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The Development of Children's Prelife Reasoning: Evidence From Two Cultures

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Two studies investigated children's reasoning about their mental and bodily states during the time prior to biological conception—"prelife." By exploring prelife beliefs in 5- to 12-year-olds (N = 283) from two distinct cultures (urban Ecuadorians, rural indigenous Shuar), the studies aimed to uncover children's untutored intuitions about the essential features of persons. Results showed that with age, children judged fewer mental and bodily states to be functional during prelife. However, children from both cultures continued to privilege the functionality of certain mental states (i.e., emotions, desires) relative to bodily states (i.e., biological, psychobiological, perceptual states). Results converge with afterlife research and suggest that there is an unlearned cognitive tendency to view emotions and desires as the eternal core of personhood.

What is the essence of personhood? Are persons represented as immaterial minds (Bloom, 2004; Kuhlmeier, Bloom, & Wynn, 2004), solid material bodies (Saxe, Tzelnic, & Carey, 2006), or some combination of both? In the present cross-cultural investigation, we explored how an understanding of persons develops in the context of children's reasoning about their mental and bodily functions during the period of time prior to biological conception (i.e., "prelife"). In many societies, there is no cultural script delineating what personal existence was like prior to conception. Because of this, children's untutored intuitions about the functionality of mental and bodily capacities during prelife can shed light on their appreciation of the enduring and thus essential components of personhood.

Considering their absence from the vast majority of Christian and Jewish faiths, which account for a third of the world's religions (Pew Research Center's Forum on Religion & Public Life, 2012), cultural scripts about prelife existence are not as ubiquitous or pancultural as they are in the case of afterlife (Emmons, 2012; Hodge, 2011a; see also Kamm, 1998; Nagel, 1970). Nevertheless, the notion that persons spiritually preexist their earthly, corporal forms has recurred in religious and philosophical traditions for thousands of years. Such notions are usually embedded in belief systems that include the concept of a life–death–rebirth cycle, wherein the eternal aspects of persons are said to transmigrate between earthly and spiritual realms (see Talmage, 1915, for the Mormon Church's linear concept of prelife existence). Cyclical belief systems have been documented among the ancient Celts (Siculus 60-30 BCE/1935) and ancient Greeks (Plato 380 BCE/2006) and continue to persist in several present-day religions including, but not limited to, Hinduism and Buddhism. Religious and philosophical descriptions of prelife beliefs vary such that in some cases, personal existence is characterized as comprising both bodily and mental attributes in a spiritual setting—a type of *preformationism* in the spirit realm—whereas in other cases the mental attributes of persons are emphasized—an enduring *mentalism*. The current investigation is the first to examine untutored intuitions about prelife, which

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may serve as a cognitive foundation for explicit prelife beliefs. Do children across different cultures that lack a prelife script naturally intuit some kind of existence prior to material embodiment, that is, prior to the point of biological conception and pregnancy? Second, if they do, does mentality take precedence over bodily attributes when reasoning about persons during prelife?

Previous studies cross-culturally assessing intuitions about afterlife—another period detached from a biological physical form—provide compelling evidence that not only are persons represented as continuing to exist after biological death but also that mentality is represented as the central and eternal feature of persons. Specifically, studies conducted in the United States, United Kingdom, Madagascar, and Spain show that children and adults reason that body-dependent capacities, hereafter referred to as "bodily" capacities (e.g., needing to eat, experiencing thirst), cease at biological death, whereas they reason that body-independent capacities, hereafter referred to as "mental" capacities (e.g., thinking, feeling sad), are more likely to continue (Astuti & Harris, 2008; Bek & Lock, 2011; Bering, 2002; Bering & Bjorklund, 2004; Bering, Hernández Blasi, & Bjorklund, 2005; Harris & Giménez, 2005). A related cross-cultural study has further shown that when adults from the United Kingdom and Brazil imagine themselves as disembodied or embodied in a rock or plant they tend to judge that their mental states (e.g., feeling happy, wanting) persist but that their bodily states (e.g., tasting, experiencing hunger) largely cease (Cohen, Burdett, Knight, & Barrett, 2011).

Many researchers consider this type of mental-state privileging to be the untutored, natural cognitive default, rooted in core differences in how we understand and interpret the mind and body (e.g., Bering, 2006; Bloom, 2004; Wellman & Johnson, 2008). A primary source of this claim is an innovative study conducted by Bering and Bjorklund (2004, Experiment 3). They found that when children from 3 to 12 years of age were told about a dead mouse and then asked whether the mouse's mental (i.e., epistemic, emotional, desire) and bodily (i.e., biological, psychobiological, perceptual) capacities continued to function after death, children from all age groups imputed more mental than bodily capacities to the dead mouse. Bering and Bjorklund (2004) argued that if enculturation to religious ideas of the afterlife had strongly contributed to reasoning, children's tendency to say that mental states persist after death would have strengthened as they grew older and gained more exposure to prevalent cultural scripts consistent with this view. In actuality, older children were more likely to say that the mouse's capacities had ceased after death, suggesting that among the younger children, beliefs about the enduring quality of mental states were untutored rather than learned responses. Bering and Bjorklund proposed that older children's increased nonfunctionality judgments were due to their advanced biological understanding of death.

Other researchers examining afterlife reasoning challenge the position that mental-state privileging is a natural, untutored, and potentially universal cognitive default. Albeit utilizing different methods, Harris and Giménez (2005) found that younger children are more likely than older children to say that a person's capacities cease after biological death (but see Astuti & Harris, 2008, Study 2). Moreover, these researchers argue that afterlife beliefs are learned and derive from testimony. This conclusion is based on the finding that older children were more likely than younger children to refer to religious concepts (e.g., the soul) when reasoning about afterlife (Harris & Giménez, 2005). Despite the different age trends reported in the study, data analyses nevertheless revealed that children from all age groups judged mental states to be functional more often than bodily states, thus supporting the mental-state privileging pattern found in other afterlife studies (Bering & Bjorklund, 2004; Bering et al., 2005).

Collectively, available findings on afterlife reasoning therefore indicate that from a young age, individuals are prone to reason that persons continue to exist despite the dramatic biological changes associated with death. Furthermore, the essence of personhood appears to be mentality: Persons' mental aspects rather than their bodily aspects are conceptualized as persisting once the physical body is destroyed.

However, while several studies show that individuals represent the mind as the enduring feature of persons following biological death, it is the case that salient and pervasive cultural scripts favoring the continuity of *postmortem* mentality raise a critical interpretive problem for making claims about untaught intuitive cognitive biases: Young children are frequently exposed to ideas about afterlife existence via conversations, religious service attendance, and the media (e.g., Rosengren et al., in press). In fact, Harris and Giménez's (2005) study revealed the presence of religious concepts in both younger and older children's afterlife reasoning. This raises the question as to whether Bering and

colleagues' pivotal pattern of findings would hold for a period where there is clearly some evidence of religious and philosophical speculation but for many cultures no prevailing cultural script—the period of prelife. In the absence of a cultural script, do children intuitively and spontaneously represent persons as having some kind of eternal existence prior to biological conception, that is, prior to possessing a material, earthly body? If so, do children intuitively understand prelife existence as principally a mental presence, following patterns found in afterlife research, or do they think prelife also includes some kind of intangible bodily presence?

To explore these questions and examine whether children's reasoning about individuals during prelife is consistent with their reasoning about individuals during afterlife, we conducted two studies that adapted Bering and Bjorklund's (2004) original study design. The use of Bering and Bjorklund's design and coding scheme enabled us to generally compare patterns of prelife results to their afterlife findings.

In the prelife study procedure, children were introduced to a drawing of a woman who was described to them as their mother before she was pregnant with them. Children were then asked 12 questions about their mental and bodily functions during that time. Questions were couched in terms of the self rather than another individual because pilot testing revealed that children found the task clearer and more concrete when this was the case. The prelife drawing was introduced within a broader temporal framework to give children an anchor for reasoning about the time prior to biological conception. By being self-referential in nature, the investigation was the first to systematically examine children's reasoning about their own, rather than another's, capacities during a period detached from a biological earthly body. The emotional salience and poignancy of personal death probably accounts for why a self-referential task has not been developed for an afterlife period.

As in Bering and Bjorklund's (2004) original study design (Experiment 3), mental-state questions were divided into three distinct question categories—epistemic, emotional, and desire. Likewise, bodily state questions were divided into three distinct question categories—biological, psychobiological, and perceptual. Asking questions from six separate categories permitted examining the degree to which children discriminate between different types of mental and bodily capacities when reasoning about prelife. It also permitted assessing which types of mental and bodily capacities are the most central to children's conceptions of personhood.

