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Scientific and everyday concepts of pregnancy and childbirth

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SCIENTIFIC AND EVERYDAY CONCEPTS OF PREGNANCY AND CHILDBIRTH

by

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Abstract

SCIENTIFIC AND EVERYDAY CONCEPTS OF PREGNANCY AND CHILDBIRTH

by

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This descriptive study characterized adults' concepts of pregnancy and childbirth and how they change when women receive scientific, medical information about pregnancy and childbirth. A total of 70 women were interviewed once: 20 never pregnant women, 20 women in early pregnancy, 20 women in late pregnancy, and 10 childbirth educators. The interviews consisted of: a background questionnaire, attribute listing task, structured interview, belief list, and a pregnancy and birth word list. The results suggest that women's knowledge changes from popular or common-sense knowledge of pregnancy and childbirth to a system of scientific knowledge in women receiving pregnancy and childbirth instruction, such as childbirth classes. Lev Vygotsky's discussion of scientific and everyday concepts may provide a framework within which to study the two systems identified in this research. It also provides a mechanism for conceptual changes of these systems.

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Introduction

Research on the development of concepts of reproduction in children has generally approached the topic from a Piagetian framework. In reviewing the literature on human reproduction and on related topics, it became apparent that there can also be conceptual change and development in adults. However, this research has not been theoretically unified. The emphasis, explanations, and terminology has varied, and there has been the use of terms such as "models, conceptions, concepts, representations and systems of knowledge." But what does recur in the literature is the finding that in adults there are alternative systems of knowledge and that with instruction and expertise there is a change from "commonsense or popular concepts or conceptual system" to more "scientific or technical concepts or conceptual system." (Nussbaum & Novick, 1982). Thus, in research on adults' conceptions of illness there are "commonsense concepts, models or representations" of laypersons and "scientific models" of illness held by doctors (Meyer, Leventhal, & Gutmann, 1985). Wellman and Johnson

(1982) state that in adult concepts of nutrition there are found technical concepts which derive from the disciplines of nutrition and biology and concepts of laypersons reflecting "commonsensical observations"; Murphy and Wright (1984) suggest that there are "implicit theories of personality" which include concepts of psychopathology held by novices (laypersons) and theories of psychopathology held by experts in psychology. In research on the effects of instruction or expertise in domains such as the physical sciences, psychology and mathematics, several investigators find a conceptual system change between novices and experts (Carey, 1985; Murphy & Medin, 1985), corresponding roughly to the distinction between commonsense and scientific knowledge (Nussbaum & Novick, 1982). A. Glass and K. Holyoak (1975), in their discussion of semantic memory, also distinguish between popular (commonsense knowledge held by laypersons and frequently learned early in life) and technical (shared by scientists and lawyers) representations of word meaning. Benaji and Crowder (1989), in discussing approaches to the study of memory, discuss the existence of "intuitive psychology",

which they define as folk wisdom, commonsense, or laypersons intuitively "knowing" many things about psychology or memory which may or may not be scientifically correct.

In all of these studies finding alternative systems of knowledge, the assumption is that the commonsense or popular concepts are shared by groups of people, and are derived from cultural and social values, beliefs, personal observations and experience, while the scientific concepts are also shared and develop through schooling or instruction. The evidence suggests that not only do the experts or persons with scientific concepts simply have more knowledge, but that the knowledge in the conceptual system is organized differently. The problem remains, however, as to how to characterize these commonsense and scientific conceptual systems - one, a commonsense or popular system held by ordinary laypersons, and another a system of scientific knowledge held by experts.

