin Mary (Mother of Jesus)	93% [b, 7]	*
Belief in Magic, Witchcraft, Spiritual Beings, Evil Eye		
Magic / witchcraft can influence people's lives	42% [b]	41.4 [e, 8]
People can be possessed by spirits	56% [b]	*
It is possible to communicate with spiritual beings or saints	46% [b]	*
Belief in Evil Eye	41% [b, 9]	34.5% [e, 10]
Prosperity Gospel		
Agree God will grant wealth and good health to believers with enough faith	54% [b]	*
Agree God does not always give wealth and good health even to believers with deep faith	35% [b]	*

	Hispanic Catholics in the United States	Current Study: *Mexican-American Catholics*
Demographics		
***Age*: Average age of adults among Catholics**	42-years [b]	35-years [e]
Highest Level of Educational Attainment		
Less than Secondary Education	*	37.5% [e]
Secondary Education or Higher	60% [b]	62.5% [e]
Pew Research Center Data (2014a, b, c)		
Sample Size (adults aged 18 or older)	2,281 [b]	N/A
Margin of Error: 95% Confidence Interval	± 2.9% [b]	N/A
Gallup Poll Data (2014)		
Sample Size (adults aged 18 or older)	173,490 [d]	N/A
Margin of Error: 95% Confidence Interval	± 1% [d]	N/A

* = Data not available

[a] = Pew Research Center (2014a)

[b] = Pew Research Center (2014b)

[c] = Pew Research Center (2014c)

[d] = Gallup Poll (2014)

[e] = From online parent surveys in the current study. The majority of participants were recruited from Riverside, Moreno Valley, Perris, and San Bernardino.

[1] = This refers to the % of participants who reported using Spanish during religious practices (in home, at mass, during religious events) 100% of the time.

[2] = This refers to the % of participants who reported using Spanish during religious practices (in home, at mass, during religious events) 70-90% of the time.

[3] = This refers to the % of participants who reported using English during religious practices (in home, at mass, during religious events) 100% of the time.

[4] = This refers to the % of participants who reported using English during religious practices (in home, at mass, during religious events) 70-90% of the time.

[5] = Renewalism is a set of religious beliefs and practices that emphasizes spiritually renewing "gifts of the Holy Spirit (e.g., speaking in tongues, divine healing, and direct revelations from God). Renewalist refers to the group of individuals who practice renewalism.

[6] = The belief in God was collapsed across certainty to reflect the total % of participants who said yes.

[7] = The percentage who agree Mary is the Virgin Mother of God and watches over believers

[8] = The percentage reported is the number of participants who believe witchcraft is real – not necessarily if witchcraft or magic can influence people's lives. Though for the 42% of Hispanic Catholics in the US who said witchcraft or magic can influence people's lives, it can be assumed they also believe that witchcraft is real.

[9] = Evil eye here is defined as the belief that certain people can cast curses or spells that cause bad things to happen.

[10] = Evil eye here was not defined for the participant; participants were just asked if the evil eye (*mal de ojo*) is real or not real.

Appendix G: Summary of Demographics for Riverside County, Riverside (City), and Participants in the Current Study

Table 1G

Demographics for Riverside County, Riverside, CA (city), and Participants from the Current Study

	Riverside County, CA (*Overall*)	**Riverside, CA (*City*)**	**Current Study: *Mexican-American Catholics in Southern California***
Demographics			
Population Estimate	2,287,741 [a]	324,722 [a]	116 [d]
% Females	50.3% [a]	50% [b]	Parent: 98.3% [d]; Child: 56.2% [d]
% Hispanic or Latino	48.4% [a]	53.7% [b]	100% [d]
Age			
Median age	34.5-years [b]	31.1-years [b]	Parent: 35.9-years [d]
Primary Language at Home: Spanish	*	*	75.9% [d]
Children (5- to 17-years)	36.9% [b]	43.3% [b]	*
Adults (18+ years)	32.0% [b]	35.4% [b]	*
Highest Level of Educational Attainment			
No Degree	19.9% [b]	23.0% [b]	25.4% [d]
High school graduate	25.8% [b]	25.9% [b]	28.9% [d]
Some College	33.3% [b]	31.4% [b]	13.2% [d, 1]
Associate's degree	*	*	9.6% [d, 1]
Bachelor's degree	13.4% [b]	12.1% [b]	15.8% [d]
Post-graduate degree	7.6% [b]	7.6% [b]	7.0% [d]
Income & Poverty			
Median household income (*2011-2015*)	$56,603 [a]	$57,196 [a]	*
Median household income	*	*	$36,000 [d, 2]
Range in income	*	*	$5,000 - $192,000 [d, 2]
% of Persons in poverty	16.2% [a]	18.8% [a]	*

	Riverside County, CA (*Overall*)	Riverside, CA (*City*)	Current Study:
Households			
Number of households	699,232 [b]	131,827 [b]	116 [d]
Persons per household (Ave)	3.2 [b]	3.5 [b]	5.54 [d]
Health			
Persons without health insurance (under 65-years-old)	18.8% [a]	10.9% [a]	*
Immunization coverage (All of US) *DPT1, DPT3, Polio, MCV, HepB3, Hib3*	91-98% [d]	*	*
Rating of health overall:			
Excellent – No Problems	*	*	Parent: 23.3% [d]; Child: 44.8% [d]
Great – Very Few Problems	*	*	Parent: 53.4% [d]; Child: 46.7% [d]
Sometimes Good, Sometimes Bad	*	*	Parent: 20.7% [d]; Child: 8.6% [d]
Bad – Several Problems	*	*	Parent: 2.6% [d]; Child: 0% [d]
Religion: Roman Catholic			100% [d]
Number of Catholic Churches (*2010*)	51 [c]	*	*
Number of Catholic Adherents (*2010*)	602,675 [c]	*	*
% of total population (*2010*)	27.52% [c]	*	*

* = Data not available

[a] = United States Census Bureau (2016)

[b] = U.S. Census Bureau (2015)

[c] = Center for Religion and Civic Culture University of Southern California (2009)

[d] = From online parent surveys in the current study. Unless otherwise specified, all reported values are those of the parents who completed the study (*N* = 116). The majority of participants were recruited from Riverside, Moreno Valley, Perris, and San

Bernardino.

[1] = “Some college” was separated out from “Associate’s Degree” in the current sample. Together, they were 22.8% of the sample.

[2] = Income was reported at time of participation; data was collected between 2018 and 2020. 6 participants declined to answer.

Appendix H: Variables of Interest for Examining Co-Existence in Explanatory Systems

Table 1H

Description of Variables of Interest for Examining Co-Existence in Explanatory Systems with Hispanic Catholics in the US

	Present in or taught to Hispanic Catholics in the United States
Folk/Naïve Biology	
Evidence for folk explanations for illness *E.g., Cold weather causes illness*	Yes (US in general)
Scientific Knowledge and Beliefs	
Evidence for scientific explanations for illness *E.g., germs cause illness*	Yes (US in general)
Religious Beliefs: Roman Catholic Religious Doctrine Taught in Catholic church	
Belief that God is able to change the impossible *Matthew 19:26*	Yes
Belief that spirits (e.g., demons) can cause illness *Luke 13:11*	Yes
Belief that Jesus can heal/treat illness *Matthew 4:23, Matthew 10:1, Matthew 10:8, Luke 5:17, Luke 13:12-13, Luke 14:4*	Yes
Belief that other individuals can heal/treat illness through God *Acts 9:34 (Peter)*	Yes
Use of prayer for supernatural change to illness *James 5:14-16*	Yes
Non-Religious Supernatural Beliefs or Practices	
Belief in Magic, Witchcraft, Spiritual Beings, Evil Eye, Miracles	Yes [a]

	Present in or taught to Hispanic Catholics in the United States
Formal Education, including scientific causes and treatments for illness	
Extent of scientific education on causes and treatments for illnesses / injuries *E.g., germs cause illness*	Taught starting in Kindergarten + (CA) [b]
Parental Ethnotheories on Causal Reasoning – Specifically Biological Illnesses	
Teaching	
Role of parent, siblings, friends, school/teacher, religious community, health community (medical hospital or clinic) in teaching children about causes of illnesses	Unknown
Age	
Appropriate age for child to know about causes & treatments of illnesses	Unknown
Endorsement of Scientific Causes & Treatments of Biological Illnesses	
Germs, Medicine	Unknown
Endorsement of Religious Supernatural Causes & Treatments of Biological Illnesses	
God, Jesus, Saints, Angels, Demons, the devil, a priest, prayer, attending mass	Unknown
Endorsement of Non-Religious Supernatural Causes & Treatments of Biological Illnesses	
Luck, fate, magic, the evil eye, witchcraft	Unknown
Extent of Endorsement of Co-Existing Causes of Biological Illnesses	Unknown
Extent of Endorsement of Co-Existing Treatments of Biological Illnesses	Unknown
Causal Language Present	
Informal causal language embedded within Spanish *E.g., Si Dios quiere – Lord willing*	Yes

[a] = Pew Research Center (2014b)

[b] = McLean (2009)

Appendix I: Salience Scores and Cultural Consensus Theory

Free-List Task as a Methodology and Salience Scores

Free-list data are commonly used in anthropological and ethnographic research to assess what types of concepts are salient and common across individuals within a specific cultural group (Purzycki & Jamieson-Lane, 2016). For instance, free-lists have been used to assess a variety of topics, ranging from what colors people can list in English (e.g., Smith et al., 1995) to what attributes god are perceived to like and dislike (e.g., Purzycki, 2011).

One method of data analytics for free-list tasks is to use a salience score. Instead of just recording the frequency of each type of explanation or item listed, salience scores take into account both the frequency and the mean position of the item. For instance, items that are listed first *and* listed often will have a higher salience score than items listed often but as the 5th or 6th item on a list. Additionally, free-list tasks as a methodology allow for a more naturalistic measure than forced-choice responses or the use of scales within cultural settings where Likert-type scales are not common and might seem strange to the participant.

