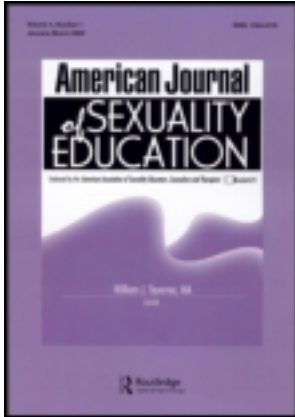


This article was downloaded by: [Sandra L. Caron]

On: 12 March 2012, At: 11:50

Publisher: Routledge

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



American Journal of Sexuality Education

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/wajs20>

Children's Understanding and Knowledge of Conception and Birth: Comparing Children from England, the Netherlands, Sweden, and the United States

Sandra L. Caron^a & Carie Jo Ahlgrim^a

^a University of Maine, Orono, ME, USA

Available online: 12 Mar 2012

To cite this article: Sandra L. Caron & Carie Jo Ahlgrim (2012): Children's Understanding and Knowledge of Conception and Birth: Comparing Children from England, the Netherlands, Sweden, and the United States, American Journal of Sexuality Education, 7:1, 16-36

To link to this article: <http://dx.doi.org/10.1080/15546128.2012.650970>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.tandfonline.com/page/terms-and-conditions>

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae, and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand, or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

Children’s Understanding and Knowledge of Conception and Birth: Comparing Children from England, the Netherlands, Sweden, and the United States

SANDRA L. CARON and CARIE JO AHLGRIM
University of Maine, Orono, ME, USA

The present study replicated research conducted decades earlier (Goldman & Goldman, 1982a; Koch, 197480) on what children in the United States know about conception and birth compared to those in other countries. Specifically, response drawings by 48 six-year-old boys and girls from England, the Netherlands, Sweden, and the United States were compared. Children were asked to draw pictures in response to two questions: “Where do babies come from?” and “How are babies made?” Descriptive analysis revealed that most six-year-olds, no matter what country they were from, tended to show a limited understanding of conception and birth. However, there were several children who demonstrated a much greater comprehension. In most cases, these children were from Sweden and the Netherlands, two countries known for their progressive sexuality education programs. The children sampled from the United States still lagged behind their peers in other countries. The results of this exploratory study suggest that differences may exist between countries, and a larger more systematic study needs to be done to determine if such differences do exist.

KEYWORDS *Children’s understanding, sexuality, birth, conception, cross-cultural*

What do children know about conception and birth? Are children too young to understand these concepts? The focus of this study is on how children

Address correspondence to Sandra L. Caron, Ph.D., Professor of Family Relations/Human Sexuality, College of Education and Human Development, University of Maine, 5749 Merrill Hall, Room 220, Orono, ME 04469-5749. E-mail: sandy.caron@umit.maine.edu

in various countries understand conception and birth. The importance of educating children about such issues has been highlighted in studies on children's sexuality dating back to the 1930s and 1940s. For example, Hattendorf (1932) and Strain (1948) noted that young children, more than any other age group, asked questions about sexuality-related issues such as conception and birth. Both authors encouraged parents and teachers to begin talking to children about sexuality topics early. Similarly, later work by Koblinsky, Atkinson, and Davis (1980) stated that adults' straightforward responses to children's sex-related questions provide a foundation for healthy and open communication about sexuality later on. However, they noted that one barrier parents and teachers may face in educating children is that they are often unclear about what to say (Koblinsky et al.). Having knowledge of how children understand certain concepts (i.e., conception and birth) can guide adults when talking with children.

THEORIES OF CHILDREN'S UNDERSTANDING OF CONCEPTION AND BIRTH

Two of the best-known human development theorists, Sigmund Freud and Jean Piaget, were among the first to hypothesize about children's understanding of reproduction. In the late 19th and early 20th centuries, Freud published his theory on infantile sexuality that included the cloacal theory, in which he theorized that children believe that babies are the result of the mother eating something special and born through the anus as in the cloaca of birds, reptiles, amphibians, and fishes (Brill, 1938). Piaget's examinations of children's questions led him to more fully investigate Freud's cloacal theory. Piaget theorized that children first believe that babies have always existed (Piaget, 1929). He observed that questions children ask concern *where* babies come from rather than *how* they are made. Piaget noted that young children are temporarily satisfied with whimsical responses that answer the "where" question, such as storks, pumpkin patches, or baby factories. However, children eventually begin to suspect that their parents play a bigger role in having a baby (Piaget). In this new phase of awareness, children come to grasp the notion that babies somehow come from their parents' bodies, primarily the mother's body. According to Piaget, in this phase of preoperational thinking known as artificialism, children believe that babies are produced piece by piece (Piaget). As children move from preoperational thought to concrete operations (in which children begin to think logically but are very concrete in their thinking) and, finally, formal operations (the development of abstract reasoning), their understanding of reproduction becomes increasingly more sophisticated.

RESEARCH ON CHILDREN'S UNDERSTANDING OF CONCEPTION AND BIRTH

Only a small number of research studies have investigated children's knowledge and cognitive understanding of reproductive issues such as conception and birth. One of the earliest published research articles on this topic appeared in 1947. Conn (1947) interviewed 100 children, ages 4–12, using doll play to investigate children's understanding of the origin of babies. His study revealed that the younger children (ages 4–5) were the most interested in the origin of babies. He also concluded that it was not until children are much older (ages 10–12) that they believe a baby is in the mother's stomach and requires surgical removal. Conn hypothesized that children's limited knowledge was the result of parents' negative attitudes and unwillingness to provide a vocabulary for discussing sexuality issues (Conn).