Four sequential age groups (5- to 6-year-olds, 7- to 8-year-olds, 9- to 10-year-olds, and 11- to 12-year-olds) were examined in the two prelife studies to assess developmental changes in reasoning. Consistent with Bering and Bjorklund's (2004) method, the youngest age group tested included 5- to 6-year-olds. However, on the basis of prior research, it was anticipated that these children would have substantially less knowledge about the biological aspects of reproduction and conception compared to the older three age groups and potentially no awareness that biological conception marks the onset of one's physical, earthly embodiment. Specifically, research on children's understanding of babies' origins has shown that children do not acquire a biological causal theory of procreation until between 7 and 10 years of age, with a complete understanding of procreation only demonstrated in adolescence (Berends & Caron, 1994; Bernstein & Cowan, 1975; Goldman & Goldman, 1982; Greene & McGee, 1991; see Emmons, 2012, for review). Including the 5- to 6-year-olds allowed us to make a formal assessment of their abilities to represent the prelife period.

Our concentration on the culturally unscripted prelife period was one strategy for probing untutored and possibly universal intuitions about personhood. We also adopted a second strategy by conducting a cross-cultural comparison. In Study 1, children were from an urban, industrialized center of Ecuador (see Emmons, 2012, for details). This population is, in many ways, reflective of urban Spanish-speaking children involved in previous work on afterlife reasoning (i.e., Bering et al., 2005; Harris & Giménez, 2005). In Study 2, however, we departed from the urban population norm typical of most psychological research and traveled to the Amazon rainforest of Ecuador to explore prelife intuitions among a rural group of children who, while sharing a common language with urban participants (i.e., Spanish), were markedly culturally different in all other respects: They were children from the indigenous hunter–horticulturalist society known as the Shuar. In contrast to urban Ecuadorian children, Shuar children, by virtue of their location in the Amazon rainforest and hunter–horticulturalist existence, are isolated from urban centers and immersed in the natural world (Barrett & Behne, 2005; Barrett & Broesch, 2012; Descola, 1996; Emmons, 2012; Harner, 1972; Pillsworth, 2008). This means that unlike their urban counterparts, Shuar children are extensively exposed to biological

events related to reproduction and the life–death cycle of living things.

Given that a biologically accurate understanding of prelife entails judging that no capacities were functional prior to conception, it seemed possible that Shuar children's experientially based biological knowledge might facilitate acquiring an accurate biological perspective. Rural children's biological inductions have been found to be less anthropocentric and more sophisticated at younger ages than urban children's (Atran et al., 2001; Ross, Medin, Coley, & Atran, 2003; Tarlowski, 2006). Comparing rural indigenous children to urban Ecuadorian children therefore provided a rich opportunity for exploring the cross-cultural generality of developmental patterns in children's conceptions of personhood while also remedying a shortcoming of much psychological research exploring cultural universals—the exclusive focus on Western European Industrialized Rich Democratic "WEIRD" cultures (Henrich, Heine, & Norenzayan, 2010; see also Astuti, Solomon, & Carey, 2004; Atran & Medin, 2008; Coley, 2000; Walker, 1999).

In the two studies, we anticipated that urban and rural children would respond to questions about their prelife capacities in one of three ways, depending on their conceptualization of the eternal features of persons. First, children could respond that none of their capacities were functional during prelife, which is in accord with a purely physical materialist, biological standpoint. Reasoning in this manner would suggest that children do not privilege any particular kinds of capacities as enduring features of persons and therefore do not view personhood as everlasting. Alternatively, children could show a tendency to say that their mental (i.e., epistemic, emotional, and desire) and bodily (i.e., biological, psychobiological, and perceptual) states were functional during prelife. Judging both mental and bodily capacities to be functional in a nonphysical context prior to biological conception would illustrate a preformationist reasoning bias. Such a bias would not only imply that personhood is viewed as eternal but also that all capacities are understood to be temporally unconstrained, permanent features of persons. Lastly, children could show a tendency to say that only their mental states (i.e., epistemic, emotional, and desire states) were functional during prelife, thus demonstrating an enduring mentalist bias. This would converge with previous findings showing that mentality—not the body—is understood to be the eternal aspect of persons.

Study 1

Method

Participants

Children in the urban sample were recruited from three nonreligiously affiliated public schools in Conocoto, Ecuador, which is located a short distance from the capital city of Quito. Reflecting the prevailing Ecuadorian ethnicity, a total of 211 predominantly of mixed Spanish–Amerindian descent boys (n = 110) and girls (n = 101) participated in the study and were divided into four age groups: 5- to 6-year-olds (n = 63, M = 6;2, SD = 7 months), 7- to 8-year-olds (n = 49, M = 8;0, SD = 8 months), 9- to 10-year-olds (n = 59, M = 9;11, SD = 7 months), and 11- to 12-year-olds (n = 40, M = 11;9, SD = 6 months). In the context of Ecuador, children were from low- to middle-income families: Adults from the Conocoto provincial area average approximately 9.2 years of schooling (Ecuador En Cifras, 2010; see also Emmons, 2012).

The dominant religion in Conocoto is Roman Catholicism, as revealed by a recent survey showing that 75% of parents with children attending Conocoto public schools claim affiliation with the Catholic Church (Emmons et al., 2013). The other 25% identify themselves as unspecified Christians, Evangelicals, mixed Catholics–Evangelicals, Jehovah Witnesses, or another Christian denomination. The Catholic Church explicitly endorses the belief that life and personhood begins at conception (Catholic Church, 1994/2000, par. 2270) and formally denies the possibility of individual existence prior to conception, as do the vast majority of Christian faiths (see Mormonism for an exception). Enculturation to this religious standpoint should therefore deter children from maintaining any notions they might have about functional capacities during prelife.

Because children's conceptualizations of their prelife capacities might also be shaped by their experiences with the natural world, it is important to note that children from Conocoto have limited everyday exposure to nature and the life–death cycle because they live in an urban center and have restricted access to green spaces. Urban children's experiences with animals and plants typically consist of acquiring them in a consumable, sellable format as well as observing available local varieties. In this sense, children from Conocoto are equivalent to inner city children from any major urban center. Unlike their rural hunter–horticulturalist counterparts, children from Conocoto generally do not acquire extensive biological knowledge from direct

experience with and observation of living biological entities, but instead rely more heavily on information that is taught to them.

Materials and Procedure

Children were tested in an unoccupied classroom at their school. They were introduced to the study by being told they were going to talk with the experimenter about moments in the past and asked questions about things that they could do then. This setup was utilized as part of a larger study exploring children's reasoning about different developmental periods in the past (Emmons, 2012; Emmons & Kelemen, 2013). The experimenter told children that she only wanted to know what they thought and that the questions were not going to be graded or part of a test.

To frame the prelife period, children were presented with three drawings representing three developmental periods in the past. The images portrayed culturally appropriate renditions of an Ecuadorian infant and woman. Initially, all three drawings were laid out on the table in a linear fashion shown left to right: prelife period, in utero fetal period, and baby period (see Figure 1). Children were told, "Look at these drawings. We know that these are not the people from your family, but we are going to imagine that it is you and your mom."

To provide an anchor point and maintain temporal clarity, the baby period was discussed first. While pointing to the baby period image, the experimenter told children, "This is you when you were a baby. Can you imagine yourself then? That was a long time ago, wasn't it?" The experimenter then pointed to the in utero period image, depicting a pregnant woman, and said, "This is your mom when she was pregnant with you. This (pointing to the in utero image) is before this (pointing to the baby period image), right?" Consistent with previous research (Springer, 1996), children understood that during the in utero period they were inside of their mothers (see Emmons, 2012; Emmons & Kelemen, 2013). Lastly, the experimenter pointed to the prelife period image, depicting a younger version of the woman, and said, "This is your mom before she was pregnant with you, that is, before you were in your mom's belly. This (pointing to the prelife period image) is before this (pointing to the in utero period image), right? Do you think that is true?" The phrase, "before you were in your mom's belly," was used to clarify that the prelife period did not represent the mother during the early stages of pregnancy.

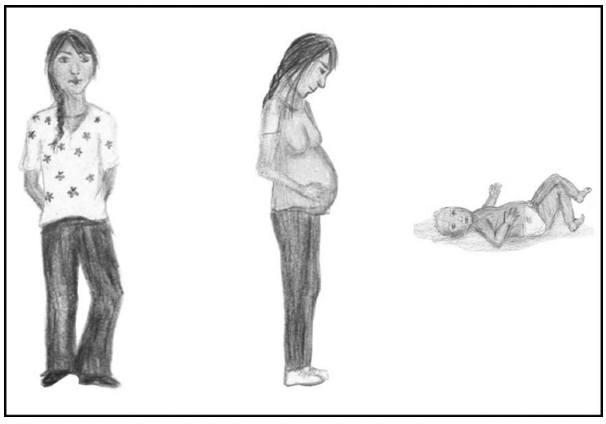

Figure 1. Images depicting three developmental periods, left to right: prelife period, in utero period, and baby period.