It is worth noting that in the studies cited above, (both those looking at children's concepts of reproduction, as well as other bodily processes, and in the studies of adults), none gives a precise

definition of what is meant by the term concept. Only Bishop and Converse (1986) in their study of concepts of illness held by laypersons and Horwitz, Wright, Lowenstein & Parad (1981) in their study of concepts of psychopathology suggest that these abstract and complex concepts are like the prototypes described by Rosch and Mewis (1975) and Rosch et al (1976). As one reads through the literature, it is clear that the term concept is generally used in a full and rather loose sense, with a focus on all the person's knowledge about the concept in question. It is clear that it is very difficult to specify and define precisely the abstract and complex concepts in these domains. One reason is that most research up to now has studied concepts of objects, and not of situations, such as processes and states, or abstract concepts (Smith & Medin, 1981). Sigel (1983) offers this definition: "a concept generally refers to a verbal label or to a set of functions that organizes an array of diverse items into a coherent whole." (p. 243) Sigel, as well as others, has pointed out that concepts can be hierarchical or non-hierarchical. Vygotsky has defined concept as word meaning, and

that the development of scientific concepts begins with verbal definitions and terms (1962). Medin and Smith (1984) and Murphy and Medin (1985), as well as others, have pointed out the problems of the various definitions of concepts and the controversies in this field. In both papers is also the conclusion that people's concepts are tied to their theories and knowledge of the world; that concepts are organized by theories, and that they cannot be separated. Perhaps the definition of concept per say is not crucial in examining the existence of alternative conceptual systems in a domain.

Some evidence, including preliminary research by this investigator, suggests the existence of alternative con- ceptual systems or systems of knowledge in the domain of human reproduction, specifically pregnancy and childbirth.

Generally, from earliest childhood, children see and hear informally about pregnancy and birth, but at present in American society, it is not until adulthood, when a woman is already pregnant or planning a pregnancy, that she seeks out and receives (if she so desires) formal instruction of scientific information about pregnancy and

childbirth, from pregnancy and childbirth classes, pregnancy literature and medical authorities. Studying conceptual change or how this system of knowledge is changed and developed in adults due to exposure of pregnancy and childbirth instruction offers us an example of adult concept development as it typically occurs in the real world. Of the theoretical systems available, Vygotsky's description of everyday and scientific concepts in a system seems to best apply as a possible way to characterize these alternative systems. Of course, his work which was developed on children to explain the development of concepts, must be adapted to apply to adult conceptual change and development in one domain.

Review of Literature

Children's Concepts of Human Reproduction

Some studies have examined various concepts children have of the human body, including concepts of reproduction, gender, bodily processes such as digestion, respiration, circulation, and the nervous system, and illness (Carey, 1985; Contento, 1981; Gellert, 1962; Nagy, 1953). In this research, children have been interviewed and questioned in various ways, generally by being asked open-ended questions which are followed by probes, on their knowledge of the concept in question.

Of special interest here is research on concepts of reproduction. Most of the few studies examining concepts of reproduction have examined this concept within a Piagetian framework.

Jean Piaget (1929, pp. 360-376) had stated that children's ideas about the origin and birth of babies should follow the same developmental progression of cognitive stages as concepts of physical causality. However, he did not investigate this directly because of "grave moral and pedagogic reasons," (page 360) and so instead relied on what could be found in published

children's talk and also on recollections of childhood. Piaget stated that young children are not interested in how babies are made, for young children believe that babies have always pre-existed. Subsequent developmental stages include a phase in which there is a combination of artificialism (in which the origin of natural phenomena are described as if produced by a process of manufacture) and animism (in which various inanimate objects, e.g., the moon, rocks, cars, are described as being alive). Later, children come to understand that babies are created in their parent's bodies and out of the material of their parent's bodies (e.g., blood, flesh).

Conn (1947) was the first to test Piaget's view. Using doll play as an interview method, he interviewed 100 children, aged 4 to 11 years old, and came up with the very surprising conclusion that: "It is inconceivable to the child of preschool age that the baby may be in the mother." He also concluded that sex information is beyond the grasp of intelligent 7 to 8 year old children and that it wasn't until children reached the ages of 9 or 10 that they noticed the mother's bulging pregnant stomach.

Maria H. Nagy (1953) examined the development of birth "theories" or children's conception of birth on the basis on interview data and written essays of 390 children aged 4 to 11 in three countries (Hungary, United States, and England). Only two questions were asked: "How did your cat or dog begin to live?" and "How did you begin to live?" followed by some probes. She interpreted all her results from a Freudian psychoanalytic perspective, but, like Piaget, found different levels of development, with pre-existence at younger ages and artificialism a little later. She interpreted her results as showing that there are four theories of birth in children, each at a different level: Theory A - there is no birth, as life is forever; Theory B - there is birth, but without the mother; Theory C - birth is explained solely from the mother; Theory D - father is also included. Interestingly, she found that children from backgrounds of permissiveness toward sex education had advanced birth conceptions.