Salience scores for items listed in a free-list task may be calculated in two ways: for the individual item or at the group-level for the item (Purzycki & Jamieson-Lane, 2016; Smith & Borgatti, 1997). The equation used for calculate individual-level item salience is:

$$\text{Item Salience} = \frac{(n + 1 - k)}{n}$$

where *n* is the number of items the individual listed, and *k* is the order of the item. For

instance, if a child says, “germs, not washing hands, and going outside without a jacket on” are the reason why someone gets sick with the cold, $n = 3$ because there were three items, and the germs $k = 1$, the not washing hands $k = 2$, and the improper outerwear $k = 3$. Thus, at the item-level, the salience score for germs is 1.0, the salience score for not washing hands = .66, and the salience score for improper outerwear = .33.

Group mean of item salience on the other hand takes into account what the salience for each item is at the group level, as well as the sample size of the group, and it is referred to as “Smith’s S” (Smith et al., 1995). For instance, if, in a sample of 10 children, only one child listed “witchcraft” as the cause of a cold and it was the 25th item they listed, the Smith’s S for witchcraft would be 0.004 (or .04/10), resulting in a very low salience and thus not appearing to be a very prominent or typical explanation for individuals in that cultural group.

Cultural Consensus Theory

Cultural consensus allows researchers to assess cultural knowledge, expertise, and level of agreement on a particular subject among participants from a specific cultural group (Purzycki & Jamieson, 2016; Weller, 2007). Instead of taking an approach of comparing a participant’s response to a “correct” answer, cultural consensus theory is done through that there is no universal “correct” response, and the notion of there even being a “correct” response is in and of itself flawed. Instead, culturally correct answers are measured through the degree of homogeneity in responses to questions on a specific set of beliefs. That is, it is a way to measure the degree of agreement among individuals from one cultural group for a particular set of questions within a specific topic or domain.

Consensus analysis have been used to study individuals' beliefs about a wide range of topics, including views on what causes the common cold in different cultural groups (e.g., Baer et al., 1999) to beliefs about why shamans observe taboos (e.g., Singh & Henrich, 2020). This type of analysis can only be done if the questions to be analyzed are all within a single domain, with questions at a similar level of difficulty. For instance, one could run separate cultural consensus analyses on individuals' beliefs regarding the causes of a cold and on what types of characteristics dogs have, but not both together within the same set of analysis. Of note, cultural consensus does *not* assume expertise on the topic at hand, and instead works best with the typical, lay individual. For instance, it should not take an individual with a medical professional degree to be able to do well on a set of questions regarding the causes of a cold. Rather, the emphasis is on how the everyday person thinks about these things.

Finally, cultural consensus analysis can be done on multiple choice questions or dichotomous-response questions (e.g., yes/no, or true/false). In cases in which there is missing data, responses may be imputed for the item by flipping a coin. That is, cultural consensus theory assumes that if a respondent does not know the answer to an item, they will guess a response instead. Consensus analysis also does not allow for more than two answer options: *Yes* [1] and *No* [0]. How much missingness is allowed varies by researcher, with some excluding participants from analysis if there is more than 10% missing across all their responses, and others including everyone up to 90% missing (Weller, 2007).

Results from a consensus analysis will indicate what the culturally correct

response is for each individual question/item as well as who in the sample of participants appears to be an "expert" on the topic (indicated by the % of culturally correct responses). Additionally, the "Comrey Ratio" can be calculated and used to assess if participants appear to be long to a single, unified culture or not. Typically, the rule of thumb is to have a ratio of at least 3:1 (Weller, 2007), but there is some debate about having a somewhat arbitrary number such as 3 as a hard-cutoff value to determine if there is indeed a single, shared culture among participants (Purzycki & Jamieson, 2016).

Appendix J:

Child Coding Categories and Example Quotes from Open-Ended Explanations

Table 1J

Child Coding Categories for Cold Sick (Alphabetical)

Name of Coding Category	Example Quote from Children – Cold Sick
**Bad Air or Pollution	"Con el aire." (*With the air.*)
**Being Wet	"Yo creo que porque… estaba lloviendo y [la lluvia] estaba cayendo y le estaba haciendo daño." (*I think that because… it was raining and [the rain] was falling and it was hurting him.*)
*Coldness in General	"Con algo frío. Salir al clima frío." (*With something cold. Going out into the cold weather*.)
*Contagion [a]	"Because people might have gotten her sick. She was playing with friends that got her sick."
Contamination [b]	"Because she was eating stuff off the ground that looks yummy to her."
Disobeying	"Um it's because um sometimes they don't- um kids don't listen to their parents."
Emotions [c]	"Martín happy y luego sad." (*Martin happy and then sad.*)
*Germs [a]	"Because she got the bad germs."
*Harmful Substance	"Uh he got poisoned."
*Improper Outerwear	"¡Porque se quitó la gorra del neck! Sí, bufanda." (*Because she took off the neck hat! Yes, scarf.*)
Injury	"A nerf gun shot his eye."
*Medicine	"Con mucho medicinas. Tomó muchos pastillas." (*With a lot of medicines. She took a lot of pills.*)
Need Doctor	"Si Clara está enferma, también, mm... si- si está así enferma, puede como ir al doctor cuando esté así." (*If Clara is sick, also, mm… if- if she is sick like that, she can like go to a doctor when she's like that.*)
Need Medicine	"She forgot to eat her medicine. They forgot about her medicine."

Name of Coding Category	Example Quote from Children – Cold Sick
Not Washing Hands [b]	"Um because maybe she didn't wash her hands after she was done using the restroom."
Outside [d]	"Yo creo que porque… estaba jugando afuera." (*I think that because… she was playing outside.*)
Personal Experience	"Esa... Le pasó como yo. La ventana estaba abierta." (*That… It's like what happened to me. The window was open.*)
Physical Activity [e]	"Porque ella corrió." (*Because she ran*.)
Rest [f]	"Porque necesita estar en la cama." (*Because she needs to be in bed.*)
Sleep	"Uh he went to sleep."
Symptom Present [g]	"Porque tiene mocos." (*Because she has boogers.*)
Time Passed	"And then you grow old when you're sick and then you die."
Using Technology	"Cause he was playing on his phone a lot."
**Witchcraft	"He's talking to [a] witch."
Food Related:	
**Eating Cold Food*	"By eating something coldy."
**Eating Unhealthy*	"Mm… que- porque tenía- comió algo que um era malo para ella." (*Mm… that- because she had- she ate something that was bad for her.*)
Nutrition General [h]	"He ate stuff. Mm jello."
Too Much Food [i]	"Por comer mucho." (*By eating a lot.*)
Other	"Ella se enfermó porque ella no se tomar Vitamina C." (*She got sick because she didn't take Vitamin C.*) [Other Subcategory: Need Supplements]
Non-Substantive Categories:	
Don't Know	"Uh… Hmm… <takes hand out and shrugs> Mm… No sé." (*Uh… Hmm… Mm… I don't know*.)
Irrelevant	"Because she's sick."

Note: For examples of quotes in Spanish, the English translation is provided in parentheses.

* = Causal Mechanisms that were a part of the pre-determined list of causes.

**** = Only one child mentioned this category, but it was part of the pre-determined list of causes.

[a] = Germs was separated out from contagion because of prior research focusing on children's understanding of germs and germ theory at this age.

[b] = Contamination and washing hands were separated out as prior work on children's understanding of illnesses has largely focused on washing hands specifically.

[c] = Both positive and negative emotions and emotional responses.

[d] = Outside included being outdoors without the mention of cold weather or cold temperatures.

[e] = Any type of exercise or physical activity.

[f] = Includes rest or being in bed, but not sleeping; sleep was its own category.

[g] = Listing 1 or more symptoms. This included: Boogers (*n* = 20), Runny Nose/Need to Blow Nose (*n* = 9), Sneezing (*n* = 7), Throwing Up (*n* = 6), Coughing (*n* = 5), Sore Throat (*n* = 3), Stomachache (*n* = 2), Bloody Nose (*n* = 1), Burping (*n* = 1), Fever (*n* = 1), Tooth loss (*n* = 1).

[h] = Eating food that is not cold or unhealthy.

[i] = Includes eating too much.

Table 2J

Child Coding Categories for Cancer Sick (Alphabetical)

Name of Coding Category	Example Quote from Children – Cancer Sick
**Bad Air or Pollution	"There was someone smoking, and she walked by the guy that was smoking, and she got really sick, she started to cough."
Being Better	"Um you'll feel better."
Chronic Illness	"Um, she got sick but if still sick then again and again."
*Coldness in General	"Cause he cold."
*Contagion [a]	"She been- um, she's been playing with her sick friends."
Contamination	"Uh, that maybe… She touched something that caused cancer?"
Disobeying	"Like- like he got sick because he didn't follow his parent's rules."
Doctor	"Um cause you go to the doctor."
Emotions [b]	"Extraña su mamá" (*He misses his mom.*)
**Genetics or Heredity	"Because- because uh because she was born like that."
*Germs [a]	"Porque, um, gérmenes." (*Because, um, germs.*)
*Improper Outerwear	"Because one time wore zero sweaters."
Injury	"Like he got hurt on his leg maybe."
**Jesus	"Um, Jesús." (*Um, Jesus.*)
*Medicine	"Because she eat some medicine when that's her dad and mom's medicine."
Nature [c]	"Like- Like he got like sick and then before he got sick he got bit by the mosquito."
*Negative Immanent Justice [d]	"Um he was doing something wrong with the law."
Need Doctor	"Porque necesita estar en el doctor por diez años." (*Because she needs to be at the doctor's [office] for 10 years.*)
Need God	"Because she didn't go see God."