Following the introduction of drawings, the experimenter collected the three images and mixed them up. Children were then asked to order the images in terms of what came before and after to check their understanding of the temporal relationship between the developmental periods. If a child failed to respond or did not understand the ordering task, the experimenter presented a modified ordering task that comprised laying down the in utero period image and asking the child to select which of the other two images came before and after. If a child failed to answer correctly on her first attempt to complete the task, the order and description of images were reviewed and the child was given a second chance to answer. The vast majority of children understood and completed the ordering task on the first attempt and all children completed the task successfully.

Once all three images were removed from the table, the experimenter laid down the prelife period image and asked the child 12 "yes–no" questions about her mental and bodily functions during that time (see Table 1). Questions such as "Could you feel happy?" were prefaced with the statement, "Think about yourself during this time when your mom still was not pregnant with you. During that time (Could you feel happy?)" Importantly, children were prompted with "why?" or "why not?" to solicit a justification for their initial "yes" or "no" response. The prelife period image was left in view while children answered questions, and neutral feedback was given following children's responses. In contrast to Bering and Bjorklund's (2004) afterlife study questions, questions from this study were devoid of emotional, social, or otherwise salient information that had the potential to bias children's reasoning.

Table 1
Questions About Prelife Capacities

Question category	Questions	Presentation order
Biological	Could your eyes work?	1
	Could your heart beat?	10
Psychobiological	Could you be thirsty?	2
	Could you be hungry?	4
Perceptual	Could you watch something?	5
	Could you listen to something?	12
Epistemic	Could you think things?	3
	Could you remember things?	6
Emotional	Could you feel sad?	9
	Could you feel happy?	11
Desire	Could you want anything?	7
	Could you desire anything?	8

Note. Half of urban children received questions framed as "did" rather than "could." This variable had no effect on their responses and was collapsed for the purposes of analysis. Only the "could" framing was used in Study 2.

A randomizer generator determined the random fixed question order presented to all children. A random fixed question order was adopted to reduce experimenter error given that this research was part of a more extensive project in which children were also asked sets of questions about two other developmental periods (the baby and in utero fetal period each employed a distinct random fixed order; see Emmons, 2012; Emmons & Kelemen, 2013) and given the variable and unpredictable testing conditions characteristic of running psychological experiments in the field. As we discuss in the following section, children's responses were coded based on their justifications to their initial forced-choice answers. The requirement that children provide justifications stimulated them to reflect on each question, reducing the risk of a general response set. The risk of fatigue effects was also reduced, given that as a result of randomization, questions regarding mental versus bodily capacities were distributed throughout the questionnaire and therefore the specific content that children reflected upon varied (see Table 1 for presentation order).

Coding. As in Bering and Bjorklund's (2004) investigation, children's justifications to their initial "yes" or "no" answers determined how responses were coded. Three coding categories delineated whether children's responses reflected a belief that the capacity was "functional" (i.e., it worked), "nonfunctional" (i.e., it did not work), or "unscorable" due to ambiguity (< 1% of all responses).

Responses were coded as functional if children gave an initial "yes" answer followed by a consistent and elaborated explanation (e.g., "Could you want anything?" "Yes, I wanted to be born and know my mother." "Could you desire anything?" "Yes, that she [mother] is pregnant.") or if children followed their initial "yes" answers with statements simply confirming a capacity's functionality (e.g., "Could you listen to something?" "Yes, I could listen there."). As in Bering and Bjorklund's (2004) investigation, responses were also coded as functional if following an initial "no" answer children gave an explanation demonstrating a belief that their capacity was in fact functional (e.g., "Could you feel sad?" "No, because I was happy."). In the aforementioned example, the capacity to feel sad is implied but not expressed due to another emotion taking precedence. Finally, children's initial "yes" answers followed by the statement "I don't know" were coded as functional because these responses displayed a bias toward reasoning that a particular capacity worked (see also Bering & Bjorklund, 2004, Experiments 2 and 3). These latter responses comprised 1% of children's total responses, the majority of which were provided by 5- to 6-year-olds (2% of their responses).

Responses were coded as nonfunctional if children gave an initial "no" answer followed by an elaborated explanation appealing to reproductive or developmental factors responsible for a capacity not working (e.g., "Could you feel hungry?" "No, because my mom wasn't pregnant with me yet." "Could you watch something?" "No, because I was very, very small.") or if children followed their initial "no" answers with statements simply denying capacity functionality (e.g., "Could your heart beat?" "No, it couldn't beat at all."). Responses were also coded as nonfunctional if initial "no" answers were followed by an elaborated explanation referencing an experiential or knowledge limitation (e.g., "Could you be thirsty?" "No, because I couldn't take anything to drink." "Could you remember anything?" "No, because I wasn't able to see.") Lastly, initial "no" answers followed by an "I don't know" statement were coded as nonfunctional because these responses displayed a bias toward reasoning that a particular capacity did not work. Such responses comprised 1% of children's total responses, the majority of which were provided by 5- to 6-year-olds (3% of their responses).

Our coding scheme, like Bering and Bjorklund's (2004), focused on children's representations of the functionality of distinct capacities. This focus was maintained because we were interested in deter-

mining which capacities children conceptualize as *functionally* essential qualities of persons—not simply whether children believe they existed in some form. As a result, a response coded as functional, by default, betrayed a belief that the child herself existed, whereas a response coded as nonfunctional did not always signify a belief that the child herself did not exist during prelife. Children claimed that their capacities were nonfunctional for numerous reasons, not limited to believing that their capacities or they themselves did not exist during prelife. For instance, children who judged a capacity to be nonfunctional based on the belief that they were "very small" seemed to think that they existed but in an impoverished state devoid of the functional capacity in question. The denial of a capacity's functionality based on this reasoning was sufficient evidence that the child did not represent the capacity as an essential, enduring feature of personhood.

One individual coded all responses, and another blind coder coded half of responses. Interrater reliability was excellent (Kappa = .93), and disagreements were resolved by discussion.

Results

Children's functional responses were examined to determine the kinds of capacities, if any, they viewed to be fundamental, enduring aspects of persons. A mentalist reasoning bias would be evidenced if children tended to judge only mental states (i.e., epistemic, emotional, and desire states) to be functional during prelife, whereas a preformationist reasoning bias would be evidenced if, in addition to mental states, children also tended to judge their bodily states (i.e., biological, psychobiological, and perceptual states) to be functional in a nonphysical context. Lastly, nonfunctionalist reasoning would be evidenced if children judged that none of their capacities were functional during prelife, thus suggesting that children do not consider any capacities to be essential, enduring features of personhood.

Following Bering and Bjorklund (2004), analyses were carried out at the question category level. Each question category (e.g., psychobiological) probed the functionality of two items (e.g., thirst and hunger); therefore, children could score between 0 and 2 functional responses. In Studies 1 and 2, Fisher's least significant difference (LSD) comparisons were used for all post hoc analyses. Fisher's LSD tests were adopted because there was reduced statistical power owing to the unavoidably smaller sample size of the indigenous Shuar child sample in Study 2.

Preliminary analyses were conducted to explore potential gender effects. None were found, so this variable was excluded from further analyses. Preliminary analyses were also conducted to ascertain whether all age groups understood the prelife period as a distinct developmental stage prior to pregnancy rather than coterminous with in utero development. To examine this, a 4 (age group) × 6 (question category) × 2 (developmental period: prelife and in utero) mixed analysis of variance (ANOVA) was conducted to compare children's functionality judgments in the present prelife study to their functionality judgments in a separate study of their beliefs about their in utero fetal capacities (Emmons, 2012; Emmons & Kelemen, 2013). The Developmental Period × Age Group interaction effect, $F(3, 101) = 8.15$, $p < .001$, $\eta_p^2 = .20$, confirmed that the 5- to 6-year-olds did not understand the prelife period as distinct from in utero development. Only by 7–8 years of age did children reliably ascribe more capacities to themselves as a fetus in utero relative to prelife. This supports findings demonstrating that young children have a limited understanding of the biological causes of reproduction (Berends & Caron, 1994; Bernstein & Cowan, 1975; Goldman & Goldman, 1982; Greene & McGee, 1991). Given that 5- to 6-year-olds potentially represented prelife as indistinct from the fetal period, as a conservative measure, we restricted our analysis of children's prelife reasoning to the oldest three age groups. We revisit the youngest children's patterns of reasoning in the General Discussion.

Figure 2 shows children's functional responses for each question category (see Table S1 in Supporting Information available online for functional responses by each item). A 3 (age group) × 6 (question category) mixed ANOVA revealed main effects of age group, $F(2, 145) = 7.82$, $p < .001$, $\eta_p^2 = .10$, and question category, $F(5, 725) = 31.77$, $p < .001$, $\eta_p^2 = .18$. The main effect of age group occurred because children's functional responses decreased with age (7- to 8-year-olds = 9- to 10-year-olds > 11- to 12-year-olds, significant at ps < .05). The main effect of question category occurred because children privileged the functionality of emotion and desire states compared to other states (emotional > desire > all other categories, biological > perceptual = epistemic, significant at ps < .05). All other question category comparisons were nonsignificant.