Two decades later, several other studies were published that investigated children's understanding of conception and birth as it relates to Freudian and/or Piagetian concepts (Kreitler & Kreitler, 1966; Moore & Kendall, 1971). Both sampled younger children. Kreitler and Kreitler used an Israeli sample of 189 children ages 4–5, and Moore and Kendall's replication of this study interviewed an American sample of 69 children ages 3–5. Few responses by children in either study supported Freudian cloacal theory of the mother swallowing food to make a baby or the Piagetian preartificialist concept that the baby has always existed in the mother. There were almost no sex differences found between boys and girls in terms of their understanding of reproduction. Interestingly, when looking at responses related to the role of the mother versus the father, nearly all children believed the father's role was inconsequential. The researchers in both studies agreed that young children are curious, ready, and capable of learning accurate concepts of conception and birth.

Bernstein and Cowan (1975) explored children's thinking about conception and birth by interviewing 60 children between the ages of 3 and 12. They were asked, "How do people get babies?" "How do mommies get to be mommies?" and "How do daddies get to be daddies?" Their findings support the hypothesis that children's understanding of reproduction proceeds through a Piagetian developmental sequence. No major sex differences emerged for responses by boys and girls in any of the age groups, except in the 7-year-olds. Boys in this age group showed less understanding of reproduction. Bernstein used her findings to devise a six-level philosophy of children's thinking about birth and conception based on Piaget's theory of cognitive development (Bernstein, 1978). The six levels are Geographers (ages 3–7), Manufacturers (ages 4–8), In-Betweens (age 5–10), Reporters (ages 7–12), Theoreticians (ages 10–12), and Putting It All Together (from 11–12 and beyond). In her book *The Flight of the Stork* (1978), Bernstein describes

her study and offers advice to parents on how to effectively talk with their children.

Two other studies published around this same time approached the topic of children's understanding of conception and birth from a cross-cultural perspective (Koch, 1980; Goldman & Goldman, 1982a). Koch compared interviews with 7- and 8-year-old children in the United States ($n = 22$) to children in Sweden ($n = 16$). Koch's study utilized drawings as a tool to evoke children's comments in response to the question, "Where do babies come from and how are babies made?" She developed the *Children's Sexuality Awareness Scale* (CSAS), a four-point scale used to rate and compare children's drawings. Koch found that the children from Sweden were significantly more advanced and technically correct in their responses. For example, the majority of children from Sweden indicated that sexual intercourse needed to take place and that a man needed to be involved, whereas none of the children from the United States indicated the act of intercourse or a man's involvement. Overall, Koch concluded that children are not only capable of understanding concepts related to conception and birth, but also Sweden's early and comprehensive sexuality education prevents misinformation (Koch).

In the other cross-cultural study, Goldman and Goldman (1982a) examined beliefs about conception and birth of 838 children ages 5–15 from Australia, England, North America, and Sweden. Goldman and Goldman developed a system for categorizing the children's responses. Their results, detailed in their book *Children's Sexual Thinking* (Goldman & Goldman, 1982b), were similar to Bernstein and Cowan's (1975) criteria in that they paralleled Piaget's theory of cognitive development. Using the *Origin of Babies Scale* (OBS) they developed, Goldman and Goldman identified six levels of children's responses: Geographers (@ age 5), Manufacturers (@ age 7), Agriculturalists (@ age 9), Reporters (@ age 11), Miniaturists (@ age 13), and Realists (@ age 15). No significant sex differences were found. Their research supported the notion that children's understanding of conception and birth proceeds through a developmental sequence, and found similar ages for many of the children's understanding at the preoperational, concrete operational level, and formal operational level, except for children from Sweden. The Swedish children reached higher levels of understanding of sexual matters earlier. Goldman and Goldman (1982a) attributed this to their earlier introduction to sex education at home and at school.

PURPOSE OF STUDY AND RESEARCH QUESTIONS

Only a handful of studies have examined children's thinking and understanding of how babies are made and where babies come from (Conn, 1947; Kreitler & Kreitler, 1966; Moore & Kendall, 1971; Bernstein & Cowan, 1975;

Koch, 1980; Goldman & Goldman, 1982a). This aspect of child development appears to be largely untapped and underresearched. Several decades have passed since the last published research on this topic, and many changes have taken place since then as relating to sexuality, including the AIDS epidemic, greater number of sexuality-related books and Web sites for both children and parents, and growing support for sexuality education in school. With such changes may have come increases in children's knowledge and understanding of conception and birth, particularly among children in the United States. While previous studies conducted decades ago found that children in the United States lagged behind their peers in other developed countries in terms of their understanding of conception and birth, this study sought to examine if this is still the case today.

The present study sought to replicate earlier research conducted by Koch (1980) and Goldman and Goldman (1982a) in order to explore what primary-aged children in the United States know about birth and conception compared with children in several other countries. Specifically, response drawings by six-year-old boys and girls from England, the Netherlands, Sweden, and the United States were compared. Children were asked to draw pictures in response to two questions: "Where do babies come from?" and "How are babies made?" Two existing measures of children's knowledge of conception and birth were used to determine each child's knowledge level and stage of cognitive development and provided the basis of comparison for the drawings: the CSAS developed by Koch and the OBS developed by Goldman and Goldman (1982a).

In addition to examining the level of understanding of conception and birth for all six-year-olds sampled, this study also compared boys' responses with girls' responses, as well as cross-cultural differences to determine if children in those countries where early sexuality education is available display an increased understanding of conception and birth. Unlike the United States and England, both Sweden and the Netherlands are recognized as countries with more progressive attitudes toward sexuality and comprehensive sexuality education beginning in kindergarten (SIECUS, 1990; Berne & Huberman, 1999). The research questions were as follows:

Research Question #1: To what extent do six-year-olds have a similar understanding of conception and birth, regardless of country of origin?