Name of Coding Category	Example Quote from Children – Cancer Sick
Need Medicine	"¡Por no comer pastillas!" (*By not eating pills!)*
Need Sleep	"Necesita dormir." (*She needs to sleep*)
**Not Attending Church or Mass	"Because she wasn't- um, going to the church."
*Not Praying	"Um, because she wasn't praying."
Not Taking Care of Self	"Porque no tiene cuidado." (*Because she isn't careful.*)
Outside [e]	"Because it was outside."
Personal Experience	"Se enfermó mi pansa de candies." (*My stomach got sick from candies.*)
Physical Activity [f]	"Porque-- porque ella estuvo corriendo." (*Because- because she was running.*)
Sleep	"Um when he goes to sleep when the sun go down."
Symptom Present [g]	"Because he had a fever."
Using Technology	"She watch tv."
Food Related:	
**Eating Unhealthy*	"Había una vez ella estaba comiendo una comida muy- no comió vegetales y nada. Y the end. Ya." (*Once upon a time she was eating food that was very- she didn't eat vegetables or anything. And the end. That's it.*)
Nutrition General [h]	"Y se- y se comió algo que se le da cáncer." (*And she- and she ate something that gave her cancer.*)
**No Food* [i]	Maybe because she didn't eat that much food at her house. At her house or a restaurant. Or at McDonalds.
Too Much Food [j]	"Uh he ate too much food."
Other	"She didn't wash her hands for dinner." [Other Subcategory: Not Washing Hands]
Non-Substantive Categories:	
Don't Know	"Mm, um… Um, because- because, um, I don't know."
Irrelevant	"He got sick."

Note: For examples of quotes in Spanish, the English translation is provided in

parentheses.

* = Causal Mechanisms that were a part of the pre-determined list of causes.

** = Only one child mentioned this category, but it was part of the pre-determined list of causes.

[a] = Germs was separated out from contagion because of prior research focusing on children's understanding of germs and germ theory at this age.

[b] = Both positive and negative emotions and emotional responses.

[c] = Describing something that is a part of nature, such as an animal.

[d] = Behaving in a non-morally responsible way, such as hurting others; is separate from disobeying.

[e] = Outside included being outdoors without the mention of cold weather or cold temperatures.

[f] = Any type of exercise or physical activity.

[g] = Listing 1 or more symptoms. This included: Hair Loss (*n* = 8), Loss of Appetite (*n* = 5), Fever (*n* = 3), Sneezing (*n* = 3), Pain (*n* = 2), Stomachache (*n* = 2), Throwing Up (*n* = 2), Boogers (*n* = 1), Farts (*n* = 1), Headache (*n* = 1), Immobility (*n* = 1), Loss of Sight (*n* = 1), Not Feeling Well (*n* = 1).

[h] = Eating food that is not cold or unhealthy.

[i] = Includes not eating some type of food or food in general, as well as eating less food.

[j] = Includes eating too much.

Table 3J

Child Coding Categories for Cold Better (Alphabetical)

Name of Coding Category	Example Quote from Children – Cold Better
*An Angel	"Because um- because um- the angel helped her get better."
*Attending Church or Mass	"Fue a la iglesia." (*She went to church*)
Care from Others [a]	"Because her mom help her."
*Destiny or Fate	"Destino." (*Destiny*)
*Doctor	"Porque el doctor ayudó a Clara." (*Because the doctor helped Clara.*)
Dry	"By getting dry."
Emotions [b]	"Because he feels happy."
*God	"Con Dios." (*With God.*)
Good Hygiene [c]	"Well, because he brushed his teeth."
*Jesus	"Uh, because the one, the Jesus helped."
**Luck	"And she ate this <points to luck card> so she can feel better."
*Magic	"Magia." (*Magic.*)
*Medicine	"Because he use MEDICINE!! YUM, YUM, YUM, YUM, YUM."
Motivation	"Because she wanted to play with her friends who was not sick."
Obeying	"Um… Mm… because she started listening to her mom."
Outside	"Como tú vas afuera." (*Like you go outside.*)
Personal Experience	"Solo yo fui- fui a las montañas y eso puede ser también que se fue a las montañas." (*Only I went to the mountains, and that can also be that she went to the mountains.*)
Physical Activity [d]	"Hacerle ejercicio." (*Doing exercise*.)
*Positive Immanent Justice [e]	"She stops pushing somebody."
*Prayer (*Orar*) [f]	"You pray when you go to sleep a lot of times and it's going to take forever; you pray to get better."

Name of Coding Category	Example Quote from Children – Cold Better
*Pray the Rosary (*Rezar*) [f]	"Because he prayed the rosary."
*Priest	"Um. Este <points at the image with the priest on the table>" (*Um, this.*)
Proper Outerwear	"She um- she um put her sweater on. She put [on a] jacket, and a blanket."
Rest [g]	"Because she was just resting in her bed."
Sleep [g]	"Mm... Porque estaba- ah- estaba durmiendo mucho y ya se hicio bien." (*Mm… Because she was- ah- because she was sleeping a lot, and that made her better.*)
Social Distancing	"She stays away from sick people."
Symptom Absent [h]	"Ya no tenía mocos." (*She didn't have boogers anymore.*)
Symptom Present [i]	"Cause he throw up."
Taking Care of Self	"Porque se cuidó." (*Because she took care of herself.*)
Taking Precautions	"Um...Porque ya um… ya no se salió." (*Um… Because now um… now she didn't go out.)*
Time Passed	"Because is morning now."
Warm or Hot [j]	"Porque estaba con una cobija, <does a motion as to wrap himself in a blanket> y luego… ya no tiene frío y ya está calientito." (*Because he had a blanket, <does a motion as to wrap himself in a blanket> and later… he was no longer cold, and now he was warm.*)
Washing Hands [c]	"Mm, que lavó sus manos otra vez todos los días." (*Mm, because she washed her hands again, every day.*)
**Witchcraft	"Con brujeros." <points at witchcraft card> (*With witches.*)
Food Related:	
**Eating Healthy*	"Mm porque estaba comiendo comida saludable." (*Mm because she was eating healthy food.*)
Liquids	"Um, tomó agua." (*Um, she drank water.*)
Warm Food	"By eating nice and warm food."
Nutrition in General [k]	Because- because candy makes them better too!

Name of Coding Category	Example Quote from Children – Cold Better
Food Related (cont.):	
No Food [l]	"Y no comió de estas cosas." (*And she didn't eat these things.*)
Other	"Yeah. and he- didn't go to the factory anymore." [Other Subcategory: Exposure]
Non-Substantive Categories:	
Don't Know	"<gasps> I don't know."
Irrelevant	"Se hizo mejor." (*She got better.*)

Note: For examples of quotes in Spanish, the English translation is provided in parentheses.

* = Causal Mechanisms that were a part of the pre-determined list of causes.

** = Only one child mentioned this category, but it was part of the pre-determined list of causes.

[a] = Includes emotional support and general care.

[b] = Both positive and negative emotions and emotional responses.

[c] = Good hygiene and washing hands were separated out as prior work on children's understanding of illnesses has largely focused on washing hands specifically.

[d] = Any type of exercise or physical activity.

[e] = Behaving in a morally responsible way, such as helping others; is separate from obeying.

[f] = Prayer was split up into *orar* and *rezar* for interviews conducted in Spanish, as *orar* is often used to indicate "talking to God", whereas *rezar* is used more for structured prayers (e.g., the Lord's Prayer) or praying the rosary.

[g] = Includes rest or being in bed, but not sleeping; sleep was its own category.

[h] = Symptom is no longer present, it went away, or character not sick with that symptom anymore. This included: No Boogers (*n* = 20), No Runny Nose (*n* = 2), and ability to open eyes (*n* = 1).

[i] = Listing 1 or more symptoms. This included: Sneezing (*n* = 7), Runny Nose/Need to Blow Nose (*n* = 2), Boogers (*n* = 1), Throwing up (*n* = 1), and Loss of Appetite (*n* = 1).

[j] = Anything that is warm or hot temperature – except warm food.

[k] = Eating food that is not specifically liquid, warm, or healthy.

[l] = Includes not eating some type of food or food in general, as well as eating less food.

Table 4J

Child Coding Categories for Cancer Better (Alphabetical)

Name of Coding Category	Example Quote from Children – Cancer Better
*An Angel	"Um because- um because- um the angel helped her got better."
*Attending Church or Mass	"Cause- cause she- she go to church and then she get better."
Being Better	"Sometimes you could do something and get better."
Care from Others [a]	"Que está en su casa y su mamá- su mamá rentó para él un cuarto." (He was at home and his mom- his mom rented him a room.)
*Doctor	"Cause the doctor fixed him."
Dry	"Paró, um, wash- um, para no mojando el cabello. Estaba drying it now." (*She stopped, um, wash- um, by not getting her hair wet. She was drying it now.*)
Emotions [b]	"Because she looks happy."
*Ghosts or Spirits	"So, the ghost made her feel better so she can be more healthy then that so make her feel better."
*God	"Porque Dios la curó." (*Because God cured her.*)
Good Hygiene	"Um, se quitó los gérmenes." (*Um, she took off the germs.*)
Hospital	"Porque se quedó unos días en el hospital." (*Because she stayed at the hospital for a few days.*)
*Jesus	"And because of baby Jesus."
*Luck	"Um by getting good luck."
**Magic	"Con la magia." (*With the magic.*)
*Medicine	"Porque, um, tomó medicina, y también, porque tomó medicina." (*Because, um, she took medicine, and also, because she took medicine.*)
*Miracles	"Es porque se- um, milagros." (*It's because she- um, miracles.*)
Motivation	Because she wanted to be better.
Obeying	"Um, porque ya- ya- ya- le obedece a su mamá." (*Um, because now- now- now- she obeys her mom.*)