These results demonstrate that from 7 to 8 years of age, urban children show a selective mentalist reasoning bias that is concentrated on the enduring functionality of emotion and desire states during

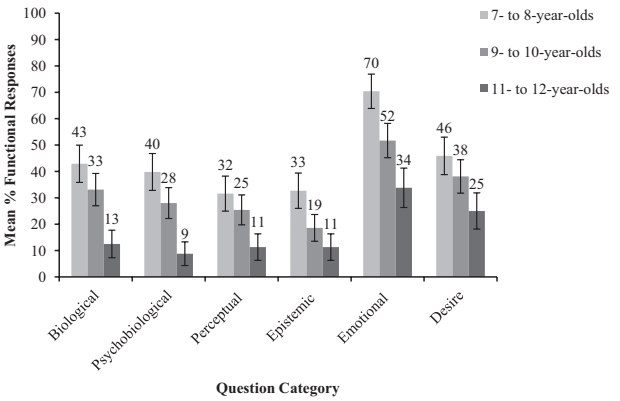

Figure 2. Mean percentages of urban children providing functional responses by age group and question category. Error bars reflect standard error of the mean.

prelife. Importantly, this tendency was not driven by responses to particular individual questions within question categories. McNemar's tests revealed that the only category with differential responding to individual question items was the biological category, $\chi^2(1, n = 148) = 21.95$, $p < .001$. Children were more likely to judge that their heart could beat during prelife than to judge that their eyes could work, potentially because they construed the heart both as a biological organ and as the seat of enduring emotion as suggested by some of their justifications (see also Winer, Cottrell, & Bica, 2010). Despite distinguishing between the two biological items, children largely converged on rejecting the functionality of their biological capacities. Importantly, no individual question item differences were found within the two question categories that children tended to privilege as functional during prelife—the emotion and desire categories. Close examination of children's responses to individual question items (see Table S1 online) confirmed that emotion and desire state privileging did not seem to be driven by a lower level effect, for example, a fatigue-induced response set derived from these questions happening to fall in the second half of the question set. Children's responses revealed no clear sign of indiscriminate responding to the last set of items: Averaged across ages, children endorsed that they could be happy (the penultimate item) 53% of the time, but endorsed that they could listen (the last item) only 27% of the time.

Justification Content Analysis

Qualitative analyses were conducted on children's justifications to elucidate why children privileged the endurance of emotions and desires over other capacities. Specifically, it was of interest to understand the extent to which biological knowledge drove children's nonfunctional responses and whether patterns of justifications to functional responses differed for emotions and desires.

Nine distinct content categories were created to detail the breadth of children's reasoning about the prelife period. Briefly, nonfunctional responses were coded into two main categories: "nonfunctional biological" when a biological justification was given and "nonfunctional limited" when a more general limitation justification, not purely biological, was given. Functional responses were coded into the following main categories: "functional biological" when a biological justification was given, "functional fate" when a future state justification was given, "functional social" when a social justification was given, and "functional psychological" when a mental-state justification was given. Furthermore, a "spiritual" category was used when a spiritual justification was given, and all other responses were coded as "other" (see Supporting Information online for full details). One individual coded all responses, and another blind coder coded half of the responses. Interrater reliability was excellent (Kappa = .89), and disagreements were resolved by discussion. Examples are provided in the Appendix (see Table S2 online for a breakdown of children's justification content).

Analyses confirmed that, consistent with afterlife research claims (Bering & Bjorklund, 2004), children's nonfunctionality judgments were primarily motivated by biological knowledge, which in the case of prelife related to reproduction and development. Interestingly, however, even as nonfunctional biological responses increased with age, across all age groups, nonfunctional biological responses were applied less readily to emotions and desires relative to other states (see Supporting Information online for analysis). This pattern supports that children represented emotions and desires as more eternal and thus less subject to developmental and biological constraints.

Additional findings confirmed that children's reasoning about prelife emotions and desires was clearly distinct from their reasoning about other states. With regard to their functional judgments, children were more likely to provide biological reasons when justifying the functionality of their biological and psychobiological states, but instead social and fate reasons when justifying the functionality of their emotion and desire states. These findings support that children tended to view themselves as emotional, desiring, and social

beings, with a fate to exist on the earth, during prelife. Analyses of the content of children's justifications yielded one additional relevant insight: Spiritual justifications were extremely rare across age groups (2% of responses overall). This further confirmed that there was no cultural religious script supporting prelife beliefs among urban Ecuadorian children and thus no script underlying their emotion and desire state privileging.

Consistent Nonfunction Theorists

Following Bering and Bjorklund (2004, Experiments 2 and 3), a final analysis was conducted to determine the percentage of children in each age group who reasoned that all 12 of their prelife capacities were nonfunctional and thus demonstrated consistent nonfunction theorizing in accord with a biologically accurate perspective. Across age groups, 33% of children conceptualized the prelife period as completely devoid of mental and bodily experiences (7- to 8-year-olds [14%], 9- to 10-year-olds [37%], 11- to 12-year-olds [50%]). Chi-square analyses indicated that the frequency of children classified as nonfunction theorists differed by age group, $\chi^2(2, n = 148) = 13.46$, $p < .001$. Specifically, fewer 7- to 8-year-olds were classified as nonfunction theorists than 9- to 10-year-olds and 11- to 12-year-olds, significant at ps $< .01$. It is worth noting that while these nonfunction theorists consistently responded that all 12 of their capacities were nonfunctional during prelife, a minority (14%) demonstrated belief that they existed in some form, primarily as underdeveloped matter (e.g., sperm or egg) inside one of their parents.

Taken together, results from individual subjects analyses are consistent with a developmental progression in which children's biological knowledge about reproduction and development increases with age. However, at 11–12 years of age, only half of children were consistent nonfunction theorists, indicating that even at this late stage in childhood development, children struggle to represent that their mental capacities, particularly their emotions and desires, were nonfunctional.

Discussion

Results from Study 1 reveal that by 7–8 years of age, urban children have an untutored bias to view themselves as having already existed as emotional and desiring beings before their mothers became pregnant with them. This general pattern replicates findings showing that the mind, rather than the body, is represented as the eternal essential core of personhood (e.g., Astuti & Harris, 2008; Bering & Bjorklund, 2004; Bering et al., 2005; Cohen et al., 2011). Interestingly, children's mental-state privileging during prelife was confined to emotional (i.e., feeling happy or sad) and desire (i.e., wanting or desiring things) states. This result contrasts subtly with findings from afterlife studies (e.g., Astuti & Harris, 2008; Bering & Bjorklund, 2004; Harris & Giménez, 2005), where epistemic states, such as the capacity to think, were also treated as privileged functional states. Analyses of children's justifications demonstrated that children failed to privilege epistemic states during prelife because of perceived biological and maturational constraints, for example, the notion that they were not physically developed enough to remember. However, while they readily applied their biological knowledge to reason why epistemic states did not function, the same was not true for emotions and desires. These mental states tended to elicit social reasoning (e.g., references to desires and feelings about family) and appeals to their fate to exist in the world (e.g., emotions and desires elicited by the prospect of pregnancy and birth). These findings support that children tend to construe themselves as socio-emotional-desiring beings during prelife but not yet biological entities with developed bodily and epistemic capacities (see Hodge, 2011b, for discussion of social reasoning in the context of afterlife).

Urban children's bias toward being selective mentalist reasoners is noteworthy because, as confirmed by children's lack of spiritual justifications, the tendency occurred in the absence of a cultural script. Furthermore, even as advancements in biological knowledge meant that older children offered fewer functional judgments than younger children, the tendency to represent eternal mental states persisted across development: Children across age groups were less likely to offer nonfunctional biological justifications when asked about emotions and desires compared to other prelife states. Urban children thus appear to represent themselves as enduring persons and face difficulty conceptualizing a time when they did not have the capacities to experience emotions and desires (see Kelemen & Rosset, 2009; Kelemen, Rottman, & Seston, 2012, for related evidence of suppression failures). But how culturally generalizable is this pattern?

Relative to rural indigenous hunter–horticulturalist children, urban children grow up with limited firsthand exposure to biological events related to reproduction and the life–death cycle. Thus, it could

be argued that attributing persons with functional capacities prior to biological conception might be a reflection of restricted exposure to the biological processes of nature among urban children rather than a more universal cognitive default. Previous research has shown that children raised in rural environments with high exposure to nature demonstrate more biologically based and less anthropocentric reasoning patterns than urban children (Atran et al., 2001; Ross et al., 2003; Tarlowski, 2006). In Study 2, we therefore examined the cultural specificity of urban children's prelife intuitions by exploring prelife conceptions of indigenous Shuar children who, as a result of their hunter–horticulturalist subsistence lifestyle, live closer to the natural world and have more opportunities for firsthand observations of biological phenomena.