Research Question #2: To what extent do six-year-old girls have a similar understanding of conception and birth compared to six-year-old boys as measured by the *Children's Sexuality Awareness Scale* and *Origin of Babies Scale*?

Research Question #3: To what extent do children from countries with a more open approach and more comprehensive sexuality education programs (i.e., Sweden and the Netherlands) have a more advanced and

comprehensive understanding of conception and birth, as measured by the *Children's Sexuality Awareness Scale* and *Origin of Babies Scale*?

METHOD

Sample

The research study included interviews with 48 children about their drawings in response to the questions "Where do babies come from?" and "How are babies made?" The sample included 12 six-year-old children (six boys and six girls) from four countries: England, The Netherlands, Sweden, and the United States. As a small, exploratory study on a sensitive topic of sexuality, a combined method of convenience sampling and snowball sampling was used. The authors conducted the interviews with children in the U.S. sample. For the non-U.S. samples, the lead author contacted colleagues teaching elementary school in England, the Netherlands, and Sweden, who in turn conducted the interviews with six-year-olds in their countries. All interviewers were female and had training in the field of sexuality. The drawings obtained from children in these countries, along with the children's responses (which were all transcribed in English), were returned to the researchers. The only identifying information obtained about the children was their gender and in which country they lived.

Procedure

The study was approved through the Human Subjects Committee of the university. A letter providing an overview of the study was given to interested parents in each country. In England, the Netherlands, and Sweden, the children were recruited and interviewed in the classroom setting after parental permission was obtained. Due to the difficulty of obtaining access to children for this study through the local school system in the United States, individual parents were contacted. Parents who showed an interest in the study were contacted by phone or e-mail to arrange a time to meet with each parent and child individually, either at the child's home or a convenient location.

While recruitment differed from the United States compared with the other countries, the data collection was the same in all countries. Parents were asked to ensure that their child was comfortable and willing to participate prior to the meeting. At the interview, parents were asked to read and sign a written parental consent form. Following the same protocol, the interviewer introduced herself and explained to the child that he or she was to help the researcher with a special project. The child was then told that the researcher was interested in his or her ideas about how babies are made and born. In all countries, children were reassured that they were not being

tested and there were no right or wrong answers; the researcher was only interested in their ideas. In addition, the children were reassured that their parents had given permission for them to talk with the researcher about where babies are made and how they are born. The children were also told that they could discontinue the interview at any time and were allowed to choose whether or not a parent remained in the room during the drawing and interviewing.

Once the child's assent was obtained, he or she was asked to first draw a picture about how babies are made and encouraged to talk about the picture during and after. The gender, country of residence, and children's comments in response to their drawing were noted on the drawing. When necessary, the interviewer repeated what was said for clarification using the language the child introduced. Responses were not corrected, and the interviewer gave no sexuality education. The procedure was repeated for the drawing of how babies are born. Drawings were retained with the permission of the children; if permission was denied, a photocopy of the original drawing was retained. In all cases, children gave permission for drawings to be retained.

Measures

Measurement tools include the CSAS developed by Koch (1980) and the OBS developed by Goldman and Goldman (1982a).

The *Children's Sexuality Awareness Scale* is a four-item scale that assesses points according to the type of information provided by the child in response to "Where do babies come from?" and "How are babies made?" This is not a progressive scale. A score of 0 would mean the child did not indicate information related to any of the four items. A drawing could earn a maximum of four points (one point per item) if it depicts or the child makes verbal reference to each of the four items. Koch's original four-point system for rating drawings and explanations was slightly modified/expanded for this study. Those modifications appear in italics below for the four-point scale:

1. Human reproduction occurring through sexual intercourse; *understanding that an egg combines with something to make a baby.*
2. Involvement of both a male and female in conception/birth; *males can't have babies.*
3. Understanding of aspects regarding prenatal development/care; *understanding that babies grow bigger inside the mother and need food to grow.*
4. Accurate knowledge of birthing; *there is a special place where the baby comes out; understanding caesarian section.*

Points were awarded for each conceptual category represented in their response. For example, a child would receive two points if he or she indicated that an egg meets a sperm (Item 1) and that a baby grows inside the mother and needs food to grow (Item 3).

The *Origin of Babies Scale* was used to rate the children's response on a Piagetian scale of cognitive development from preoperational, concrete operations, and formal operational thinking, with transitional stages in between. Scores on the OBS depended upon the complexity of the child's response to "Where do babies come from?" and "How are babies made?" Scores ranged from zero to six, with higher scores indicating a higher level of thinking. A response of "no answer" would receive a score of 0; a response that was "complete and accurate" would receive a score of 6. Scoring categories with brief descriptions for the OBS developed by Goldman and Goldman (1982b, pp. 219, 237) are as follows:

1. The Geographers (@ age 5)—Children believe that babies have always existed, and the relevant question is "where" babies were before they came to live with the family, not "how."
2. The Manufacturers (@ age 7)—Children believe that God, doctor, or father makes the baby and puts it in the mother. Children's thinking also displays the "digestive fallacy" that babies are formed by something the mother ate/by food.
3. The Agriculturists (@ age 9)—Children's ideas are technically feasible but unrealistic. This is termed the "agricultural fallacy"—seed planting.
4. The Reporters (@ age 11)—Children's explanations are technically realistic and show some awareness of a biological process (e.g., ovum or sperm).
5. The Miniaturists (@ age 13)—Children at this level believe that babies are preformed in miniature. They are either as ovists and believe that the egg is activated by the sperm, or animalcultists and believe that the sperm uses the ovum as an incubator.
6. The Realists (@ age 15)—Children now understand that two discrete entities, ovum and sperm, combine to become another unique human being. The concept of physical causality is now comprehensible to them.