Name of Coding Category	Example Quote from Children – Cancer Better
Others' Experiences [c]	"Oh, my dad got cancer. He didn't get cancer; my dad got cancer."
Outside	"Um cause she went outside."
Physical Activity [d]	Caminando. (*Walking.*)
*Positive Immanent Justice [e]	"Because she was being nice to others."
*Prayer (Orar) [f]	"Praying."
*Pray Rosary (Rezar) [f]	"Um... porque ya rezó." (*Um… because she already prayed*.)
*Priest	"Cause the priest made her get better."
Proper Outerwear	"Because she always puts something on. Jacket, pants, gloves, socks."
*Saints	"Porque espíritu. [Como los santos]." (*Because a spirit. [Like the saints].*)
Sleep	"Because she- she was sleeping a lot."
Social Distancing	"And she- she didn't play with her sick friends."
Symptom Absent [g]	"Because her head is not hurting anymore."
Symptom Present [h]	"Porque- porque se- se- se sudo." (*Because- because she- she- she sweat.*)
Taking Care of Self	"Um porque... porque se cuidó." (*Um because… because she took care of herself.*)
Taking Precautions	"Uh he didn't go outside."
Time Passed	"Because she was, she was waiting and waiting until she until she was better."
Warm or Hot [i]	"Getting warm."
Food Related:	
**Eating Healthy*	"I think she got better by not eating junk food."
Liquids	"And by drinking more water."
Warm Food	"Because she- she was- she was eating hot stuff like hot soup. Mmhmm eating hot soup."
Nutrition in General [j]	"Uh comió sándwich y se mejoró." (*Uh, he ate [a] sandwich and he got better.*)

Name of Coding Category	Example Quote from Children – Cancer Better
Food Related (cont.):	
No Food [k]	"Um by- by not eating a lot of food. Only just a one pancake."
Other	"Granting a wish." [Other Subcategory: Wish]
Non-Substantive Categories:	
Don't Know	"Because... I don't know."
Irrelevant	"Se- se mejoró." (*She- she got better*.)

Note: For examples of quotes in Spanish, the English translation is provided in parentheses.

* = Causal Mechanisms that were a part of the pre-determined list of causes.

** = Only one child mentioned this category, but it was part of the pre-determined list of causes.

[a] = Includes emotional support and general care.

[b] = Both positive and negative emotions and emotional responses.

[c] = Describing someone else's experience with the illness.

[d] = Any type of exercise or physical activity.

[e] = Behaving in a morally responsible way, such as helping others; is separate from obeying.

[f] = Prayer was split up into *orar* and *rezar* for interviews conducted in Spanish, as *orar* is often used to indicate "talking to God", whereas *rezar* is used more for structured prayers (e.g., the Lord's Prayer) or praying the rosary.

[g] = Symptom is no longer present, it went away, or character not sick with that symptom anymore. This included: Pain (n = 4), Loss of Appetite (n = 2), Hair Loss (n = 1), Headache (n = 1), and Stomachache (n = 1).

[h] = Listing 1 or more symptoms. This included: Pain (*n* = 1) and Sweat (*n* = 1).

[i] = Anything that is warm or hot temperature – except warm food.

[j] = Eating food that is not specifically liquid, warm, or healthy.

[k] = Includes not eating some type of food or food in general, as well as eating less food.

Appendix K:

Parent Coding Categories and Example Quotes from Open-Ended Explanations

Table 1K

Parent Coding Categories for Cold Sick (Alphabetical)

Name of Coding Category	Example Quotes from Parents – Cold Sick
Age [a]	"So I think it's just because she's still little and her immune system is still developing, you know, she has to develop those things in her to fight these little bugs so I think it's just because she is small. She's probably a small child or-."
*Bad Air or Pollution	"Mm, maybe you know there's dust and that caused a congestion, maybe you know breathing uh—dust and it causes like uh runny nose or-or congestion."
Bathing in Cold Water	"O se bañó con agua helada." (*Or she bathed in cold water.*)
*Being Wet	"Like having his hair wet when he lives in Chicago <laughs>. I don't know much more about Martin, but."
*Coldness in General	"Maybe it was cold. It was snowing and cold weather outside."
*Contagion [b]	"Well she was probably around someone else that had a cold. So that's why she got sick."
Contamination [c]	"By playing with dirt or dirty stuff."
Disobeying	"Porque no le hizo caso a su mamá." (*Because she didn't listen to her mom*.)
Environment [d]	"Maybe the environment."
*Germs [b, e]	"Mm. Agarró el virus." (*Mm. He caught a virus.*)
*Improper Outerwear	"Mm por andar sin zapatos, un ejemplo." (*Mm by walking around without shoes, for example.*)
Just Happens [f]	"I can't tell you, "Because he wanted to" – because he doesn't want to. Nobody does. I just think it's a natural coming… I think it's your time to get sick, you're just gonna get sick, and you can't help it."
Lack of Physical Activity	"Not being active, not exercising."

Name of Coding Category	Example Quotes from Parents – Cold Sick
Lifestyle	"Mm pues, no nada más- nada más los hábitos." (*Mm well, nothing more than- nothing more than habits.*)
Low Immune System	"Her immune system is very low, and because she has very low immune system, she easily catches a cold from other people."
**Luck	"Or it's just by luck."
Need Medicine	"Pues no se vacunó también." (*Well she also wasn't vaccinated.*)
Need Supplements	"Falta de vitaminas." (*Lack of vitamins.*)
Not Taking Care of Self	"Pues no sé cuido- no sé cuido suficiente." (*Well she didn't take care of herself- she didn't take care of herself well enough.*)
Not Taking Precautions	"Pues como te digo también que no tomó las precauciones." (*Well, like I tell you, he also didn't take precautions.*)
Not Washing Hands [c]	"And they didn't wash their hands properly or something so, she got contact with that… With the cold."
Outside [g]	"Mm it could be either she was outside…."
Personal Experience	"Pues como yo me refiero a mi, si me baño con agua caliente y salgo, me hace daño; me da resfriado." (*Well like referring to myself, if I bathe with warm water and I leave, it affects me; it gives me a cold.*)
Poor Hygiene	"Not having good hygiene."
Specific Type of Illness [h]	"Puede ser porque tenía alergia." (*It could be because he had allergies.*)
Stress	"She was stressed out at work."
Symptom Present [i]	"Um you can have a runny nose. He can have a runny nose if he has a cold."
Temperature Change [j]	"Sí, que estaba en un lugar caliente y la sacaron a lo frío y viceversa." (*Yes, if she was in a warm place and was taken out into the cold and vice-versa.*)
Temporal Timing [k]	"Inverno es la época de enfermarse." (*Winter is the time to get sick.*)
Weather [l]	"It could be, again, weather related."

Name of Coding Category	Example Quotes from Parents – Cold Sick
Food Related:	
**Eating Cold Food*	"Talvez tomó cosas frías." (*Perhaps she drank cold things.*)
No Food [m]	"Not eating."
**Eating Unhealthy*	"Also, his diet, that is something that I am not mentioning. Like his diet and what he's eating and what's… Yes. Eating unhealthy or not- Sometimes, I feel like we need more of certain vegetables or vitamins and things like that."
Other	"And then she's probably not um going to the doctor." [Other Subcategory: Need Doctor]
Non-Substantive Categories:	
Don't Know	"Pues no sé. Yo no conozco a Clara, ni sé que hizo, ni como come, ni que hace." (*Well I don't know. I don't know Clara, nor what she did, nor how she eats, nor what she does.*)
Irrelevant	"Yes... but I mean, to explain, probably not, there's many reasons to that- why you could get a cold."

Note: For examples of quotes in Spanish, the English translation is provided in parentheses.

* = Causal Mechanisms that were a part of the pre-determined list of causes.

**** = Only one parent mentioned this category, but it was part of the pre-determined list of causes.

[a] = Sickness depends on the age of the person – whether it's young or old.

[b] = Consist with the child coding, germs was separated out from contagion because of prior research focusing on children's understanding of germs and germ theory at this age.

[c] = Consist with the child coding, contamination and washing hands were separated out as prior work on children's understanding of illnesses has largely focused on washing hands

specifically.

[d] = Includes environmental factors or the environment in general.

[e] = Germs also includes mention of germs, virus, or bacteria.

[f] = Just happens, there is no reason, no explanation, not explainable.

[g] = Outside included being outdoors without the mention of: cold weather or cold temperatures, weather in general, or specific environmental factors.

[h] = Parent mentioned a specific type of illness, other than a cold. This included: Allergies (*n* = 3) and *gripa* (flu; *n* = 1).

[i] = Listing 1 or more symptoms. This included: Body ache (*n* = 1), Runny Nose (*n* = 1), and Sore Throat or Ear (*n* = 1).

[j] = Temperature change from hot to cold or cold to hot; weather change from hot to cold or cold to hot.

[k] = It's the time of year, it happens X times a year or this often.

[l] = Weather that does not specify if it is hot or cold.

[m] = Includes not eating some type of food or food in general, as well as eating less food.

Table 2K

Parent Coding Categories for Cancer Sick (Alphabetical)

Name of Coding Category	Example Quotes from Parents – Cancer Sick
Age [a]	"Depends- how old is he?"
*Bad Air or Pollution	"It could be the air. Yeah, it could be the air, pollution, many different things."
Cellular Change	"Abnormal division of cells in her body."
*Destiny or Fate	"Um, well I think that would depend on like what the cause of the cancer is. Like, um, if- if it was unexpected, maybe it's just fate, and it is out of his control."
Emotions [b]	"Puede haber sido por- por guardar como odio, rencor." (*It could have been by- by holding onto like hate, resentment*.)
Environment	"I think like the environment has to do with like- the environment has, you know, reasons for why people get sick with cancer."
*Genetics or Heredity	"Mm científicamente puede tenerlo por sus genes." (*Mm scientifically he could have it because of his genes.*)
*Germs [c]	"Uh... foreign bacteria invaded his body."
*God	"Uh, pues, porque tal vez porque Dios lo quiso así, que se enfermara de cáncer." (*Uh, well, because maybe God wanted it that way, that he get sick with cancer.*)
Harmful Substance [d]	"Um, girl I can go on. We got pesticides…"
Injury	"Quizás un mal golpe que no se atendió. Pues alguna fractura que no sea atendido a lo mejor se le hizo cáncer o…." (*Perhaps a bad hit that she didn't take care of. Like a fracture that wasn't cared for that maybe became cancer.*)
Just Happens [e]	"Um, is- is just um, what is it. Y- you don't have no, um, I mean, you don't know is just- you don't have to do something to get cancer; it just appears."
Late Detection	"So, maybe he- he was- was, uh, taking care of his health, and he go to the doctor, and they detect the cancer; it was a little bit late."