Study 2

Method

Participants

Children in the rural sample were from an indigenous Shuar village in the Amazon Basin of Ecuador. Two children were omitted from data analysis due to inattention during questioning. The remaining 72 Shuar boys (n = 37) and girls (n = 35) were divided into four age groups: 5- to 6-year-olds (n = 13, M = 6;3, SD = 6 months), 7- to 8-year-olds (n = 21, M = 7;11, SD = 7 months), 9- to 10-year-olds (n = 17, M = 10;0, SD = 6 months), and 11- to 12-year-olds (n = 21, M = 12;3, SD = 11 months). All children attended nonreligiously affiliated schools, with almost all children attending the small community school of mixed-age and grade classrooms run by Shuar community members. Despite the existence of schools, education is limited among the Shuar, especially among older community members (Barrett & Haley, 2013). However, the impact of this is reduced given that the Shuar maintain themselves through subsistence activities rather than earnings and income (Barrett & Haley, 2013).

Shuar children's experiences with nature include cultivating and foraging for plants that comprise their diet and medicine, tending domestic animals, hunting wild game, and fishing in nearby rivers. Their subsistence lifestyle means that from a young age, Shuar children are able to identify numerous animals and local flora along with their uses and behaviors. As a result of being members of a hunter–horticulturalist society immersed in the natural world who raise and breed domestic animals (e.g., hunting dogs, chickens, and horses), Shuar children encounter more birth events than urban Ecuadorian children. They also have more exposure to animals in different periods of development, including fetal development, than urban Ecuadorian children who lack comparable experiences. For example, following a hunt, a female animal's unborn fetuses can be observed during the cleaning and preparation of the carcass. If repeated exposure to biological events such as these can promote a better understanding of reproduction, Shuar children might be expected to have a more biologically accurate understanding of prelife compared to urban children who have less exposure to these types of events. In particular, it seemed possible that, because of their observationally based biological knowledge, Shuar children might be generally less inclined to judge that any of their capacities—mental or bodily—were functional during prelife.

Although most Shuar nominally identify as Christian, Catholic, or Evangelical, the Church plays a much smaller role in indigenous communities compared to urban communities, and many traditional beliefs about spirits and witchcraft endure (H. C. Barrett, personal communication, November 10, 2011). As in most societies, the Shuar have culturally supported afterlife beliefs endorsing a spiritual existence after death. Nevertheless, the biological aspects of death such as the cessation of agency are salient to them from 3 to 5 years of age (Barrett & Behne, 2005). Shuar children are exposed to living and dead animals on a regular basis and witness human death when community members die and are buried in the village. Similarly, Shuar children are regularly exposed to biological processes associated with reproduction. However, in contrast to the explicit cultural support available for afterlife beliefs, there is no indication of culturally sanctioned beliefs about prelife existence either historically or in modern times among the Shuar (Descola, 1996; Emmons, 2012; Harner, 1972). To quote Descola's (1996) ethnography, "It is accepted that the embryo is endowed with a *wakan* [soul] as soon as it is conceived, but nobody seems to know where this soul comes from or bothers in the slightest about the matter." Discussions between the first author and multiple Shuar informants in addition to conversations with anthropologist H. C. Barrett, who has worked with the Shuar for over 15 years, further confirmed the absence of contemporary cultural prelife beliefs in the community where children were tested (Emmons, 2012). In this respect, Shuar children's lack of cultural exposure

to scripted prelife beliefs is comparable to that of urban children in Study 1.

Materials and Procedure

The study method and procedure were identical to those described in Study 1. The majority of rural children were interviewed in an unoccupied classroom at the community school. Seven children were interviewed at home because they attended school in another village.

Coding. The coding procedure was also identical to the procedure described in Study 1. Children's justifications to their initial "yes" or "no" answers were used to determine whether they believed the capacity was "functional" (i.e., it worked) or "nonfunctional" (i.e., it did not work; see Study 1 for more details). As in Study 1, Shuar children's initial "yes" answers followed by an "I don't know" explanation were coded as "functional." These responses comprised 6% of children's total responses and were provided mostly by children from the youngest two age groups (5- to 6-year-olds [12% of their responses], 7- to 8-year-olds [11% of their responses], 9- to 10-year-olds [3% of their responses], and 11- to 12-year-olds [2% of their responses]). Children's initial "no" answers followed by an "I don't know" explanation were likewise coded as "nonfunctional." These responses comprised 6% of children's total responses and were provided mostly by children from the middle two age groups (5- to 6-year-olds [5% of their responses], 7- to 8-year-olds [8% of their responses], 9- to 10-year-olds [10% of their responses], and 11- to 12-year-olds [3% of their responses]). Responses coded as "unscorable" due to ambiguity comprised less than 1% of children's total responses. One individual coded all responses, and another blind coder coded half of the responses. Interrater reliability was excellent (Kappa = .96), and disagreements were resolved by discussion.

Results

Children's functional responses were examined to establish whether Shuar children represented any capacities as essential, lasting features of personhood. Once again children could score between 0 and 2 functional responses, and Fisher's LSD comparisons were used for all post hoc analyses. If rural children are biased toward being selective mentalist reasoners like their urban counterparts, they should only privilege the functionality of their emotions and desires during prelife.

Preliminary analyses were conducted to explore potential gender effects. None were found so this variable was excluded from further analyses. Preliminary analyses further assessed whether children represented the prelife period as a distinct developmental period prior to in utero development. A 4 (age group) × 6 (question category) × 2 (developmental period: prelife and in utero) mixed ANOVA was conducted to compare children's prelife reasoning in this study with their in utero reasoning reported in a separate study (see Emmons, 2012; Emmons & Kelemen, 2013). As in Study 1, the interaction effect between developmental period and age group, $F(3, 68) = 3.50$, $p = .02$, $\eta_p^2 = .13$, confirmed that 5- to 6-year-olds did not represent the prelife period as distinct from in utero development. Only by 7–8 years of age did Shuar children differentiate between the two periods. On the basis of these findings and to maintain consistency with Study 1, we restricted our analysis of Shuar children's prelife reasoning to the three oldest age groups. The youngest children's patterns of reasoning are revisited in the General Discussion.

Figure 3 shows children's functional responses for each question category (see Table S3 in Supporting Information online for functional responses by item). A 3 (age group) × 6 (question category) mixed ANOVA revealed main effects of age group, $F(2, 56) = 6.42$, $p < .01$, $\eta_p^2 = .19$, and question category, $F(5, 280) = 7.23$, $p < .001$, $\eta_p^2 = .11$. The main effect of age group occurred because children's functional responses decreased with age (7- to 8-year-olds > 9- to 10-year-olds = 11- to 12-year-olds, significant at ps < .05). The main effect of question category occurred because children privileged the functionality of emotion and desire states compared to other states (emotional = desire > per-

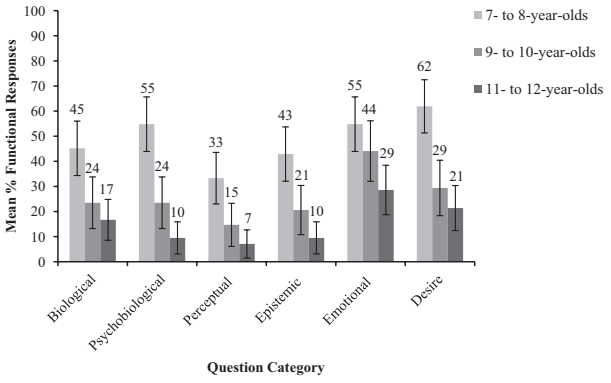

Figure 3. Mean percentages of rural children providing functional responses by age group and question category. Error bars reflect standard error of the mean.

ceptual = epistemic, emotional > biological = psychobiological > perceptual, significant at ps < .05). All other question category comparisons were nonsignificant.

These results replicate and extend findings from Study 1. By 7–8 years of age, rural indigenous children demonstrated a bias to be selective mentalist reasoners. As in Study 1, this effect was not driven by individual question items within question categories. McNemar's tests showed that the only categories with differential responding to individual question items differences were the biological, $\chi^2(1, n = 59) = 8.47$, $p < .01$, and perceptual question categories, $\chi^2(1, n = 59) = 7.11$, $p < .01$. Like urban children, rural children were more likely to judge that their heart could beat during prelife than to judge that their eyes could work. They were also more likely to judge that they could listen during prelife than to judge that they could watch. Despite these differences, children largely converged on rejecting the functionality of their biological and perceptual capacities. No individual question item differences were found within the privileged emotion and desire question categories. As in Study 1, the consistency of children's functionality judgments within these item categories did not appear to reflect a low-level fatigue-induced response set. Although desire and emotion questions occurred in the second half of the fixed order question set, children discriminated between items presented late in the question order (see Table S3 online). For example, on average children endorsed that they could be happy (the penultimate item) 39% of the time, whereas on average they endorsed that they could listen (the last item) 27% of the time.