In terms of how these stages relate to Piaget, Goldman and Goldman (1982b) believed the first two levels (Geographers and Manufacturers) represent Piaget's preoperational thinking, Agriculturists represent a transitional level, Reporters represent Piaget's concrete operational level of thinking, Miniaturists represent a transitional level, and Realists are formal operations.

Data Analysis

Due to the relatively small number of children involved in the exploratory study, inferential statistics are not appropriate for this type of descriptive study. Descriptive variables (gender, country in which they live) were examined, as well as scores on the CSAS and OBS. Children's drawing and quotes were scored on the CSAS and OBS by the co-researchers. These scores were compared for an inter-rater reliability of 84%. See Figures 1, 2, 3, and 4 for sample drawings by the children from the four countries.

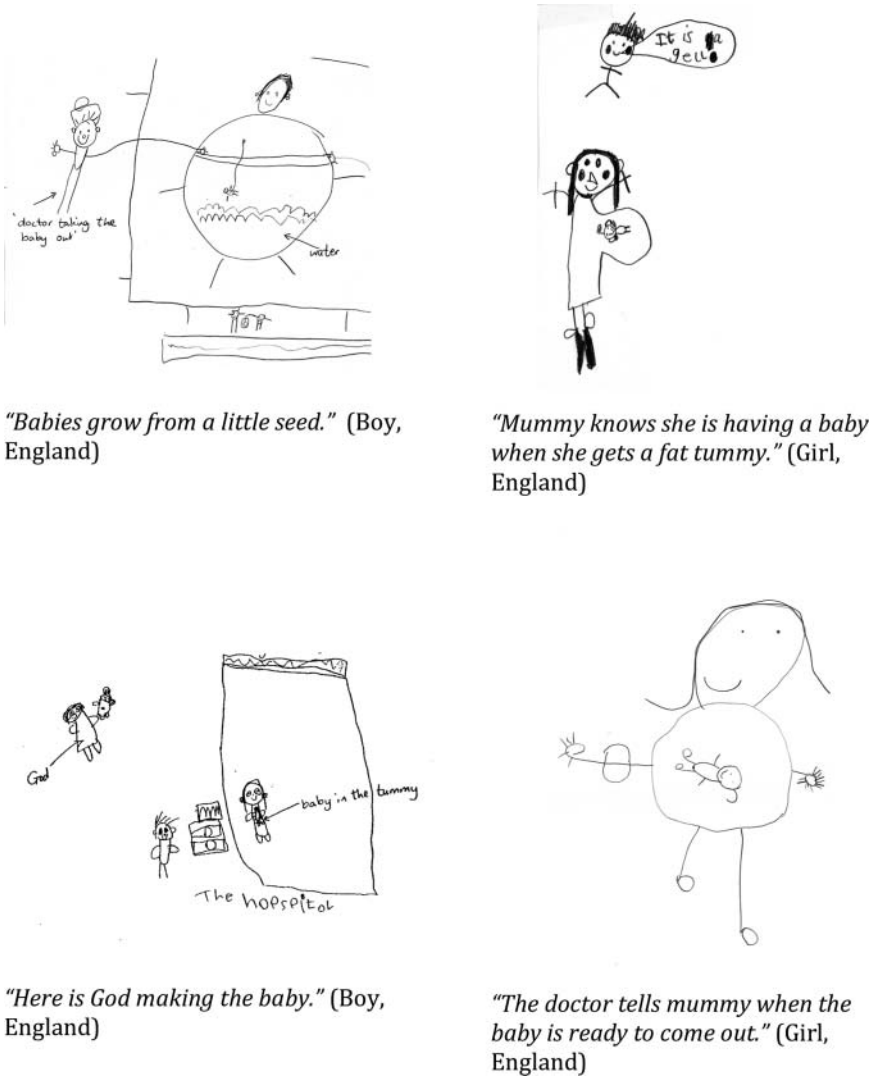
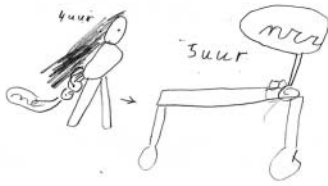
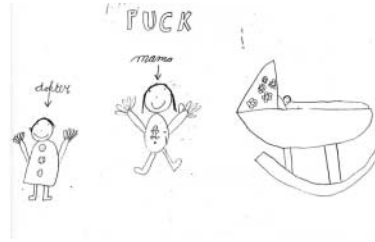


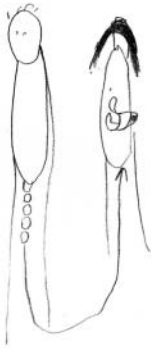
FIGURE 1 Sample drawings by six-year-old children in England.



"Babies come through a special hole in my mother." (Boy, The Netherlands)



"In the hospital, the baby is born. Daddy cuts the umbilical cord. But the doctor is there because the baby has blood on the skin." (Girl, The Netherlands)



"The drops of the man come together with the egg of the mother. The baby grows and grows and becomes bigger and then when it is big enough it comes out of the mother." (Boy, The Netherlands)



"Once the egg meets the father's sperm, it grows and grows. Nine months later a mother is in the hospital and the baby will be delivered." (Girl, The Netherlands)

FIGURE 2 Sample drawings by six-year-old children in The Netherlands.

RESULTS

Research Question #1

The first research question asked "To what extent do six-year-olds have a similar understanding of conception and birth, regardless of country of origin?" Scores on the CSAS and OBS are reported in Tables 1, 2 and 3.