Two later studies tested Piaget's hypothesis and Freud's theory of childbirth (Kreitler & Kreitler, 1966; Moore & Kendall, 1971). They both questioned Piaget's theory and directly refuted Freud's theory

(that is, that children up to the age of 6 years believe in the universality of the penis and that babies are born through the anus). Both sets of investigators studied children within a very narrow age range (4 - 5 1/2 years, 3 - 5 1/2 years) and used a standardized format of interview questions. Kreitler and Kreitler concluded that Piaget's theory about the artificialist concept was disconfirmed, but that children do believe in the independent pre-existence of babies. Both studies also found that young children are well informed about sex differences and that they do realize there are babies in the bulging bellies of pregnant women. Kreitler and Kreitler found that the children variously believed the fetus is: growing and developing, eating, sleeping, playing or suffering, and that birth is explained mostly through the concept of opening the belly, or through the mother's "sexual organ".

However, it is only recently that well-researched and comprehensive studies have been done on this topic. Two large studies of developing concepts of human reproduction were carried out by Bernstein and Cowan (1975) and Goldman and Goldman (1982). In both of these studies, groups of children from a large age

range were interviewed, and both studies looked at the concepts of the origin of babies and the role of both parents in procreation. In both it was found that these concepts go through a Piagetian developmental progression (preoperational, concrete and formal operations, and the transitions between them).

Bernstein and Cowan (1975) interviewed and gave several Piagetian-type tasks to upper middle-class white children: 20 boys and 20 girls at each of three age levels (3 - 4, 7 - 8, 11 - 12). They developed and used a social causality questionnaire which examined the concept of the origin of babies. The interviews included set questions such as "How do people get babies?", "What does the word "born" mean? and the answers were probed until the child's thinking was made explicit and as detailed as possible. Six age-related developmental levels of thinking were found which corresponded to Piaget's developmental stages.

Goldman and Goldman (1982) interviewed 838 children, aged 5 to 15 years in five countries (Australia, England, United States, Canada, and Sweden) about how children perceive and explain human reproduction. Again, individual interviews were used, in which there were some set questions (e. g., How are

babies made?), which were followed by probes. The answers were scored with Bernstein and Cowan's categories, and both children's understanding of the origin of babies and the roles of mothers and fathers in procreation were found to follow an age-related developmental progression based upon preoperational, concrete operational, and formal operational levels. The six levels are summarized as follows: Level 1 - Preoperations. Spatial causality. Children see the issue as spatial ("where"), not causal ("how"). To them, babies have always preexisted. Level 2 - Preoperations. Artificialism. Child answers "how" questions by saying that babies are manufactured (e.g., by Jesus, God or father) by some natural materials (e.g., by food). Level 3 - Transitional. Explanations are technically possible, but unrealistic. The child is aware that the explanation involves some sort of relationship between a man and a woman, some aspects of sexual intercourse, and of some of the components involved (e.g., egg, seed, fluid). Level 4 - Concrete operations. Child gives physical explanations, which are technically realistic. The child reveals awareness of biological processes, but cannot explain what about these processes causes new life to begin (e. g., babies

are formed from eggs and sperm, but cannot explain fertilization). Level 5 - Transitional. Child explains babies as being preformed in miniature, either in the egg or in the sperm. Thus, fertilization is still not seen as fusion. Level 6 - Formal operations. Physiological process is now understood, and that the origin of a new being is from both parents. This explanation includes scientific physiological information.