Justification Content Analysis

Using the scheme in Study 1, qualitative analyses were carried out to explore why children were privileging the endurance of emotions and desires relative to other capacities. One individual coded all responses, and another blind coder coded half of the responses. Interrater reliability was excellent (Kappa = .94), and disagreements were resolved by discussion. Examples are provided in the Appendix (see Supporting Information online for full coding details and Table S4 for a complete breakdown of children's justification content).

The general pattern of results mirrored those found in Study 1. As among urban children, Shuar children's nonfunctional judgments were primarily driven by biological knowledge tied to reproduction and development. However, even as nonfunctional biological responses increased with age, children across ages tended to apply their biological knowledge less frequently when reasoning about emotions and desires compared to other states (see Supporting Information online for analysis). These findings lend support to the notion that biological knowledge does not operate in a manner that eradicates a selective mentalist bias. In addition, rural children gave different justifications for the functionality of emotion and desire states relative to other states. Specifically, they were more likely to provide functional biological justifications when reasoning about biological and psychobiological states, but were more likely to offer functional social and functional fate responses when reasoning about emotion and desire states. Replicating findings from Study 1, these findings show that even rural, hunter–horticulturalist children tend to represent themselves as emotional, desiring, and social beings, with a fate to exist on earth, during the prelife period. Of additional relevance, there were no spiritual justifications among the Shuar. This provided further confirmation of the lack of a cultural prelife script among rural Shuar children (see Supporting Information online for further discussion of coding category patterns).

Consistent Nonfunction Theorists

As in Study 1, analyses were carried out to determine the percentage of children in each age group who judged that they lacked all 12 of their functional capacities during prelife, a response pattern consistent with the biologically accurate position. Across age groups, 37% of children were classified as nonfunction theorists (7- to 8-year-olds [14%], 9- to 10-year-olds [29%], and 11- to 12-year-olds [67%]). Chi-square analyses indicated that the frequency of children classified as nonfunction theorists differed by age group, $\chi^2(2, n = 59) = 12.95$, $p < .01$. Specifically, fewer 7- to 8-year-olds and 9- to 10-year-olds were classified as nonfunction theorists than 11- to 12-year-olds, significant at ps < .05. These results are consistent with findings from Study 1 suggesting that children struggle to represent their own nonexistence, particularly the inability to experience emotions and desires. This conceptual struggle endures through late childhood, even among rural indigenous children who have extensive observational experience of the natural world, the reproductive cycle, and other biological processes. Notably, while these nonfunction theorists reasoned that all 12 of their capacities were nonfunctional, a minority (14%) revealed that they

believed that they existed as small underdeveloped matter inside one of their parents.

Discussion

Rural indigenous children's reasoning about prelife largely replicated results from Study 1 and demonstrated that rural children, like urban children, tend to be selective mentalist reasoners when reasoning about prelife. Shuar children privileged the enduring functionality of their emotion and desire states while largely denying the functionality of their epistemic and bodily states. Justification data revealed that rural children, like urban children, readily applied their biological knowledge about reproduction and development to judge that their epistemic states did not function. By contrast, emotions and desires were more likely to elicit social reasoning and ideas about their fate to exist on earth. This replicates findings from Study 1 and again indicates that children were biased to view themselves as socio-emotional-desiring beings, but not yet biological beings, during prelife.

Taken together, results from Study 2 indicate that intuitive reasoning patterns observed among urban children generalize to rural indigenous children who have substantially more opportunities to witness biological processes occurring in nature. Rural children never provided spiritual responses, confirming that religious cultural scripts were not responsible for their response patterns. Therefore, children's selective mentalist reasoning bias appears not to be merely an artifact of religious cultural scripts or impoverished experiences with the natural world, but rather an unlearned cognitive bias rooted in intuitive conceptions of personhood.

General Discussion

To elucidate the development of children's conceptions of the essence of personhood, we conducted two studies exploring prelife reasoning among children from two distinctive cultural groups in Ecuador. Findings revealed that despite the absence of prelife cultural scripts and the steady accrual of countervailing biological knowledge, children from two very different cultural backgrounds tend to maintain beliefs that there is some form of individual existence prior to material embodiment on earth. Furthermore, from the time when they grasp prelife as a unique period prior to biological conception and pregnancy, children tend to be selective mentalist reasoners who view the core of a person's eternal existence as the ability to experience emotions (i.e., feeling happy and feeling sad) and desires (i.e., wanting and desiring). These general patterns are consistent with afterlife research demonstrating that children are inclined toward reasoning that the mind—not the body—survives death (e.g., Astuti & Harris, 2008; Bering & Bjorklund, 2004; Bering et al., 2005) and suggests that the tendency to reason in terms of an eternal mind is a universal cognitive default. Furthermore, this cognitive default appears difficult to overcome or suppress as revealed by the finding that 50% of urban 11- to 12-year-olds (33% of rural 11- to 12-year-olds) continued to reason that at least one of their capacities functioned during prelife (see Kelemen & Rosset, 2009; Kelemen et al., 2012; Legare, Evans, Rosengren, & Harris, 2012; Legare & Gelman, 2008; Shtulman & Valcarcel, 2012, for further discussion on suppression and the endurance of intuitive explanatory models).

Results from the two prelife studies closely mirrored developmental patterns found in Bering and colleagues' afterlife research in that although certain mental states remained consistently privileged, children's overall beliefs that they had functional capacities during prelife decreased with age (Bering & Bjorklund, 2004; Bering et al., 2005). Patterns yielded by 5- to 6-year-olds in both cultures revealed that until children recognize a biological cause responsible for a personal origin point (i.e., conception), their default tendency is to reason that they always had the mental and bodily capacities of a fetus in utero (Emmons, 2012; Emmons & Kelemen, 2013). Young children's initial difficulty representing bodily, as well as mental, nonexistence parallels findings showing that young children initially struggle to represent the origins and nonexistence of animal species. Specifically, when young children are asked to explain species origins, they frequently provide explanations indicating that they believe the animal simply emerged from preexisting matter (e.g., "[They] grew on earth from eggs …"; Evans, 2000, 2001). In the present studies, awareness of how individuals biologically originate appeared to provide older children with a framework for representing personal nonexistence and also rejecting the notion of functional capacities during prelife. However, even at ages when biological knowledge about reproduction and development had been acquired, children's untutored beliefs about the essential and core properties of persons competed with their biologically accurate understanding (see Kelemen et al., 2012; Legare & Gelman, 2008). This resulted in children being less

able to apply their available biological knowledge to—and therefore more likely to endorse the functionality of—emotions and desires during prelife compared to other capacities.

Interestingly, while many prelife reasoning patterns mirrored those found in afterlife studies, subtle differences also occurred. Specifically, afterlife studies have found that children not only endorse the enduring functionality of emotions and desires after biological death but also all other mental capacities including epistemic states such as thinking (e.g., Astuti & Harris, 2008; Bering & Bjorklund, 2004; Bering et al., 2005). By contrast, the current studies found that children largely restricted their functional judgments about prelife to emotions and desires while generally rejecting the idea that they had the capacities to think and remember. Somewhat paradoxically, children appealed to biological considerations when reasoning about epistemic states but not when reasoning about emotion and desire states. In particular, children's justifications showed that they tended to believe that epistemic states require a fully formed body and brain to occur, but that emotions and desires are relatively body and development independent. Consistent with this interpretation, and despite the unique question orders adopted, results on urban Ecuadorian and rural indigenous Shuar children's reasoning about their capacities as babies and fetuses revealed similar patterns: Emotions and desires were attributed more often during these early life stages than were epistemic states (Emmons, 2012; Emmons & Kelemen, 2013). Parenthetically, the consistency of children's tendency to privilege emotion and desire state functionality during both prelife and early life stages converges with the unique justification patterns found for these items as well as the individual question item patterns described in both studies to further support that children's selective mentalist bias was not simply a lower level by-product of using a fixed question order (future research will use different question orders to definitively rule out this possibility).

The finding that children consistently prioritize the capacities to experience emotions and desires as core properties that both precede biological life and survive biological death is significant not only because it provides insights into children's unlearned intuitions about the eternal essence of personhood but also because it converges with recent research on adults' perceptions of mind and humanness (Gray, Gray, & Wegner, 2007; Gray & Wegner, 2012; Haslam, 2006; Haslam, Bain, Douge, Lee, & Bastian, 2005; see Chandler, 2000, for discussion on the separate topic of essentialist and narrative representations of personal identity). Specifically, research on adults' perceptions of mind and humanness suggests that there are two dissociable factors in adults' conceptions of humanness, which can be implicated when others are dehumanized: "uniquely human" traits that distinguish us from the other animals (e.g., the capacity for rational, analytical thought) and immutable "essentially human" traits that distinguish us from machines and automata (e.g., the capacity to harbor emotions and drives; Haslam, 2006; Haslam et al., 2005; see also Gray & Wegner, 2012). Adults have been found to regard essentially human traits (e.g., emotionality) as the more basic and unchanging aspects of humanness, present from early in development. The current findings on prelife reasoning, in combination with results from afterlife research, indicate that children share these intuitions about the primary and secondary aspects of human nature and furthermore regard essentially human traits as so central to personhood that they are often judged to preexist biological development. This essentialist position about emotions and desires is also consistent with research demonstrating that adults and children judge emotions and passions to be more aligned with the "soul" and "spirit" than with intellect (Richert & Harris, 2006, 2008; Roazzi, Nyhof, & Johnson, 2013).