As outlined in Table 1, the scores on the CSAS for the total sample of 48 children ranged from 0 to 3. Approximately one-third of the sample (33%; $n = 16$) received a score of 0, indicating that their responses to the questions "How are babies made?" and "Where do babies come from?" did not refer to any of the four areas on the CSAS. Most of these children were from England and the United States. Another one-third of the sample (29%; $n = 14$) received 1 point for referring to only one of the content areas. The



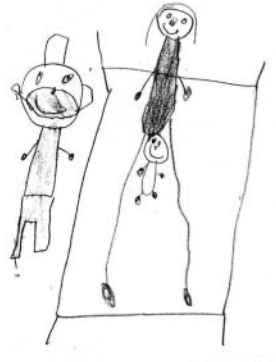
"I saw a movie where a lot of small thing moved around inside a mummy's stomach. There was an egg and one of the small things touches the egg and they were stuck together. The egg then closes and the baby starts to grow."
(Boy, Sweden)



"The child lies in mother's stomach. In mother's book I have seen that it comes upside down. The child comes out down in the bottom and I think it is near where you wee." (Girl, Sweden)



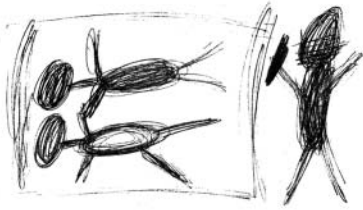
"I know where babies come from. An egg goes down in a tube and at the end it comes to a cave. A lot of small things come out looking the same as tadpoles. All the tadpoles from the father enter the egg. The first tadpole is the one that enters the egg. The egg goes further to a place where it will grow and becomes bigger. The baby is nude when born."
Boy, Sweden



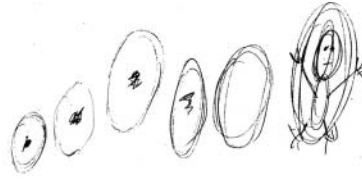
"It is an egg in the stomach like a seed that grows when it is watered. I don't know how it comes into the stomach. The doctor at the hospital helps the mother to take the child out from the bottom." (Girl, Sweden)

FIGURE 3 Sample drawings by six-year-old children in Sweden.

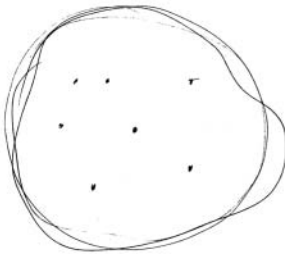
final one-third of the sample received 2 or 3 points for referring to several categories; most of these children were from the Netherlands and Sweden. Of these, 25% ($n = 12$) received 2 points for referring to two of the content areas; and 13% ($n = 6$) received 3 points for referring to three of the content areas. None of the children's responses earned a score of 4 for mentioning something from all four categories.



"I think they are made by a mom and a dad, but I am not sure how; maybe during special time when they are alone." (Boy, United States)



"God makes the eggs that are in all mommies." (Girl, United States)



"Babies are made from these eggs. Dad does not have eggs like this that is why he cannot have any babies." (Boy, United States)



"Babies are made by mommy with help from God and doctors help get them out. Babies come out the hole in mommy." (Girl, United States)

FIGURE 4 Sample drawings by six-year-old children in the United States.

When examining which of the four items on the CSAS were referred to by 32 of the 48 children (Table 2), Item 4 on birthing was mentioned most often (59%; $n = 19$), followed by Item 2 on male and female involvement (50%; $n = 16$) and Item 3 on prenatal development (47%; $n = 15$), and Item 1 on intercourse was referred to the least (16%; $n = 5$). Examples include:

Item 1: *"Mummy and Daddy have a special cuddle; special stuff goes into mummy which makes mummy pregnant."* (Boy, England)

Item 2: *"My dad cut the umbilical cord when I was born."* (Girl, the Netherlands)

Item 3: *"I know that a baby starts out tiny and then grows and grows until it is huge."* (Boy, Sweden)

Item 4: *"Babies come from mother's stomach. I think they come out a hole near her bottom."* (Girl, United States)

TABLE 1 Points on the *Children's Sexual Awareness Scale* (n = 48)

	0 points	1 point	2 points	3 points	4 points
England:					
6 Boys	4	1	1	0	0
6 Girls	3	2	1	0	0
12 Total	7	3	2	0	0
The Netherlands:					
6 Boys	2	3	0	1	0
6 Girls	0	2	2	2	0
12 Total	2	5	2	3	0
Sweden:					
6 Boys	1	0	3	2	0
6 Girls	1	2	2	1	0
12 Total	2	2	5	3	0
United States:					
6 Boys	1	4	1	0	0
6 Girls	4	0	2	0	0
12 Total	5	4	3	0	0
Totals for All:					
All 24 Boys	8	8	5	3	0
All 24 Girls	8	6	7	3	0
Grand Total	16	14	12	6	0

TABLE 2 Items on *Children's Sexuality Awareness Scale* included in children's responses (n = 32*)

	Item 1: Intercourse/ egg combines/ with something	Item 2: Male/female involvement	Item 3: Prenatal development	Item 4: Understanding of birth
England:				
2 Boys	1	1	1	0
3 Girls	0	1	0	3
5 Total	1	2	1	3
The Netherlands:				
4 Boys	0	1	1	4
6 Girls	1	5	2	4
10 Total	1	6	3	8
Sweden:				
6 Boys	2	2	5	3
5 Girls	1	1	3	4
11 Total	3	3	8	7
United States:				
4 Boys	0	4	2	0
2 Girls	0	1	1	1
6 Total	0	5	3	1
Totals for All:				
All 16 Boys	3	8	9	7
All 16 Girls	2	8	6	12
Grand Total	5	16	15	19

* 32 of the 48 children gave responses that fit at least one of the four categories on the CSAS; 16 children did not include any of the 4 items on the CSAS in their drawings or verbal responses.