Of special interest in the Goldman and Goldman study is the finding that the Swedish sample displayed earlier ages than the other nationalities at each developmental level in knowledge of the origin of babies and the contributory roles of both parents in procreation. This was explained by the fact that Sweden was the only country to start universal early (from the age of 8 years) health and sex education programs. In fact, there was variation among national lines, with North American preteen children who do not receive sex education, if they do at all, until the high school years, showing a slower rate of cognitive development in these two areas, but they do catch up by the teenage years. English children scored higher than the other English speaking groups during the ages 9 to

11, which is when they received some sex education in the school system. The Australian sample, who receive sex education only with secondary schooling, scored midway between the English and the North American sample. Thus, formal school instruction in sex education appeared to influence the results. Also, it must be noted that all children were chosen so that they had at least one younger sibling, so it can be said that all the children had exposure to a pregnant woman. The researchers also stated that it was evident from the results that, where children did not receive sex and health information, they constructed their own explanations and myths, a finding which is shared in other domains of knowledge, such as in concepts of illness (Pidgeon, 1985).

A study by Barrow (1977) of seventh-graders comprehension of human reproduction concepts after a school course on reproduction found that these students admit that they do not understand or know many aspects of human reproduction, including conception, pregnancy, birth, and menstruation, but feel that they should be taught these things. Barrow also cited an earlier study in which it was found that in a local population of 13 year olds, 100% knew that a baby comes from a

mother's body, which confirms what the other studies have shown.

In summary, there appears to be a consensus among investigators that children's concepts of the origin of babies and the contributory role of both parents in procreation go through a Piagetian developmental progression that is age related, but is also influenced by school instruction. The studies did not separate out or discuss the contribution of cultural beliefs and values, personal experiences and school instruction in this knowledge, but it appears that school instruction, notably biology, health or sex education, must play a part in the children's knowledge, especially in knowing about physiological aspects of conception. The Goldman and Goldman study was the only study to look for and find national differences in results, differences which they attributed to national differences in school instruction of sex and health education and possibly cultural permissiveness or restrictiveness in sex education.

The few studies in the literature, however, look only at a small portion of the concept of human reproduction, neglecting pregnancy and birth; none looked at the concepts of children over the age of 15

years. It is unknown how these concepts of human reproduction further develop and change in the later teenage years and in adulthood, especially when exposed to further instruction.

Adults' Concepts of Human Reproduction and Related Areas

In reviewing the literature on concepts of human reproduction and of other related topics, it appears that there can be conceptual change and development in these domains in adults, but researchers have approached it and treated it differently from the study of human reproduction concepts in children. A recurrent finding is that in adults, with experience or formal instruction of scientific or technical information in a domain, there is a change from commonsense, popular or everyday concepts or system of knowledge, to more scientific or technical concepts or system of knowledge in that domain.

Domains where this distinction has appeared is in research on adults' concepts of illness, concepts of psychopathology, and in various science domains such as physics, mathematics, mechanics and psychology.

Research on Adults' Commonsense Concepts of Illness

Research on adults' concepts of illness and causes of illness has frequently found a distinction between commonsense models or representations of illness and medical, scientific models or representation of illness held by people. This finding initially came about through health psychologists examining preventive health behaviors and patient compliance with recommended health and treatment regimes. Much of this research has used interviews, in which open-ended questions are asked and followed by probes, and perhaps supplemented by questionnaires.

Leventhal, Meyer and Nerenz (1980) and Lau and Hartman (1983) suggested that laypersons have illness representations, which generally consist of a disease label, a perceived cause, the concrete symptoms of the disease, the course of the disease (illness duration) and his or her beliefs about the treatment and consequences of the disease. The degree of organization of illness representations will vary from person to person, but these illness representations are different and may even be contrary to medical models of the illness. They suggested that these illness representations guide the health behaviors of people. Leventhal, Meyer and Nerenz (1980) suggested that three

basic sources of information appear to shape the patient's theory of illness: personal experience, information from the external social environment including shared cultural beliefs (from family, media, etc.), and information based on past experiences with illness.

Meyer, Leventhal and Gutmann (1985) found in their interviews of hypertensives that people develop commonsense models, that is, lay cognitive models, of hypertension which were not coherent and well-organized, and which were different from the medical model (held by doctors and scientists) of hypertension. They also found that these models evolve over time and that typically persons with commonsense models of hypertension did not make the links between cause of high blood pressure, symptoms and the physiological mechanisms of their disorder. This research was done by conducting extensive, semi-structured interviews in which open-ended questions (e.g., "In your own words, what do you think high blood pressure means? How do you think high blood pressure started in your case?") were followed by systematic probes to get at the patient's beliefs of the causes, mechanisms, and consequences. Also, the

particular models held by the patients influenced their behavior in whether they complied with treatment, took medication and used medical facilities. In this study and in the Baumann and Leventhal study (1985), subjects' beliefs were little or not at all influenced by contrary medical information.