Collectively, children seem to robustly view the core of personhood as an enduring ability to experience emotions and desires. Developmental patterns revealed by the content analysis of children's prelife justifications indicate that biological knowledge about reproduction and pregnancy may not be sufficient to suppress default intuitions about these mental states. Results from the rural indigenous sample are especially relevant to this point. Children raised in a hunter–horticulturalist society with daily exposure to the natural world exhibited a selective mentalist bias about prelife almost identical to their relatively nature-deprived urban counterparts. Moreover, findings from both studies illustrated that spiritual explanations were rarely, if ever, provided to explain why one's prelife capacities could or could not function. Contrast this with approximately 55% of spiritual responses provided by Spanish children when reasoning about afterlife (Harris & Giménez, 2005). Based on the prelife findings, enculturation to religious scripts does not appear to be the cause of children's essentialist intuitions about the eternal aspects of persons. Instead, the centrality of emotions and desires to conceptions of personhood is emphasized by the ease in which emotion and desire questions generated social- and mental-state reasoning among chil-

dren at all ages. Findings from the current studies therefore provide support for claims that children intuitively distinguish the mind and body and primarily represent persons in terms of their eternal, immaterial minds, while viewing the physical, material body as merely a secondary characteristic (e.g., Bloom, 2004; Kuhlmeier et al., 2004).

The implications of children's intuitive prelife reasoning are broad. Not only do the current findings clarify that cultural narratives do not precede children's mentalist bias, but they also suggest that philosophical and religious belief systems endorsing a mental existence prior to biological conception utilize and build upon existing cognitive biases (see Bering & Bjorklund, 2004, for a similar argument about afterlife beliefs). Recent research by Rosengren et al. (in press) has focused on examining the role of cultural scripts in elaborating children's immortality beliefs with regard to afterlife. Therefore, future research will be aimed at looking at how prelife reasoning develops in societies with explicit prelife scripts (e.g., reincarnationist societies such as in India) and those with strong official identification with materialist metaphysics and secular worldviews (e.g., Mainland China). Examining the development of prelife reasoning in these societies will illustrate the degree to which cultural factors can either heighten or suppress mental-state attributions over the course of development.

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Appendix: Coding Examples for the Content of Children's Prelife Responses

Example question: Could you feel happy?

Coding category

Nonfunctional Biological:

No, because I didn't exist.

No, because I wasn't in the womb.

No, because I wasn't formed yet.

No, because my mom still isn't pregnant.

No, because I was dead. It seemed that I wasn't alive in the world.

Nonfunctional Limited:

No, because I didn't know what it is to feel happy.

No, because I didn't know how my mom's belly was.

Functional Biological:

Yes, because always I was inside my mom's belly.

Yes, because I was in the world.

Functional Fate:

Yes, because my mom will be pregnant.

Yes, because very soon I would be born.

Functional Social:

Yes, because I was with my family.

Yes, because I was already in my parents' thoughts that they would have me. [also coded as functional fate]

Functional Psychological:

Yes, because I desired to have a sister and I wanted my parents' love. [also coded as functional social]

Functional Other:

Yes, because I felt happy. [simple restatement]

Spiritual:

Yes, I felt that I was with God.

Other:

No, I don't know why. ["I don't know" response]

Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

Appendix S1. Details on the Content Coding of Urban and Rural Children's Justifications.

Table S1. Percentages of Urban Children Providing Functional Responses by Age Group.

Table S2. Mean Percentages of Urban Children's Responses Coded Into Distinct Content Categories by Age Group and Question Category.

Table S3. Percentages of Rural Children Providing Functional Responses by Age Group.

Table S4. Mean Percentages of Rural Children's Responses Coded Into Distinct Content Categories by Age Group and Question Category.

Appendix S1: Details on the Content Coding of Urban Children's Justifications

Nine distinct justification coding categories were created to examine how children were conceptualizing the pre-life period and specifically assess why children were privileging emotion and desire states over other capacities: two categories specific to "non-functional" justifications; five categories specific to "functional" justifications; and two additional categories that could be applied to both "functional" and "non-functional" justifications (sample responses for each coding category are provided in the main text Appendix).

Consistent with afterlife research claims (Bering & Bjorklund, 2004), non-functionality judgments were generally motivated by biological considerations. Non-functional responses therefore mostly fell into two categories, differentiated only by the scope of children's biological reasoning: "Non-functional biological" codes were applied if children explicitly appealed to reproductive and developmental factors to explain why a capacity could not function. A conservative "non-functional limited" code was applied when children appealed to some kind of environmental, physical, or other general constraint that prevented a capacity from working but did not mention reproductive and developmental constraints. To distinguish children who had explicit reproductive and developmental knowledge from children who did not, these two categories were mutually exclusive.

Alternatively, functional responses appeared to be motived by a variety of considerations not limited to biological factors. Thus, the five categories specific to functional responses were: "functional biological" if the child gave a biological reason to explain why a capacity functioned; "functional fate" if the child referenced a future, unrealized biological event associated with coming into the world (e.g., pregnancy, birth) to explain why a capacity functioned; "functional social" if the child referenced members of their social group to explain why a capacity

functioned; and "functional psychological" if the child referenced functioning mental states (not mentioned in the original question) to explain why a capacity worked. Children often provided more than one reason why their capacities were functional. Functional responses could be therefore coded into multiple categories.

The remaining two codes were applied to certain types of non-functional and functional responses: A "spiritual" code was applied when the child appealed to supernatural agents or places to explain why a capacity did or did not function. All remaining responses were coded as "other" and included "I don't know" statements, non-elaborated confirmations of initial "yes" or "no" answers, and ambiguous responses (see Table S2 for a detailed breakdown of the content of children's justifications).

Results

The majority of children's non-functional responses were coded as non-functional biological. To explore the role of biological knowledge acquisition in suppressing children's functional pre-life judgments, children's responses coded as non-functional biological were systematically explored. A 3 (age group) x 6 (question category) mixed ANOVA revealed main effects of age group, $F(2, 145) = 5.81$, $p < .01$, $\eta_p^2 = .07$, and question category, $F(5, 725) = 25.36$, $p < .001$, $\eta_p^2 = .15$. The main effect of age group confirmed that children's non-functional biological responses increased with age (7- to 8-year-olds < 9- to 10-year-olds = 11- to 12-year-olds, sig. *p*s < .05). However, across all ages, non-functional biological responses occurred less frequently for emotion and desire states than all other states (emotional < desire < biological = psychobiological = perceptual, emotional < desire < epistemic < biological, sig. *p*s < .05). With regard to children's non-functional limited responses, examination of Table S2 indicated that these justifications were provided infrequently. Nevertheless, across age groups,

they were provided most often for epistemic states (all reported comparisons for both urban and rural cultures have been confirmed as statistically significant through mixed ANOVA analyses with Fisher's LSD post hoc tests, *p*s < .05). These findings confirm that knowledge about reproduction and development increases with age yet is less readily applied to questions about emotions and desires, suggesting that these states are construed as eternal and less subject to developmental and biological constraints.

An overview of the content of children's functional responses (see Table S2) revealed that children's functional justifications varied depending on question category. Responses coded as functional biological and functional social responses decreased with age, consistent with the overall increase of non-functional biological responses with age. However, across age groups, responses coded as functional social and functional fate were elicited most often for emotion and desire states; functional psychological responses were also elicited most often for emotion states. Conversely, functional biological responses were elicited most often for biological and psychobiological states. These patterns suggest that children were making a clear distinction between emotion and desire states and bodily states. Specifically, it seemed that emotions and desires prompted children to reason more in terms of social relationships and their fate to exist in the world rather than in terms of existing biological states. Notably, these patterns cannot be attributed to exposure to cultural scripts about pre-life given that spiritual justifications were provided rarely across ages and question categories (2% of responses overall).

Details on the Content Coding of Rural Children's Justifications

Identical to Study 1, the content of indigenous rural Shuar children's justifications were coded into nine distinct categories to examine rural children's conceptualization of the pre-life period and to specifically examine why they privileged emotion and desire states over other

capacities (see Table S4 for a detailed breakdown of the content of children's justifications; sample responses for each coding category are provided in the main text Appendix).