TABLE 3 Scores on the *Origin of Babies Scale* (n = 48)

	Geographer 1	Manufacturer 2	Agriculturist 3	Reporter 4
England:				
6 Boys	2	3	1	0
6 Girls	6	0	0	0
12 Total	8	3	1	0
Netherlands:				
6 Boys	5	0	0	1
6 Girls	3	0	1	2
12 Total	8	0	1	3
Sweden:				
6 Boys	1	0	2	3
6 Girls	2	2	2	0
12 Total	3	2	4	3
United States:				
6 Boys	2	3	1	0
6 Girls	1	5	0	0
12 Total	3	8	1	0
Totals for All:				
All 24 Boys	10	6	4	4
All 24 Girls	12	7	3	2
Grand Total	22	13	7	6

On the OBS measuring children's level of cognitive development (Table 3), 45% (n = 22) were coded as Geographers for their responses that implied babies have always existed, while 27% (n = 13) were coded as Manufacturers for responding that babies came such places as God or doctors. Fewer (15%; n = 7) of the children's responses were coded as Agriculturists for implying babies come from planting a seed; 13% (n = 6) of the children's responses were coded as a Reporter. These children gave descriptions that revealed an awareness of a biological process. None of the children's responses were rated beyond Reporters on the OBS. Overall, most of the six-year-old children sampled appear to be in Piaget's preoperational level of cognitive development. Examples of responses include:

Geographer: "*Babies grow from mommy's belly.*" (Boy, England)

Manufacturers: "*Babies are made by God and given to families. God puts an egg in the Mother's stomach.*" (Girl, United States)

Agriculturists: "*The baby comes from the belly where daddy plants his seed in mommy.*" (Girl, the Netherlands)

Reporter: "*There was an egg and one of the small things touches the egg and they were stuck together. The egg then closes and the baby starts to grow.*" (Boy, Sweden)

Research Question #2

The second research question examined gender differences: *To what extent do six-year-old girls have a similar understanding of conception and birth compared to six-year-old boys as measured by the Children's Sexuality Awareness Scale and Origin of Babies Scale?*

On the CSAS, girls and boys scored nearly identically on the number of items they were able to identify (Table 1). About one-third (33%) of both girls ($n = 8$) and boys ($n = 8$) failed to identify any of the four items. Another one-third (29%) of both girls ($n = 6$) and boys ($n = 8$) identified one item. The remaining girls ($n = 10$) and boys ($n = 8$) identified two or three items. Specifically, seven girls and five boys identified two items on the CSAS, and three girls and three boys identified three items.

In terms of what items were identified by boys versus girls (Table 2), more boys than girls included Items 1 and 3. Specifically, more boys than girls referred to intercourse or the egg combining with something (three boys versus two girls) and prenatal development (nine boys versus six girls). More girls than boys (12 girls versus seven boys) included Item 4, indicating an understanding of birth through the vagina or a C-section. An equal number of boy ($n = 8$) and girls ($n = 8$) included Item 2 on male involvement in their responses. Examples of boys and girls responses are presented below:

Item 1: *"A lot of small things come out looking the same as tadpoles. All the tadpoles from the father enter the egg."* (Boy, Sweden)

Item 2: *"In the hospital, the baby is born. Daddy cuts the umbilical cord."* (Girl, the Netherlands)

Item 3: *"The egg is where the baby is at. It lives and grows in the stomach until it is ready to come out."* (Boy, United States)

Item 4: *"This girl's mum had a caesarian."* (Girl, England)

On the OBS, boys scored higher than girls in their understanding of "Where do babies come from?" (Table 3). Half of the girls scored as Geographers (50%; $n = 12$), followed by Manufacturers (29%; $n = 7$); fewer scored as Agriculturists (13%; $n = 3$) or Reporters (8%; $n = 2$). On the other hand, more of the boys' responses were rated in the higher categories of understanding. Specifically, boys' responses ranged from Geographers (41%; $n = 10$), Manufacturers (25%; $n = 6$), to Agriculturists (17%; $n = 4$), and Reporters (17%; $n = 4$). Examples of responses include:

Geographer: *"Babies are like presents; you can ask for one and hopefully get it."* (Boy, United States)

Manufacturers: *"Jesus made the body, first the bones to see how it would look like, then he stuck on the skin."* (Boy, England)

Agriculturists: *"It is an egg in the stomach like a seed that grows when it is watered. I don't know how it comes into the stomach."* (Girl, Sweden)

Reporter: *"Once the egg meets the father's sperm, it grows and grows. Nine months later a mother is in the hospital and the baby will be delivered."*
(Girl, the Netherlands)

Research Question #3

The third research question examined: *To what extent do children from countries with more comprehensive sexuality education programs have a more advanced and comprehensive understanding of conception and birth, as measured by the Children's Sexuality Awareness Scale and Origin of Babies Scale?*

On the CSAS, about half the 24 children from England ($n = 7$) and the United States ($n = 5$) received a 0 for their responses (or their lack thereof) to the questions "How are babies made?" and "Where do babies come from?" (Table 1). Only two children from the Netherlands and Sweden received a 0 for not mentioning an item on the CSAS. When looking at the remaining 32 children who identified at least one of the four items on the CSAS, children from Sweden ($n = 10$) and The Netherlands ($n = 10$) identified more items than children from the United States ($n = 7$) and England ($n = 5$). In fact, five of the children from the Netherlands and eight of the children from Sweden received 2 or more points. Three children from the Netherlands and Sweden included three of the four items on the CSAS in their responses.