Pennebaker and Epstein (1983) also found that people have commonsense representations about illness, which included beliefs about the relation between symptoms of an illness and the illness. They hypothesized that these beliefs are influenced by social information from others, from past experiences, as well as by physiological state. They also mentioned work done by Jones (1982), who used a multidimensional scaling technique to show that laypersons organized disease symptoms along the dimensions of painfulness, familiarity, and embarrassment, while medical students organized symptoms along a life-threatening vs. nonthreatening continuum. Bishop and Converse (1986) and Prohaska, Leventhal, Leventhal and Keller (1985), who studied specific disease symptoms of common diseases, also found that laypersons form cognitively organized representations of common illness which are generally consensual. Bishop and Converse called these

illness representations illness concepts or prototypes, which was adapted from E. Rosch's definition of prototypes.

Pill and Stott (1982, 1985, 1985), in their semi-structured interviews with British working-class women found that laypersons had commonsense concepts of illness causation and responsibility and that for most, these were different than that held by medical and health personnel. They also found socioeconomic differences in the concepts held, with women having higher levels of education having concepts that are closer to that held by the medical and health establishment. Pill and Stott also mention that their samples generally relied on a "lay referral system", that is, a reliance on social networks for information rather than on what some women characterize as "they, the current experts".

Parmalee (1985) has also discussed in a similar vein how illness, sickness and health are social constructs, that is, they are terms used by all persons, but when meanings of these terms are examined, it is apparent that different segments of society define and use these terms differently. For example, medical persons use these terms to define abstract

categories of entities that are similar across individuals, such as influenza and diabetes, but psychologists, sociologists and anthropologists are more likely to use the terms to refer to the processes and experiences of individuals and to society's view of these individuals.

Research on Adults' Concepts Using Novices and Experts

Another area where conceptual differences in adulthood have been studied is in the sciences, especially physics, mechanics and psychology. Some of this research has occurred in an attempt to develop the best ways to teach science concepts to students (whether high school or college students) and to then be able to test this knowledge (Diekhoff, 1983; Stanners, Brown, Price & Holmes, 1983). Studies have shown that students shift from a novice or naive conceptual system (or preconceptions or misconceptions as some call them) to an expert conceptual system when learning and gaining expertise with science concepts (Chi, Glaser & Rees, 1982; Larkin, McDermott, Simon, & Simon, 1980; Thro, 1978; Wiser, 1988). Or as Nussbaum and Novick (1982) have suggested, there are alternative frameworks prior to or after exposure to relevant

science instruction in a given domain. Researchers have approached the novice-expert shift from an information processing perspective in how problems are solved, meanings of concepts, and relationships among concepts, that is, in the structure of knowledge. What is typically found is a restructuring among knowledge or concepts as well as knowledge of more facts between novices and experts, or prior to and after classroom instruction in a given domain.

While much novice-expert research has looked at conceptual systems in the physical sciences, a few studies have looked at the concepts and changes in conceptual structure between novices and experts in knowledge of child psychopathology and medical diagnosis of heart disease.

Murphy and Wright (1984) examined concepts and changes in conceptual structure of three categories of childhood psychological disturbances by three groups of experts, who had varying levels of clinical experience (ranging from beginning counselors at a summer camp for disturbed children to clinical psychologists), and one group of novices (who were college undergraduates with no experience in abnormal psychology). All subjects were asked to make attribute listings of an aggressive

child, a depressive child, and a disorganized child. It was found that experts listed more attributes for each category or concept, and agreed better on those attributes than novices, thus displaying more specific knowledge. However, contradicting other study findings, such as Homa et al (1979), in which experts' concepts were more differentiated, with more distinctive, and with fewer overlapping attributes than novices, it was found by Murphy and Wright that experts' concepts were not more distinctive, but the more expert the subjects, the more their categories seemed to overlap. For example, experts listed "feels angry" and "feels sad" for all concepts. Murphy and Wright (page 153) account for this by suggesting that "gaining real-world expertise in certain domains involves changes in the structure of knowledge that simply do not manifest themselves in concept-learning experiments with artificial stimuli." They suggest the possibility, which was also suggested by Chi, Feltovich, and Glaser (1981), that when people learn a new concept, they focus on distinctive features or "surface features" to separate it from other concepts, but with more experience and knowledge they also learn underlying similarities or principles. Murphy and