Results

As in Study 1, the majority of rural children's non-functional responses were justified with appeals to explicit biological factors and thus were coded as non-functional biological (see Table S4). To examine the role of biological knowledge in Shuar children's pre-life reasoning, a 3 (age group) x 6 (question category) mixed ANOVA on non-functional biological responses was conducted. This analysis revealed main effects of age group, $F(3, 56) = 4.50$, $p = .02$, $\eta_p^2 = .14$, and question category, $F(5, 280) = 5.24$, $p < .001$, $\eta_p^2 = .09$. Like urban children, Shuar children's non-functional biological responses increased with age (7- to 8-year-olds < 11- to 12-year-olds, $p < .05$). Even with this general increase over development, non-functional biological responses were provided less often for emotion and desire states relative to other states (emotional = desire < biological = psychobiological = perceptual, emotional < epistemic, sig. *p*s < .05). In terms of non-functional limited responses, they were provided infrequently and no significant patterns across development or question category emerged. These findings confirm that biological knowledge was not applied as readily to emotion and desires and therefore did not operate in a manner that eradicated a selective mentalist bias.

An overview of the content of children's functional responses (see Table S4) revealed that, as in Study 1, Shuar children's functional justifications varied depending on question category and that functional biological and functional social responses decreased with age. Across age groups, functional social responses and functional fate responses were elicited most often for emotion and desire states; functional psychological responses were also elicited most often for emotion, desire, and epistemic states. Conversely, functional biological responses were

elicited most often for biological and psychobiological states. As in Study 1, these patterns suggest that children distinguished between bodily states and emotion and desire mental states. In particular, emotions and desires seemed to prompt children to reason more in terms of social relationships and their future fate of existing in the world. Notably, these trends were not due to exposure to a cultural script about pre-life: Shuar children never provided spiritual justifications.

Table S1
Percentages of Urban Children Providing Functional Responses by Age Group

		Age groups (years)		
Category	Capacity	7 to 8	9 to 10	11 to 12
Biological	Eyes	33	20	5
	Heart	53	46	20
Psychobiological	Thirst	35	27	10
	Hunger	45	29	8
Perceptual	Watch	31	19	10
	Listen	33	32	13
Epistemic	Think	33	24	18
	Remember	33	14	5
Emotional	Sad	74	49	35
	Happy	67	54	33
Desire	Want	39	37	25
	Desire	53	39	25

Table S2

Mean Percentages of Urban Children's Responses Coded Into Distinct Content Categories by Age Group and Question Category

		Question categories						
		Biological	Psycho-biological	Perceptual	Epistemic	Emotional	Desire	Total
Age group (years)	Coding categories							
7 to 8	NF Biological	51 (6)	44 (7)	5 (6)	48 (6)	22 (5)	41 (6)	43 (5)
	NF Limited	1 (1)	3 (2)	4 (2)	11 (3)	3 (2)	4 (2)	4 (1)
	F Biological	23 (5)	38 (6)	13 (4)	8 (3)	12 (4)	11 (4)	18 (3)
	F Fate	2 (1)	1 (1)	0 (0)	5 (3)	15 (4)	8 (3)	5 (1)
	F Psychological	8 (3)	0 (0)	0 (0)	4 (2)	21 (4)	0 (0)	6 (1)
	F Social	7 (3)	2 (1)	13 (4)	14 (4)	40 (6)	16 (4)	15 (2)
	F & NF Spiritual	3 (2)	2 (1)	0 (0)	3 (2)	1 (1)	1 (1)	2 (1)
	F & NF Other	10 (3)	13 (4)	15 (4)	12 (3)	8 (3)	20 (4)	13 (2)
9 to 10	NF Biological	64 (6)	64 (6)	64 (5)	62 (6)	39 (6)	48 (6)	57 (5)
	NF Limited	1 (1)	3 (1)	0 (0)	7 (3)	7 (3)	7 (3)	4 (1)
	F Biological	15 (3)	23 (5)	5 (2)	4 (2)	7 (3)	4 (2)	10 (2)
	F Fate	3 (1)	1 (1)	0 (0)	2 (1)	20 (5)	11 (3)	6 (1)
	F Psychological	7 (2)	0 (0)	0 (0)	1 (1)	15 (4)	3 (1)	4 (1)
	F Social	4 (2)	0 (0)	14 (3)	9 (3)	20 (4)	17 (4)	11 (2)
	F & NF Spiritual	4 (2)	2 (1)	5 (2)	2 (1)	4 (3)	3 (2)	3 (2)
	F & NF Other	9 (3)	8 (3)	14 (4)	14 (4)	7 (3)	13 (4)	11 (2)
11 to 12	NF Biological	83 (5)	78 (6)	74 (5)	69 (4)	53 (4)	56 (4)	69 (7)
	NF Limited	0 (0)	5 (2)	4 (2)	11 (6)	6 (7)	11 (7)	6 (2)
	F Biological	8 (3)	6 (3)	6 (3)	0 (3)	6 (3)	3 (4)	5 (2)
	F Fate	1 (1)	0 (0)	0 (0)	5 (0)	14 (3)	15 (2)	6 (2)
	F Psychological	1 (1)	0 (0)	0 (0)	0 (2)	9 (4)	1 (5)	2 (1)
	F Social	1 (1)	0 (0)	5 (2)	5 (0)	19 (4)	10 (1)	7 (1)
	F & NF Spiritual	0 (0)	1 (1)	1 (1)	0 (3)	1 (5)	1 (4)	1 (0)
	F & NF Other	8 (3)	10 (4)	10 (5)	11 (0)	8 (1)	9 (1)	9 (6)

Note. NF refers to non-functional responses and F refers to functional responses. *SEM* reported in parentheses.

Table S3

Percentages of Rural Children Providing Functional Responses by Age Group

		Age groups (years)		
Category	Capacity	7 to 8	9 to 10	11 to 12
Biological	Eyes	38	6	5
	Heart	52	41	29
Psychobiological	Thirst	57	24	10
	Hunger	52	24	10
Perceptual	Watch	24	6	0
	Listen	43	24	14
Epistemic	Think	48	24	10
	Remember	38	18	10
Emotional	Sad	62	47	29
	Happy	48	41	29
Desire	Want	67	24	19
	Desire	57	35	24

Table S4

Mean Percentages of Rural Children's Responses Coded Into Distinct Content Categories by Age Group and Question Category

		Question categories						
		Biological	Psycho-biological	Perceptual	Epistemic	Emotional	Desire	Total
Age group (years)	Coding categories							
7 to 8	NF Biological	43 (10)	33 (9)	50 (10)	38 (10)	36 (10)	33 (10)	39 (9)
	NF Limited	0 (0)	2 (2)	0 (0)	0 (0)	0 (0)	2 (2)	1 (1)
	F Biological	21 (7)	50 (10)	14 (6)	5 (3)	7 (4)	12 (6)	18 (4)
	F Fate	0 (0)	0 (0)	0 (0)	0 (0)	2 (2)	10 (4)	2 (1)
	F Psychological	0 (0)	2 (2)	0 (0)	10 (6)	5 (3)	7 (4)	4 (2)
	F Social	5 (3)	0 (0)	12 (5)	19 (8)	33 (9)	21 (7)	15 (4)
	F & NF Spiritual	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	F & NF Other	31 (9)	14 (7)	24 (9)	31 (9)	21 (9)	21 (8)	24 (7)
9 to 10	NF Biological	62 (9)	56 (11)	56 (10)	56 (12)	41 (11)	47 (12)	53 (9)
	NF Limited	0 (0)	6 (6)	3 (3)	6 (4)	3 (3)	6 (6)	4 (2)
	F Biological	21 (6)	24 (9)	0 (0)	3 (3)	15 (7)	9 (5)	12 (4)
	F Fate	0 (0)	0 (0)	0 (0)	0 (0)	9 (5)	6 (4)	2 (1)
	F Psychological	0 (0)	0 (0)	0 (0)	3 (3)	0 (0)	0 (0)	0 (0)
	F Social	0 (0)	0 (0)	9 (5)	0 (0)	6 (6)	6 (6)	3 (2)
	F & NF Spiritual	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	F & NF Other	18 (7)	15 (7)	32 (10)	32 (10)	26 (9)	26 (10)	25 (7)
11 to 12	NF Biological	79 (7)	83 (7)	81 (6)	74 (9)	62 (10)	64 (10)	74 (7)
	NF Limited	2 (2)	2 (2)	0 (0)	2 (2)	2 (2)	5 (3)	2 (2)
	F Biological	7 (4)	10 (6)	0 (0)	0 (0)	2 (2)	0 (0)	3 (2)
	F Fate	0 (0)	0 (0)	0 (0)	0 (0)	14 (7)	5 (3)	3 (2)
	F Psychological	0 (0)	0 (0)	0 (0)	0 (0)	7 (5)	0 (0)	1 (1)
	F Social	2 (2)	0 (0)	7 (4)	2 (2)	0 (0)	5 (5)	3 (1)
	F & NF Spiritual	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	F & NF Other	10 (6)	5 (3)	12 (6)	21 (9)	17 (7)	24 (9)	15 (6)

Note. NF refers to non-functional responses and F refers to functional responses. *SEM* reported in parentheses.