Name of Coding Category	Example Quotes from Parents – Cancer Sick
Lifestyle	"Um depends on how he- what his lifestyle is like. Maybe he's a smoker. So maybe he is doing things that might lead to a cancer for just kinda careless."
Low Immune System	"Um her immune system probably was weak or something."
**Luck	"¿Cómo creo? No sé. A la gente no más a veces le toca. No hay una razón exacta por qué una persona tiene cáncer. [Researcher: "Okay. ¿So sería como el destino o la suerte?"] [Parent: "Sí.] (*How do I think? I don't know. Sometimes it's just someone's turn. There isn't an exact reason why someone has cancer. [Researcher: "Okay. So, would it be like destiny or luck?" [Parent: "Yes."]*) [n]
*Medicine	"Mm it could be medications they took, and then they just got it after. <nodded head yes>"
Natural [f]	"Um yo diría que es algo natural." (*Um, I would say that it's something natural.*)
Need Doctor	"Uh, it depends. Maybe he was sick, uh, before that he never went to the doctor to make some studies."
**Negative Immanent Justice [g]	"Um, I believe [God] telling me that you need to stop what you're doing." [o]
Not Taking Care of Self	"Por descuido físico." (*Due to physical neglect.*)
Others' Experiences [h]	"Mi papá eso le pasó. Fue por fumar. O eso dijeron por lo menos." (*That happened to my dad. It was because of smoking. Or at least that's what they said.*)
Specific Type of Illness [i]	"Por una alergia." (*Due to an allergy.*)
Stress	"Um we live under a very high stressed environment, either at work or at home, that can also affect the development of that disease."
Symptom Present [j]	"I mean all I can say is inflammation. I- It's in your body in some sort of ways, letting you know that something's not…"
Tumor	"Maybe, um, he grew a tumor or something."
Type of Cancer	"Todo depende de qué tipo de cáncer sea." (*Everything depends on what type of cancer it is.*)

Name of Coding Category	Example Quotes from Parents – Cancer Sick
*Witchcraft	"En esa pregunta, no sé si es causa de una maldición que viene de su descendencia, de sus antepasados." (*In regards to that question, I don't know if it's caused by a curse that comes from her descendants, from her ancestors.*)
Food Related:	
**Eating Unhealthy*	"I think, um, not eating healthy. Eating a lot of processed food, I think."
Nutrition General [k]	"Tal vez cierto alimento." (*Maybe a certain food.*)
***No Food* [l]	"Porque no comía." (*Because she wasn't eating.*)
Too Much Food [m]	"Pues, uh, hay veces que nos enfermamos hasta de lo que comemos, pero si uno come en exceso, se enferma." (*Well, uh, there are times that we get sick from what we eat, but if someone eats excessively, they get sick.*)
Other	"Um he might've caused it himself. I've heard so many crazy stories. Maybe, um, he wanted to people to feel sorry for him. He want free money. There is endless stories." [Other Subcategory: Self-caused]
Non-Substantive Categories:	
Don't Know	"I don't know. <shakes head no> It's such a big question. I don't know."
Irrelevant	"Eh, es una pregunta… cómo- cómo- cómo te explico… que nunca me la habían preguntado." (*Eh, it's a question… how- how- how do I explain it to you… that I have never been asked this before.*)

Note: For examples of quotes in Spanish, the English translation is provided in parentheses.

* = Causal Mechanisms that were a part of the pre-determined list of causes.

**** = Only one parent mentioned this category, but it was part of the pre-determined list of causes.

[a] = Sickness depends on the age of the person – whether it's young or old.

[b] = Both positive and negative emotions and emotional responses.

[c] = Germs also includes mention of germs, virus, or bacteria.

[d] = Includes mention of toxins, radiation, pesticides, or other harmful substances.

[e] = Just happens, there is no reason, no explanation, not explainable

[f] = Describing cancer as being a natural process, without specifying what specific natural causes.

[g] = Behaving in a non-morally responsible way, such as hurting others.

[h] = Describing someone else's experience with the illness.

[i] = Parent mentioned a specific type of illness, other than cancer. This included: Infection (*n* = 3) and allergies (*n* = 1).

[j] = Listing 1 or more symptoms. This included: Inflammation (*n* = 1) and Physical Reaction (*n* = 1).

[k] = Eating food that is not necessarily unhealthy.

[l] = Includes not eating some type of food or food in general, as well as eating less food.

[m] = Includes eating too much.

[n] = This specific explanation was split into two categories: destiny and luck.

[o] = This specific explanation was split into two categories: God and negative immanent justice.

Table 3K

Parent Coding Categories for Cold Better (Alphabetical)

Name of Coding Category	Example Quotes from Parents – Cold Better
Care from Others [a]	"Um, the help of her mom."
Detox	"Um, he- I mean, sometimes when you do get sick, I feel like your body also does need to flush out all that bad stuff inside your body. So, um…"
*Doctor [b]	"And he went to the doctor."
Dry	"Um ya no… mojándose." (*Um not getting wet anymore.*)
Faith	"Yo pienso que el creer en Dios y tener la fe de Dios es- es bastante ayuda." (*I think that believing in God and having faith in God is- is a lot of help.*)
Followed Doctors Orders [b]	"And, well, follow the rules what the doctor say. Like…"
*God	"Pues gracias a Dios también. Se mejoró, la sanó." (*Well, thanks to God as well. She got better, He cured her.*)
Good Hygiene [c]	"Okay so her hygiene improve[d]."
*Herbal Remedies [d]	"Remedios caseros. (*Home remedies.*) I mean especially if she doesn't want to be taking medication. It would have been that."
Improved Immune System	"Because her immune system developed um…I guess fought over the cold."
Lifestyle Change	"How? Oh man, I feel like I answered the how with the why. Agh. Uh, how? Um, changing her lifestyle to something healthier."
*Medicine	"Ibuprophen. Or medicina (*medicine*)."
Personal Experience	"Que es lo que yo hago cuando tengo alguna gripa. Casi por lo regular nunca los llevo al doctor; solo es ajo [es] algo que yo sé que es, es bueno para eso." (*That's what I do when I have some flu. I almost never take them to the doctor; garlic is just something that I know is, is good for that.*)
Physical Activity [e]	"She went to do exercise and sweated it out."

Name of Coding Category	Example Quotes from Parents – Cold Better
** Positive Immanent Justice [f]	"Um, I think if Martin lives a righteous life."
Prayer (*Orar*) [g]	"Porque, pues, su familia hizo oraciones." (*Because, well, her family did prayers.*)
Proper Outerwear	"Um he wore a sweater."
Rest [h]	"She rested. She was resting."
*Saints	"Saint Anthony took care of her."
Severity of Illness	"It depends how bad she was sick."
Sleep [h]	"She slept for a long time."
Social Distancing	"I mean stay away from the friends that he was- that was sick so he could [get] better and not get worse."
Specific Type of Illness [i]	"It could have been just allergies. If that's all he had."
Supplements [j]	"She probably increased her vitamin. Vi- vitamin C. Or maybe she put a diffuser and got like- like what we do. We put a- a diffuser with like essential oils, and it kills the germs in the air."
Taking Care of Self	"Because she took care of herself."
Taking Precautions	"He stayed indoors."
Time Passed	"Time. Yeah. Their body kicks in after a while if you don't."
Warm or Hot	"Um making sure she stayed warm and not get cold."
Washing Hands [c]	"Okay, maybe washing hands more frequently while he was sick."
Food Related:	
**Eating Healthy*	"Maybe eating healthier too."
Liquids	"And drinking lots of fluids."
Warm Food	"Warm foods sometimes helps too."
Nutrition in General [k]	"Comió." (*She ate.*)
**No Food* [l]	"She [was] avoiding eating for a while. She was fasting."
Other	"Clara, hm… she was faking it, <laughs> I don't know." [Other Subcategory: Faking]

Name of Coding Category	Example Quotes from Parents – Cold Better
Non-Substantive Categories:	
Don't Know	"I don't know."
Irrelevant	"Porque se mejoró." (*Because she got better.*)

Note: For examples of quotes in Spanish, the English translation is provided in parentheses.

* = Causal Mechanisms that were a part of the pre-determined list of causes.

**** = Only one parent mentioned this category, but it was part of the pre-determined list of causes.

[a] = Includes emotional support and general care.

[b] = Doctor and following doctors orders were separated out into different categories as the latter focuses more on what the individual is doing to him/herself.

[c] = Good hygiene and washing hands were separated out as prior work on children's understanding of illnesses has largely focused on washing hands specifically.

[d] = Herbal remedies (*remedios naturales*) includes the use of home remedies (*remedios caseros*) and herbal teas and was separated out from supplements.

[e] = Any type of exercise or physical activity.

[f] = Behaving in a morally responsible way, such as helping others.

[g] = Prayer was split up into *orar* and *rezar* for interviews conducted in Spanish, as *orar* is often used to indicate "talking to God", whereas *rezar* is used more for structured prayers (e.g., the Lord's Prayer) or praying the rosary. Prayers made by either self and others and self were included in this category.

[h] = Includes rest or being in bed, but not sleeping; sleep was its own category.

[i] = Parent mentioned a specific type of illness, other than a cold.

[j] = Supplements included mention of taking vitamins, vitamin c, essential oils, and VapoRub.

[k] = Eating food that is not specifically liquid, warm, or healthy.

[l] = Includes not eating some type of food or food in general, as well as eating less food.