Wright suggest that the novices they studied had "implicit personality theories" which were at a surface level and which probably did not tie the three concepts into one framework.

This study by Murphy and Wright supports the earlier findings of Horowitz, Wright, Lowenstein and Parad (1981) in which it was found that the meanings of psychologically diagnostic concepts such as an aggressive-impulsive child, depressed-withdrawn child, and borderline-disorganized child, change as the person gains more clinical experience, with experts' concepts having more features, but with novice's concepts also having features that are not part of the expert's concepts (perhaps misconceptions). In this study, the concept of prototype (from Rosch et al, 1976) was adopted to describe ill-defined psychological concepts such as depression. They define prototype as a "kind of theoretical ideal, a theoretical standard against which real people can be evaluated. No one person matches the theoretical standard perfectly, but different people approximate it to different degrees. The more closely the person approximates the ideal, the more the person typifies the concept." (Horowitz et al, page 568).

A study by Johnson et al (1981) found differences in medical diagnostic reasoning between novices (medical students) and different levels of experts in pediatric cardiology. They state that contrary to what they call the imprecise knowledge of novices, the medical expert has a "hierarchy of disease knowledge that is well organized and extensively differentiated into a number of disease variants." (page 237).

Much of the novice-expert research is descriptive, without a theoretical backing. There has been some theoretical work within this framework on the acquisition of knowledge, such as Sternberg's Theory of Knowledge Acquisition in the Development of Verbal Concepts (1984) and Neves and Anderson's Theory of Knowledge Compilation (1981). Each of these theories contains a process for collecting new information, a process for combining pieces of new information, and a process for relating the new to the old information. However, criticisms of the novice-expert research and the models mentioned above are that they are incomplete and limited. Criticisms include the failure to specify: mechanisms of change and acquisition, the role of instruction in acquisition of science concepts, and that scientific concepts or theories are culturally

formulated systems, rather than individually created (Yussen, 1984; Orlich & Bello, 1986).

It must be mentioned that some studies examining conceptual development in children have also discussed their findings in terms of the distinction between naive, popular or everyday concepts and scientific concepts. Studies such as Wellman and Johnson's study (1982) on the development of the concepts of nutrition and Johnson and Wellman's study (1982) on concepts of the mind and brain are two examples. These studies found that young children have naive concepts, which are based on personal observations and cultural popular conceptions in a domain, and as a child grows older and gains more technical knowledge in that domain which occurs through school instruction, these concepts eventually develop and transform into scientific concepts. They mention this as being similar to Lev Vygotsky's theory of everyday and scientific concepts, but did not expand on it.

Perhaps this same process occurs in adults when acquiring new concepts in a domain. Wellman and Johnson hold this view, and Carey (1985, p. 187) also suggested this in her discussion of novice-expert shifts in conceptual change: "That 4- to 10-year-olds

undergo a novice-expert shift does not, of course, imply that 10-year-olds, or normal adults for that matter, are experts in biology. Patently, they are not. My point is that the kind of conceptual reorganization children experience during these years is at least as radical as the conceptual reorganization adults experience when gaining expertise in some fields. Apparently, expertise is a relative matter; there is room for many novice-expert shifts in the course of mastering each domain of natural science."

Research on Adults' Scientific and Everyday Concepts of Pregnancy and Childbirth

As was discussed, research on children's concepts of human reproduction has only looked at conceptual change and development in children up to the early teenage years. However, evidence from the domains of illness and the physical sciences have demonstrated that in adults there are conceptual differences among groups, and that concepts can change and develop. One would expect the same to occur in adults' concepts of human reproduction, specifically pregnancy and birth, as a person receives instruction of scientific and medical information about pregnancy and birth.