In terms of which items the 32 children from the various countries included (Table 2), children from Sweden were more likely to mention Item 3 on prenatal development ($n = 8$) and Item 4 on birthing ($n = 7$), while children from the Netherlands were more likely to mention Item 4 on birthing ($n = 8$) and Item 2 on male and female involvement ($n = 6$). Children from the United States who identified an item correctly were more likely to mention Item 2 on male and female involvement ($n = 5$) and Item 3 on prenatal development ($n = 3$). Of the children from England who identified an item correctly, Item 4 on birthing ($n = 3$) was most frequently identified. It should be noted that Item 1 (intercourse/the egg needs to combine with something) was included in the responses by at least one child from England, the Netherlands, and Sweden, but not from any child in the United States. Examples of responses to the various items include:

Item 1: *"An egg and a seed from the father come together; it goes through a hole. I know there are three holes: a slit, bottom and maybe it is called a baby hole."* (Girl, the Netherlands)

Item 2: *"I think they are made by a mom and dad, but I am not sure how; maybe during special time when they are alone."* (Boy, United States)

Item 3: *"Mommy had to eat lots of healthy food to have a baby grow."* (Boy, England)

Item 4: *"I think the babies lie in the stomach for nine months. Then it comes out from the bottom; head first – sometimes the feet."* (Girl, Sweden)

On the OBS, most children's understanding of "Where do babies come from?" could be categorized as Geographers ($n = 22$) and Manufacturers ($n = 13$), indicating a preoperational level of cognitive development (Table 3). When examining scores by country, more children's responses from England ($n = 8$) and the Netherlands ($n = 8$) were categorized at Geographers, whereas more children's responses from the United States ($n = 8$) could be categorized as Manufacturers. In fact, half of the children in the U.S. sample (6:12) mentioned God in their response to where babies come from and how babies are made. Only two children from England mentioned God or Jesus. No children from the Netherlands or Sweden mentioned God. Children from Sweden showed a higher level of cognitive understanding as Agriculturists ($n = 4$), and children's responses from both the Netherlands ($n = 3$) and Sweden ($n = 3$) were categorized with the highest level of understanding as Reporters. For example:

Geographer: *"Mummy knows she is having a baby when she gets a fat tummy."*
(Girl, England)

Manufacturers: *"Babies are made by God and put in mom's stomach."* (Girl, United States)

Agriculturists: *"A butterfly comes with the egg when they are married. The butterfly tickles a little on the neck and so the egg gets in. The egg hatches and becomes a child."* (Girl, Sweden)

Reporter: *"The drops of the man come together with the egg of the mother. The baby grows and grows and becomes bigger and then when it is big enough he comes out of the mother."* (Boy, the Netherlands)

DISCUSSION

The first research question asked if all six-year-olds have a similar understanding of conception and birth. An affirmative response to this question was supported by the results in this study. All of the children, regardless of country, tended to score lower on both the CSAS and OBS. These findings support previous research by Bernstein and Cowan (1975) and Goldman and Goldman (1982a) that indicate children in this age group tend to use preoperational thinking and to fall into the descriptive categories of Geographers and Manufacturers. It is interesting to note that while most of the children fit into these two categories (35 out of 48 children), several of the children gave responses indicating higher cognitive development in the categories of Agriculturist and Reporters. Most of these children were from the Netherlands and Sweden.

When looking at responses to specific items on the CSAS, few children (6:48) indicated Item 1, that intercourse or the egg combining with something was necessary for conception to take place. Most of those children were from Sweden (4:6). On the other hand, half the children in the United States mentioned God (6:12), a finding consistent with Koch's earlier study (1980). For Item 2 on male involvement, most of the children who mentioned the role of the father (10:16) indicated that he was involved in making the baby, such as "*The drops from the man come together with the egg of the mother*" (Boy, the Netherlands) or "*Babies are made by a mom and a dad*" (Boy, United States). Few children referred to the father's role as "*Daddy takes mummy to the hospital*" (Girl, England) or simply stating that "*Men can't bear babies*" (Boy, Sweden) or "*Dad does not have eggs*" (Boy, United States). Previous studies by Koch (1980) and Goldman and Goldman (1982a) found that children rarely mentioned the father or only mentioned his role as inconsequential. The findings from this study revealed that many of the children included the father in their responses related to conception and birth, and many explained that the father plays an important role in making the baby.

Research question two asked if there is a difference between the boys and the girls in understanding conception and birth as scored by the CSAS and OBS. The children's responses suggest that there are gender differences in what boys and girls say they know, with more girls including birth as part of their understanding. On the OBS, slightly more responses by the boys were categorized as Agriculturists or Reporters, suggesting a higher level of cognitive understanding in this area.

A relationship between culture and knowledge was suggested by the findings. On the CSAS, the children from Sweden and the Netherlands scored higher than the children from England and the United States. Similar findings were found on the OBS, with children's responses from the Netherlands and Sweden rated higher in their cognitive understanding of conception and birth. Results support findings of earlier cross-cultural studies (Koch, 1980; Goldman & Goldman, 1982a).

The overall findings suggest that it is possible for children to understand concepts such as conception and birth. It is reasonable to assume that parents and educators can discuss these issues with their children regardless of their country of origin. Although most six-year-olds in this study, no matter what country they were from, tended to show a limited understanding of conception and birth, there were several children who demonstrated a much greater comprehension. In most cases, those children with greater knowledge and understanding were from the Netherlands and Sweden, countries noted for their progressive attitudes and positive sexuality education programs (Berne & Huberman, 1999).

Limitations

Because this was an exploratory study with the purpose of examining children's understanding of conception and birth, it has the common limitations of including a small number of participants and a nonrandom sample. Although the participants are from four different countries, the sample from each country is nonrepresentative of the country as a whole, so results are not generalizable to the larger population.

The trustworthiness of the study may have been affected by the children's response to the interview process. As noted firsthand by the interviews conducted in the United States by the authors, some children were uncomfortable with the questions and/or being asked to draw pictures for a stranger. The level of discomfort was noticeable in some cases by the quiet voices and/or the reluctance to answer the questions. Also, some children appeared to become frustrated with drawing their pictures and would ask to start over. In response to such discomfort or frustration, children were told there were no right or wrong answers and assured they did not need to finish if they did not want to.