Table 4K

Parent Coding Categories for Cancer Better (Alphabetical)

Name of Coding Category	Examples from Parents – Cancer Better
*Attending Church or Mass	"He was constantly in church every week."
Care from Others [a]	"Los cuidados de sus padres." (*Her parents' care.*)
*Doctor [b]	"Yo creo que- yo creo que, um, el doctor lo ayudó." (*I think that- I think that, um, the doctor helped him.*)
Early Detection	"Or she probably had uh- she probably caught it early. Yeah."
Education	"Uh, she became educated, and learn how to [what way to go about it], I guess."
Emotions [c]	"They maybe fixed her emotional wounds, maybe."
Faith	"Obviously I do believe that in when there's a serious illness like that, your faith can help you."
Followed Doctors' Orders [b]	"She did the, um, everything the doctor told her, like the step-by-step process."
Ganas de Vivir [d]	"Las ganas que ella le hecho de vivir. De- de- de- de- de- de tomar lo que a ella le daban, también todo esa- esa razón es – también – es grande. De que tenía ganas de vivir." (*The effort that she put in to live. Of- of- of- of- of- of taking what she was given, as well as all of that- that reason is – also – is big. Of having the desire to live.*)
*God	"Pero yo pienso que Dios es maravilloso. Así que cuando Dios dice, "Solo vas a sufrir por esta enfermedad, pero no vas a morir de ella, te la voy a quitar," Dios la quita. Yo creo- yo sí creo que Dios cuando, este, va a curar una persona de cancer, la cura completamente." (*But I think that God is wonderful. So when God says, "You are only going to suffer from this sickness, but you aren't going to die from it, I'm going to remove it from you," God removes it. I believe- yes, I believe that when God, um, is going to cure a person from cancer, he cures cures them completely*.)

Name of Coding Category	Examples from Parents – Cancer Better
*Herbal Remedies [e]	"Con um tratamientos de casa um, este, como se puede decir. Remedios naturaleza, uh huh." (*With, um, home treatments. Um, um, how can I say this. Natural remedies, uh huh.*)
Improved Immune System	"Um… his body, his immune system was able to fight it out. I mean…I think that's ultimately what it comes down to. I mean you can pray so much but people still get sick and you can pray so, much and people get better, and you can blame it on faith, or you can blame it on medicine, but I think ultimately, it's your body's capability and reaction to whatever you've got going on."
*Jesus	"So maybe uh Jesus helped."
Lifestyle Change	"Cambio su vida- su estilo de vida." (*She changed her life- her lifestyle*)
Medical Treatments [f]	"Wow. <laughs and is silent for a while> Por su tratamiento." (*Wow. <laughs and is silent for a while> Because of her treatment.*)
*Medicine [f]	"Pues con medicina y ya." (*Well, with medicine and that's it.*)
*Miracle	"Honestly, something like that, I strongly believe that it can be a miracle, and it can be - I don't know – something, you know, something more than just the medical field or just more than medicine itself."
Motivation	"It's cause it's all on you, but sometimes you lose that motivation to keep going and then you just let go, and then you're ruined; that disease takes over you."
Others' Experiences [g]	"Well I'm thinking my- my aunt survived cancer, so how she probably did it."
Physical Activity [h]	"A lo mejor hizo ejercicio; salió a caminar, a correr, y no estaba en su cama enferma." (*Maybe she did exercise. She left to go walking, running, and she wasn't in her bed sick.*)
Positive Mentality	"I think she was positive about her diagnosis."

Name of Coding Category	Examples from Parents – Cancer Better
*Prayer (*Orar*) [i]	"Um praying can help you. Um, not necessarily direct prayer from the person who is sick, but those people that surround you. Um, I do think, I wanna say that, you know, in my cultural upbringing, that that's one of the main things that can help someone get better when they have something like that."
*Pray Rosary (*Rezar*) [i]	"Praying a lot of rosaries."
**Priest	"Maybe the priest sent masses for him, you know? Som- some- I've heard that they send masses, you know, they- uh, in Italy or Rome. And people, you know, finally get better."
Religion [j]	"I don't know if she's religious. Is she religious? <laughs> I mean, in- in my case, if I were to have cancer, I think [the doctor] and religion would have a lot to do with me, um, with the way I would feel and pretty much go about that etapa (*stage*) of your life of having cancer, you know?" [k]
Rest	"To- to take a lot of rest."
*Saints	"[Praying to] the saints." [l]
Severity of Illness	"Pues su cáncer no era maligno." (*Well her cancer wasn't malignant.*)
Taking Care of Self	"Because she took care of herself."
Taking Precautions	"By being proactive."
Food Related:	
**Eating Unhealthy*	"Um… having a better- eating healthier."
Other	"She had insurance. That's- that's- no, that's a real question." [Other Subcategory: Access to medical care.]
Non-Substantive Categories:	
Don't Know	"I have no idea."
Irrelevant	"Uh pienso que se mejoró <paused> porque se curó. <laughed>" (*Uh I think that she got better <paused> because she was cured. <laughed>*)

Note: For examples of quotes in Spanish, the English translation is provided in parentheses.

* = Causal Mechanisms that were a part of the pre-determined list of causes.

**** = Only one parent mentioned this category, but it was part of the pre-determined list of causes.

[a] = Includes emotional support and general care.

[b] = Doctor and following doctors' orders were separated out into different categories as the latter focuses more on what the individual is doing to him/herself.

[c] = Both positive and negative emotions and emotional responses.

[d] = *Ganas de vivir* roughly translates to "a desire or will to live." But it is much more than that; it is also more than just having a positive mentality or motivation in general. It is a drive, a state of being – mental, emotional, physical – that shows you not only *want* to live, but you have what it takes. You know you only have one life, and you need to make the most of it, never giving up in the process.

[e] = Herbal remedies (*remedios naturales*) includes the use of home remedies (*remedios caseros*) and herbal teas and was separated out from supplements.

[f] = Medical treatments was separated out from medicine; medical treatments includes: surgery, chemotherapy, radiation, and medical treatment in general.

[g] = Describing someone else's experience with the illness.

[h] = Any type of exercise or physical activity.

[i] = Prayer was split up into *orar* and *rezar* for interviews conducted in Spanish, as *orar* is often used to indicate "talking to God", whereas *rezar* is used more for structured prayers (e.g., the Lord's Prayer) or praying the rosary. Prayers made by either self and others and self were included in this category.

[j] = Explanations mentioning religion or religious experiences in general, without specifying which items or activities, were included in this category.

[k] = This specific explanation was split into two categories: doctor and religion.

[l] = This specific explanation was split into two categories: prayer and saints.

Appendix L: CRT-D

Table 1L

Seven Questions Included in the CRT-D for children and parents

Question	Response Type	
	Intuitive	*Analytic*
(1) What do cows drink?	Milk	Water
(2) If you're running a race and you pass the person in second place, what place are you in?	1st Place	2nd Place
(3) A farmer has 5 sheep. All but 3 run away. How many are left?	2 Sheep	3 Sheep
(4) What hatches from a butterfly egg?	Butterfly	Caterpillar
(5) If there are 3 apples and you take away 2, how many do you have?	1 Apple	2 Apples
(6) What weighs more: One pound of rocks or one pound of feathers?	Rocks	Same
(7) Who makes Christmas presents at the North Pole?	Santa	Elves

Note. This measure is from Young et al. (2018), Young and Shtulman (2020; in press).

Table 2L

Breakdown Response Type of the CRT-D for Children

	Cows [b]	**Race** [a]	**Sheep** [a]	**Butterfly** [a]	**Apples** [b]	**Weight** [b]	**Christmas** [b]
Sample size *N*	99	98	102	100	102	100	103
# of Intuitive:	75	22	36	27	43	52	76
% of Intuitive:	75.8%	22.4%	35.3%	27.0%	42.2%	52.0%	73.8%
# of Analytic:	12	5	7	11	16	1	6
% of Analytic:	12.1%	5.1%	6.9%	11.0%	15.7%	1.0%	5.8%
# of Don't Know:	2	9	6	18	3	4	4
% of Don't Know:	2.0%	9.2%	5.9%	18.0%	2.9%	4.0%	3.9%
# of Other:	10	62	53	44	40	43*	17
% of Other:	10.1%	63.3%	52.0%	44.0%	39.2%	43.0%	16.5%

[a] = Child Results: Intuitive responses given less frequently than Other

[b] = Child Results: Intuitive responses given more frequently than Other

Table 3L

Breakdown Response Type of the CRT-D for Parents

	Cows [a]	**Race** [a]	**Sheep** [a]	**Butterfly** [a]	**Apples** [a]	**Weight** [a]	**Christmas** [a]
Sample size *N*	116	116	114	116	116	116	116
# of Intuitive:	76	60	35	73	6	58	55
% of Intuitive:	65.5%	51.7%	30.7%	62.9%	5.2%	50.0%	47.4%
# of Analytic:	35	52	57	29	106	56	31
% of Analytic:	30.2%	44.8%	50.0%	25.0%	91.4%	48.3%	26.7%
# of Don't Know:	0	0	5	0	0	0	2
% of Don't Know:	0.0%	0.0%	4.4%	0.0%	0.0%	0.0%	1.7%
# of Other:	5	4	17	14	4	2	28
% of Other:	4.3%	3.4%	14.9%	12.1%	3.4%	1.7%	24.1%

[a] = Parent Results: Intuitive responses given less frequently than Other

Appendix M: Reality Status of Causal Mechanisms for Parents

Table 1M

Parents' Beliefs About the Reality Status of Natural, Religious, and Supernatural Causal Mechanisms – Overall for the Full Sample