Research from a novice-expert framework, while important for the discussion of conceptual change in adulthood, may not be the most useful approach theoretically for the study of pregnancy and human reproduction concepts in adulthood. As was seen, the novice-expert framework has been generally used to study conceptual change in the domain of the physical sciences, especially in classroom instruction of science concepts. Many studies showed that prior to instruction, the novices had no prior knowledge or understanding of the concepts to be understood, for these were concepts students first only encountered in a classroom, while children grow up hearing about pregnancy and birth and seeing pregnant women from a young age. As was seen from the research on children, by the teenage years, children have a fairly sophisticated concept of the origin of babies which includes pregnancy (Goldman & Goldman, 1982). As "novices" they are quite knowledgeable, although their knowledge may be different from "experts." On the other hand, it could be said that a person who has never been pregnant and not attended childbirth education classes or read pregnancy literature is a novice about the medical, scientific system of

knowledge about pregnancy and birth (which includes anatomy and physiological processes, fetal development, medical technology and procedures, and all aspects of prenatal care). After instruction and experience, one would expect restructuring of knowledge, and the person would become more expert in the domain. Another similarity with the novice-expert shift research is that, in adults, it appears that conceptual changes in the domain of human reproduction are domain-specific changes, not domain-general. Thus it involves restructuring of domain-specific knowledge.

In considering adults' concepts in the domain of human reproduction, the issue may be one of alternative systems of knowledge rather than a difference between novices and experts. That is, there may be a commonsense, popular or everyday system of concepts of pregnancy and birth, culturally shared, concrete, experientally based and typically held by adults (by "novices"), and a system of scientific concepts of pregnancy and birth, which are the result of instruction and are commonly held by medical and health professionals. These two systems may, in fact, be best characterized by Lev Vygotsky's theory of everyday or spontaneous concepts and scientific or non-spontaneous

concepts. An examination of adults' concepts of pregnancy, before and after change, as well as mechanisms of change is needed.

The term pregnancy is used to apply to the normal nine month pregnancy, beginning with conception and ending in childbirth. Key features of the domain of human reproduction that need examining are conception, pregnancy and childbirth. Components of the scientific system of knowledge about this domain are: anatomy and physiological processes, including the developing fetus, prenatal care (which includes nutrition in pregnancy and other pregnancy behaviors to ensure a healthy pregnancy and baby), and medical management (which includes obstetrical technology and procedures used in pregnancy and childbirth) (Benson, 1984). The everyday system of knowledge of this domain still needs to be explored. Concepts in this domain can be formulated at the concrete level of personal observation, experience and cultural beliefs, or at an abstract scientific level, and within each of these concepts can be other concepts at a concrete or abstract level. For example, childbirth can consist of a woman knowing on a concrete level, based on what others have personally told her, that it "gets more and

more painful, the woman screams and moans, and then the baby comes out," or it can include abstract scientific concepts of labor, transition and delivery, with discussion of the uterus and cervix and other biological processes involved, and possible current obstetrical management involved (fetal monitoring, labor and delivery medications, episiotomy, etc.).

Evidence that adults may have different systems of knowledge about reproduction, both scientific and popular, comes from studies that have looked at: (1) beliefs about pregnancy and birth or "old wives' tales", (2) explanations of attitudes or behaviors of pregnant women, (3) behavioral or knowledge differences among different groups or lack of scientific information about pregnancy in certain groups of pregnant women, (4) childbirth classes and their effects if any, and (5) articles in the popular media (Mayer, 1986). Many of these studies have focused on women not having scientific information about pregnancy, rather than on what the women do know, that is, what their concepts are. All these studies lack theoretical explanations.

One source of evidence for commonsense, popular or everyday concepts of pregnancy comes from studies that

have looked at beliefs about pregnancy or "old wives' tales. Pregnancy beliefs have been found and studied in many cultures, including contemporary American culture. Researchers have documented the existence within American society of ethnic and cultural variation in these beliefs, which are especially prevalent among women with less formal education (Johnson & Sarty, 1978; Newton & Newton, 1972; Snow, Johnson & Mayhew, 1978).