It should be noted that the difficulty in obtaining parental permission for the U.S. sample reveals much about attitudes and comfort around children being asked about such topics, as well as the nature of sexuality education in this country. One might expect that those U.S. parents consenting to allow their children to be interviewed would likely be the most open regarding sexual matters and therefore have more knowledgeable children. On the contrary, the results reveal that the children in the U.S. sample did not score higher in their understanding of conception and birth compared to children in the other countries. In fact, when comparing the United States to other countries, the gap in children's knowledge may be wider than was found in this study due to the self-selected nature of the U.S. sample.

Implications

This study contributes to a small body of research dating back to the 1940s about how children think and process information about conception and birth. This study suggests that early education in sexuality increases young children's knowledge and understanding of some aspects of sexuality. It is also important to consider the impact of what parents and educators are teaching children. As the interviews revealed, children appear to incorporate what they learn and are told into what they think. Cultural surroundings that support education about the facts of sexuality are associated with increased understanding of conception and birth among young children.

The impact of this early sexual knowledge on later sexual development should also be considered in terms of what happens to children as they move

into their teen years. Countries such as Sweden and the Netherlands, which offer comprehensive sexuality education beginning in kindergarten, appear to provide a better foundation for sexual growth and to facilitate greater acceptance of sexuality. In these countries with more open attitudes toward sexuality and greater recognition of the need to educate young people, there are higher rates of contraceptive use by both male and female teens and lower rates of teen pregnancy, birth, and abortion (Berne & Huberman, 1999; Darroch, Singh, & Frost, 2001). This is in stark contrast to the United States, which has the highest rates of teen pregnancies, births, and abortions among industrialized countries, along with England, which has some of the highest rates in Europe (Darroch et al.).

This study suggests that there is a range of understanding about conception and birth among young children. Further studies may provide a more solid basis for assessing the type of sexuality education appropriate for educating younger children with diverse understandings. Clearly, there is a need to educate young children about these issues. As can be seen from many of the drawings obtained from this study, children without accurate knowledge will invent their own explanations of conception and birth based on myths and misconceptions. On the other hand, children who have been provided with adequate education on conception and birth are able to understand where babies come from and how babies are made.

These results suggest that a gap in understanding continues to exist between children living in the United States and England compared to children in Sweden and the Netherlands, and that gap needs to be examined further. These findings suggest we have made little progress in this area since the research of Koch (1980) and Goldman and Goldman (1982a). The findings imply we have a long way to go in our culture's acceptance of sexuality education for our children by both parents and teachers.

Suggestions for future research include: 1) replication with a larger representative sample to allow generalizability and allow for statistical testing; 2) consistency in interviewers and sample selection to increase reliability; 3) a reevaluation of possible interview questions to determine what will elicit answers that more clearly reflect how children process sexual information cognitively; and 4) conducting interviews with parents in countries such as the United States in order to better understand what concerns they have in educating their young children about conception and birth. Understanding parents' resistance or hesitancy to discuss such matters with their children will provide useful information for improving materials to assist parents in talking to their children and at the same time help relieve their concerns. It is important that more research is conducted to examine what children know and understand about a variety of sexuality issues. Solid empirical research will help in the development of appropriate materials for young children.

REFERENCES

- Berne, L., & Huberman, B. (1999). *European approaches to adolescent sexual behavior and responsibilities: Executive summary call to action*. Washington, DC: Advocates for Youth.
- Bernstein, A. C., & Cowan, P. A. (1975). Children's concepts of how people get babies. *Child Development*, *46*, 77–91.
- Bernstein, A. C. (1978). *The flight of the stork*. New York, NY: Delacorte Press.
- Brill, A. A. (1938). *The basic writings of Sigmund Freud*. New York, NY: Random House.
- Conn, J. H. (1947). Children's awareness of the origins of babies. *Journal of Child Psychiatry*, *1*, 140–176.
- Darroch, J., Singh, S., & Frost, J. (2001). Differences in teenage pregnancy rates among five developed countries: The roles of sexual activity and contraceptive use. *Family Planning Perspectives*, *33*, 244–250, 281.
- Goldman, R., & Goldman, J. D. (1982a). How children perceive the origin of babies and the roles of mothers and fathers in procreation: A cross-national study. *Child Development*, *53*, 491–504.
- Goldman, R., & Goldman, J. D. (1982b). *Children's sexual thinking*. Boston, MA: Routledge & Kegan Paul.
- Hattendorf, K. W. (1932). A study of the questions of young children. *Journal of Social Psychology*, *3*, 37–65.
- Hodson, D. S., & Wampler, K. (1988). Social class and parental involvement in the sex education of children. *Journal of Sex Education and Therapy*, *14*(2), 13–17.
- Koblinsky, S., Atkinson, J., & Davis, S. (1980). Sex education with young children. *Young Children*, *31*, 29–35.
- Koch, P. B. (1980). A comparison of the sex education of primary-aged children in the United States and Sweden as expressed through their art. In J. M. Samson (Ed.), *Childhood and sexuality* (pp. 345–355). Montreal, Canada: Editions Etudes Vivantes.
- Kreitler, H., & Kreitler, S. (1966). Children's concepts of sexuality and birth. *Child Development*, *37*, 363–378.
- Moore, J. E., & Kendall, D. G. (1971). Children's concepts of reproduction. *Journal of Sex Research*, *7*, 42–61.
- Piaget, J. (1929). *The child's conception of the world*. New York, NY: Harcourt, Brace and Company.
- Sex Information and Education Council of the United States. (1990). SIECUS position statements 1990. *SIECUS Reports*, *18*(2), 10–12.
- Strain, F. B. (1948). *The normal sex interests of children*. New York, NY: Appleton-Century Crofts.