	All Parents		
Causal Mechanism	Real *N* (%)	Not Real *N* (%)	Don't Know *N* (%)
Natural			
Germs	110 (94.8%)	3 (2.6%)	3 (2.6%)
Medicine	114 (98.3%)	1 (0.9%)	1 (0.9%)
Herbal Remedies	108 (93.1%)	1 (0.9%)	7 (6.0%)
Doctor	116 (100%)	-	-
Religious Supernatural			
God	113 (97.4%)	-	3 (2.6%)
Jesus	113 (97.4%)	-	3 (2.6%)
Angels	106 (91.4%)	6 (5.2%)	4 (3.4%)
Saints	96 (82.8%)	11 (9.5%)	9 (7.8%)
A Priest	108 (93.1%)	2 (1.7%)	6 (5.2%)
Prayer (*Orar*)	113 (97.4%)	1 (0.9%)	2 (1.7%)
Praying the Rosary (*Rezar*)	108 (93.1%)	4 (3.4%)	4 (3.4%)
Miracles	110 (94.8%)	3 (2.6%)	3 (2.6%)
The Devil	82 (70.7%)	22 (19.0%)	12 (10.3%)
Demons	82 (70.7%)	18 (15.5%)	16 (29.3%)
Non-Religious Supernatural			
Evil Eye	40 (34.5%)	55 (47.4%)	21 (18.1%)
Luck [a]	60 (52.2%)	37 (31.9%)	18 (15.5%)
Destiny or Fate	94 (81.0%)	10 (8.6%)	12 (10.3%)
Karma	71 (61.2%)	29 (25.0%)	16 (13.8%)
Ghosts or Spirits	69 (59.5%)	30 (25.9%)	17 (14.7%)
Magic	25 (21.6%)	70 (60.3%)	21 (18.1%)
Witchcraft	48 (41.4%)	43 (37.1%)	25 (21.6%)

[a] = Of the 116 parents interviewed, one parent declined to answer if Luck was real or not real; percentages are out of the remaining 115 parents' responses.

Table 2M

Parents' Beliefs About the Reality Status of Natural, Religious, and Supernatural Causal Mechanisms – Split by Interview Language

	English Interviews			Spanish Interviews		
Causal Mechanism	Real *N* (%)	Not Real *N* (%)	Don't Know *N* (%)	Real *N* (%)	Not Real *N* (%)	Don't Know *N* (%)
Natural						
Germs	47 (90.4%)	2 (3.8%)	3 (5.8%)	63 (98.4%)	1 (1.6%)	-
Medicine	51 (98.1%)	1 (1.9%)	-	63 (98.4%)	-	1 (1.6%)
Herbal Remedies	47 (90.4%)	1 (1.9%)	4 (7.7%)	61 (95.3%)	-	3 (4.7%)
Doctor	52 (100%)	-	-	64 (100%)	-	-
Religious Supernatural						
God	51 (98.1%)	-	1 (1.9%)	62 (96.9%)	-	2 (3.1%)
Jesus	51 (98.1%)	-	1 (1.9%)	62 (96.9%)	-	2 (3.1%)
Angels	50 (96.2%)	2 (3.8%)	-	56 (87.5%)	4 (6.3%)	4 (6.3%)
Saints	44 (84.6%)	6 (11.5%)	2 (3.8%)	52 (81.3%)	5 (7.8%)	7 (10.9%)
A Priest	49 (94.2%)	-	3 (5.8%)	59 (92.2%)	2 (3.1%)	3 (4.7%)
Prayer (*Orar*)	50 (96.2%)	1 (1.9%)	1 (1.9%)	63 (98.4%)	-	1 (1.6%)
Praying the Rosary	47 (90.4%)	4 (7.7%)	1 (1.9%)	61 (95.3%)	-	3 (4.7%)
Miracles	50 (96.2%)	2 (3.8%)	-	60 (93.8%)	3 (4.7%)	1 (1.6%)
The Devil	38 (73.1%)	11 (21.2%)	3 (5.8%)	44 (68.8%)	11 (17.2%)	9 (14.1%)
Demons	37 (71.2%)	7 (13.5%)	8 (15.4%)	45 (70.3%)	11 (17.2%)	8 (12.5%)
Non-Religious Supernatural						
Evil Eye	22 (42.3%)	20 (38.5%)	10 (19.2%)	18 (28.1%)	35 (54.7%)	11 (17.2%)
Luck [a]	31 (59.6%)	16 (30.8%)	5 (9.6%)	29 (46.0%)	21 (33.3%)	13 (20.6%)
Destiny or Fate	43 (82.7%)	2 (3.8%)	7 (13.5%)	51 (79.7%)	8 (12.5%)	5 (7.8%)

	English Interviews			Spanish Interviews		
Causal Mechanism	Real *N* (%)	Not Real *N* (%)	Don't Know *N* (%)	Real *N* (%)	Not Real *N* (%)	Don't Know *N* (%)
Karma	35 (67.3%)	13 (25.0%)	4 (7.7%)	36 (56.3%)	16 (25.0%)	12 (18.8%)
Ghosts or Spirits	37 (71.2%)	9 (17.3%)	6 (11.5%)	32 (50.0%)	21 (32.8%)	11 (17.2%)
Magic	12 (23.1%)	31 (59.6%)	9 (17.3%)	13 (20.3%)	39 (60.9%)	12 (18.8%)
Witchcraft	24 (46.2%)	19 (36.5%)	9 (17.3%)	24 (37.5%)	24 (37.5%)	16 (25.0%)

[a] = Of the 64 parents interviewed in Spanish, one parent declined to answer if Luck was real or not real; percentages are out of the remaining 63 parents' responses.

Appendix N: Reality Status of Causal Mechanisms for Children

Table 1N

Children's Beliefs About the Reality Status of Natural, Religious, and Supernatural Causal Mechanisms

	Full Sample		English Interviews		Spanish Interviews	
Causal Mechanism	Real *N* (%)	Not Real *N* (%)	Real *N* (%)	Not Real *N* (%)	Real *N* (%)	Not Real *N* (%)
Natural						
Germs	64 (61%)	41 (39%)	33 (67.3%)	16 (32.7%)	31 (55.4%)	25 (44.6%)
Medicine	94 (89.5%)	11 (10.5%)	44 (89.8%)	5 (10.2%)	50 (89.3%)	6 (10.7%)
Herbal Remedies [a]	78 (75.7%)	25 (24.3%)	34 (70.8%)	14 (29.2%)	44 (80.0%)	11 (20%)
Doctor	97 (92.4%)	8 (7.6%)	45 (91.8%)	4 (8.2%)	52 (92.9%)	4 (7.1%)
Religious Supernatural						
God	82 (78.1%)	23 (21.9%)	36 (73.5%)	13 (26.5%)	46 (82.1%)	10 (17.9%)
Jesus *	93 (88.6%)	12 (11.4%)	47 (95.9%)*	2 (4.1%)*	46 (82.1%)*	10 (17.9%)*
Angels *	75 (71.4%)	30 (28.6%)	40 (81.6%)*	9 (18.4%)*	35 (62.5%)*	21 (37.5%)*
Saints [b]	84 (80.8%)	20 (19.2%)	37 (77.1%)	11 (22.9%)	47 (83.9%)	9 (16.1%)
A Priest	95 (90.5%)	10 (9.5%)	43 (87.8%)	6 (12.2%)	52 (92.9%)	4 (7.1%)
Prayer (*Orar*)	89 (84.8%)	16 (15.2%)	42 (85.7%)	7 (14.3%)	47 (83.9%)	9 (16.1%)
Praying the Rosary (*Rezar*) **	90 (85.7%)	15 (14.3%)	37 (75.5%)**	12 (24.5%)**	53 (94.6%)**	3 (5.4%)**
Miracles	65 (61.9%)	40 (38.1%)	28 (57.1%)	21 (42.9%)	37 (66.1%)	19 (33.9%)
The Devil	24 (22.9%)	81 (77.1%)	10 (20.4%)	39 (79.6%)	14 (25.0%)	42 (75.0%)
Demons	12 (11.4%)	93 (88.6%)	4 (8.2%)	45 (91.8%)	8 (14.3%)	48 (85.7%)
Non-Religious Supernatural						
Evil Eye	44 (41.9%)	61 (58.1%)	16 (32.7%)	33 (67.3%)	28 (50.0%)	28 (50.0%)
Luck	81 (77.1%)	24 (22.9%)	38 (77.6%)	11 (22.4%)	43 (76.8%)	13 (23.2%)
Destiny or Fate	59 (56.2%)	46 (43.8%)	24 (49.0%)	25 (51.0%)	35 (62.5%)	21 (37.5%)

	Full Sample		English Interviews		Spanish Interviews	
Causal Mechanism	Real *N* (%)	Not Real *N* (%)	Real *N* (%)	Not Real *N* (%)	Real *N* (%)	Not Real *N* (%)
Karma **	55 (52.4%)	50 (47.6%)	18 (36.7%)**	31 (63.3%)**	37 (66.1%)**	19 (33.9%)**
Ghosts or Spirits	24 (22.9%)	81 (77.1%)	10 (20.4%)	39 (79.6%)	14 (25.0%)	42 (75.0%)
Magic	52 (49.5%)	53 (50.5%)	25 (51.0%)	24 (49.0%)	27 (48.2%)	29 (51.8%)
Witchcraft	49 (46.7%)	56 (53.3%)	21 (42.9%)	28 (57.1%)	28 (50.0%)	28 (50.0%)

[a] = Of the 105 children interviewed, two children were not asked if Herbal Remedies was real or not real (one English interview, one Spanish interview); percentages are out of the remaining children's responses.

[b] = Of the 105 children interviewed, one child was not asked if Saints was real or not real (English interview); percentages are out of the remaining children's responses.

* $p < .05$ for χ^2 test comparing differences in Reality Status (Real, Not Real) X Interview Language (English, Spanish)

** $p < .01$ for χ^2 test comparing differences in Reality Status (Real, Not Real) X Interview Language (English, Spanish)

Appendix O: Correspondence of Reality Status of Causal Mechanisms for Parent-Child Dyads

Table 1O

Correspondence of Parent-Child Dyad's Beliefs About the Reality Status of Natural, Religious, and Supernatural Causal Mechanisms – Across the Full Sample (N = 105)

	Parent and Child Agree			**Parent and Child Disagree**		
Causal Mechanism	**Overall Agreement *N* (%)**	*Agree it is Real N (%)*	*Agree it is Not real N (%)*	**Overall Disagreement *N* (%)**	*Child = Not Real, Parent = Real/Don't Know N (%)* [g]	*Child = Real, Parent = Not Real/Don't Know N (%)* [g]
Natural [a]	***76.8%*** [a]			***23.2%*** [a]		
Germs	**61 (58.1%)**	*61 (58.1%)*	–	**44 (41.9%)**	*41 (39.0%)*	*3 (2.9%)*
Medicine	**93 (88.6%)**	*93 (88.6%)*	–	**12 (11.4%)**	*11 (10.4%)*	*1 (1.0%)*
Herbal Remedies [b]	**70 (68.0%)**	*70 (68.0%)*	–	**33 (32.0%)**	*25 (24.3%)*	*8 (7.8%)*
Doctor	**97 (92.4%)**	*97 (92.4%)*	–	**8 (7.6%)**	*8 (7.6%)*	–
Religious Supernatural [c]	***66.1%*** [c]			***33.9%*** [c]		
God	**80 (76.2%)**	*80 (76.2%)*	–	**25 (23.8%)**	*23 (21.9%)*	*2 (1.9%)*
Jesus	**90 (85.7%)**	*90 (85.7%)*	–	**15 (14.3%)**	*12 (11.4%)*	*3 (2.9%)*
Angels	**72 (68.6%)**	*69 (65.7%)*	*3 (2.9%)*	**33 (31.4%)**	*27 (25.7%)*	*6 (5.7%)*
Saints [d]	**77 (74.0%)**	*73 (70.2%)*	*4 (3.8%)*	**27 (26.0%)**	*16 (15.4%)*	*11 (10.6%)*
A Priest	**87 (82.9%)**	*87 (82.9%)*	–	**18 (17.1%)**	*10 (9.5%)*	*8 (7.6%)*
Prayer	**86 (81.9%)**	*86 (81.9%)*	–	**19 (18.1%)**	*16 (15.2%)*	*4 (3.8%)*
Praying the Rosary	**85 (81.0%)**	*84 (80.0%)*	*1 (1.0%)*	**20 (19.0%)**	*14 (13.3%)*	*6 (5.7%)*
Miracles	**60 (57.1%)**	*60 (57.1%)*	–	**45 (42.9%)**	*40 (38.1%)*	*5 (4.8%)*
The Devil	**34 (32.4%)**	*18 (17.1%)*	*16 (15.2%)*	**71 (67.6%)**	*65 (61.9%)*	*6 (5.7%)*
Demons	**22 (21.0%)**	*8 (7.6%)*	*14 (13.3%)*	**83 (79.0%)**	*79 (75.2%)*	*4 (3.8%)*
Non-Religious Supernatural [e]	***41.3%*** [e]			***58.7%*** [e]		
Evil Eye	**46 (43.8%)**	*15 (14.3%)*	*31 (29.5%)*	**59 (56.2%)**	*30 (28.6%)*	*29 (27.6%)*

	Parent and Child Agree			Parent and Child Disagree		
Causal Mechanism	**Overall Agreement *N* (%)**	*Agree it is Real N (%)*	*Agree it is Not real N (%)*	**Overall Disagreement *N* (%)**	*Child = Not Real, Parent = Real/Don't Know N (%)* [g]	*Child = Real, Parent = Not Real/Don't Know N (%)* [g]
Luck [f]	**43 (41.3%)**	*37 (35.6%)*	*6 (5.8%)*	**67 (64.4%)**	*17 (16.3%)*	*44 (42.3%)*
Destiny or Fate	**50 (47.6%)**	*46 (43.8%)*	*4 (3.8%)*	**55 (52.4%)**	*42 (40.0%)*	*13 (12.4%)*
Karma	**45 (42.9%)**	*32 (30.5%)*	*13 (12.4%)*	**60 (57.1%)**	*37 (35.2%)*	*23 (21.9%)*
Ghosts or Spirits	**40 (38.1%)**	*17 (16.2%)*	*23 (21.9%)*	**65 (61.9%)**	*58 (55.2%)*	*7 (6.7%)*
Magic	**41 (39.0%)**	*10 (9.5%)*	*31 (29.5%)*	**64 (61.0%)**	*22 (21.0%)*	*42 (40.0%)*
Witchcraft	**38 (36.2%)**	*19 (18.1%)*	*19 (18.1%)*	**67 (63.8%)**	*37 (35.2%)*	*30 (28.6%)*

[a] = The % reported is the average proportion of agreement/disagreement for all parent-child dyads across all 4 natural causes

[b] = Of the 105 children interviewed, two children were not asked if Herbal Remedies was real or not real (one English interview, one Spanish interview); frequencies are out of the remaining 103 parent-children dyad's responses.

[c] = The % reported is the average proportion of agreement/disagreement for all parent-child dyads across all 10 religious causes

[d] = Of the 105 children interviewed, one child was not asked if Saints was real or not real (English interview); frequencies are out of the remaining 104 parent-children dyad's responses**.**

[e] = The % reported is the average proportion of agreement/disagreement for all parent-child dyads across all 7 supernatural causes.

[f] = Of the 105 parents interviewed, one parent declined to answer if Luck was real or not real; frequencies are out of the

remaining 104 parent-children dyad's responses**.**

[g] = The type of disagreement for parent-child dyads was based off of the child's judgment type since parents were also given the option of choosing "don't know" alongside "real" and "not real." Parents only chose "don't know" a total of 8.5% of time across all 21 variables and all 105 parents, though the rate of "don't know" varied slightly by the type of causal mechanism: 2.4% for natural causes, 5.3% for religious supernatural causes, and 16.5% for non-religious supernatural causes.

Appendix P: Parental Ethnotheories of Illness – Full Sample

Table 1P

Parental Ethnotheories on Appropriate Social Partners to Teach Children about Illnesses and How Old Children Should Be to Learn from that Community – Across Full sample

	Parental Ethnotheories by Type of Illness – Full Sample			
	Common Cold		Cancer	
Community	***% Yes***	***% No***	***% Yes***	***% No***
Parent				
Previously Talked to Child	69.8%	30.2%	15.5%	84.5%
If yes:	(*n* = 82)		(*n* = 18)	
Who brought it up [a]	*P* = 62.2% [b]	*C* = 26.8% [b]	*P* = 64.7% [b]	*C* = 29.4% [b]
Age of Child when first talked about the illness [c]	*M* = 2.763 (*SD* = 1.247)		*M* = 4.139 (*SD* = 1.135)	
Still talk about illness	55.2%	15.5%	64.7%	35.3%
Should parents be the primary community to teach children about this illness?	91.2%	8.8%	70.2%	29.8%
Older Siblings or Older Cousins				
Should teach children	80.0%	20.0%	38.3%	61.7%
If yes:	(*n* = 92)		(*n* = 44)	
Age sibling/cousin should be [c]	*M* = 8.602 (*SD* = 3.889)		*M* = 12.639 (*SD* = 3.878)	
Age child should be [c]	*M* = 3.674 (*SD* = 1.816)		*M* = 7.310 (*SD* = 3.571)	

	Parental Ethnotheories by Type of Illness – Full Sample			
	Common Cold		Cancer	
Community	***% Yes***	***% No***	***% Yes***	***% No***
Friends				
Should teach children	41.7%	58.3%	28.8%	71.4%
If yes:	(*n* = 48)		(*n* = 32)	
Age friend should be [c]	*M* = 6.913 (*SD* = 3.552)		*M* = 10.750 (*SD* = 4.283)	
Age child should be [c]	*M* = 4.398 (*SD* = 1.845)		*M* = 7.531 (*SD* = 3.750)	
Educational Community				
Should teach children	96.5%	3.5%	69.3%	30.7%
If yes:	(*n* = 111)		(*n* = 79)	
Age child should be [c]	*M* = 4.385 (*SD* = 1.666)		*M* = 8.284 (*SD* = 2.977)	
Medical Community				
Should teach children	96.6%	3.4%	93.0%	7.0%
If yes:	(*n* = 112)		(*n* = 106)	
Age child should be [c]	*M* = 4.302 (*SD* = 1.954)		*M* = 8.223 (*SD* = 3.411)	
Religious Community				
Should teach children	33.6%	66.4%	26.5%	73.5%
If yes:	(*n* = 39)		(*n* = 30)	
Age child should be [c]	*M* = 5.000 (*SD* = 2.555)		*M* = 8.250 (*SD* = 3.216)	

	Parental Ethnotheories by Type of Illness – Full Sample			
	Common Cold	Cancer	Statistical Comparison	
Ages	***Mean* (*SD*)**	***Mean* (*SD*)**	***t*** [d]	**d** [d]
Age – Children in General [c]	*M* = 3.269 (*SD* = 1.861)	*M* = 8.085 (*SD* = 3.678)	-14.350***	1.394
Age Range	0- to 11-years	1- to 15-years		
Age – Own Child [c]	*M* = 3.943 (*SD* = 2.213)	*M* = 8.770 (*SD* = 3.343)	-15.995***	1.505
Age Range	0- to 14-years	2- to 15-years		

[a] = For these questions, parents were only asked the question if they had indicated "yes" to the child learning from that social partner or community. Subsequent percentages reported are only for those parents.

[b] = P refers to the % of parents who brought up the illness whereas C refers to the % of children who brought up the illness. The remaining % was parents who said both the parent and child brought up that illness (cold = 11.0%, cancer = 5.9%)

[c] = All ages are reported as *M* and (*SD*) in years. 0 indicates the parent said "newborn."

[d] = Paired-Samples T-Tests were conducted to compare parents' report of ages for each illness.

† $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$