These beliefs are culturally transmitted through social networks, are handed down generation to generation, and are believed by women and may govern their behavior. The beliefs generally identify a maternal behavior, activity or pregnancy symptom which will lead to some consequence, but typically no causal or underlying mechanism is given. These beliefs have generally not been examined scientifically, and in fact, most are contrary to current scientific information and could even prove to be dangerous to the pregnancy or fetus. Kruger and Maetzold (1983) recently surveyed American midwest women who had had children or were pregnant and recorded 121 beliefs which fell into three major classifications: maternal practices which might make an impression on the fetus

and affect it negatively or positively, other activities which would insure a healthy baby and a safe delivery, and beliefs concerning gender of the baby. Examples of beliefs found by Goldfarb (1988), Kruger and Maetzold (1983), Snow, Johnson and Mayhew (1978) and this researcher's preliminary data are: women viewing violence, accidents or ugly animals during pregnancy results in a deformed baby; pregnant women experiencing heartburn results in a baby with curly or a lot of hair; pregnant women having "ugly" or "unkind" thoughts would have babies with similar characteristics; eating a large quantity of eggs or chicken could result in the child being an early riser; the pregnant woman raising her arms above her head could strangle the fetus; pregnant women should not get cavities in their teeth filled because the filling would fall out; a pregnant woman should not get a hair permanent for it "would not take"; a pregnant woman carrying "low or carrying high" could variously mean a boy or a girl baby.

Looking at the few studies where pregnant women have been asked to give explanations for their pregnancy attitudes or behaviors also suggests whether they do or do not have knowledge of scientific

information and whether they are basing their explanations on a concrete level (e.g., personal experience or observations) or scientific information.

Hook (1978) interviewed 250 women in his study of dietary cravings and aversions during pregnancy, and found that while the majority of the women were regularly drinking coffee, or alcoholic beverages at the start of pregnancy, a significant percentage (at least 25% of them) reduced their consumption of these beverages in the first half of pregnancy, while a very few women increased their intake. Reasons for reduced coffee and alcohol intake was primarily attributed to factors such as nausea, loss of urge or taste, indigestion, limiting calorie intake, while only a few cited concern for health of the infant. Hook, however, did not explore the reasons why the other women continued to drink alcohol and coffee at prepregnancy levels. A similar finding was found by Little, Schultz and Mandell (1976). Snow et al (1978) also found that women's reasons for why it is acceptable or not to consume alcohol during pregnancy did not reflect knowledge of abstract scientific information, but instead was based on concrete experiences. For example, some women said it was not good to drink a lot

during pregnancy because it may affect the coordination of the mother and cause her to fall down. This does not reflect the view of the medical community which has for more than a decade urged all women to abstain or severely limit alcohol intake due to possible negative effects on the pregnancy and fetus. It is now known that large amounts of alcohol consumed during pregnancy can result in Fetal Alcohol Syndrome (FAS), which is characterized by a pattern of malformations, growth and mental retardation defects and that even moderate or low alcohol intake can have a negative effect on the pregnancy and fetus (Blake, 1980; Kline, Shrout, Stein, & Susser, 1980; Streissguth et al, 1989; Zuckerman & Hingson, 1986). Similarly, the medical profession currently urges pregnant women to severely limit or abstain from coffee intake due to possible deleterious effects of caffeine on the fetus. These effects have been suggested by animal studies, but the data on humans is still inconclusive with some researchers finding a link to adverse pregnancy outcomes with caffeine consumption and others finding no evidence of negative effects. (Berkowitz, 1982; Beaulac-Baillargeon & Derosiers, 1987; Shapiro, 1983; Srisuphan & Bracken, 1986).

In a study looking at drug ingestion (prescription and over-the-counter) of pregnant women, Woodward et al (1982) found in their study that the average woman took 2.31 drugs during pregnancy (most of which were over-the-counter drugs), and that these women knew very little about the drugs ingested, with only 50% knowing the names and fewer than half even knowing why they had taken the drugs, and almost none knowing any side-effects of the drugs. Medical advice currently recommends that pregnant women avoid all medications, both prescription and over-the-counter, if possible during pregnancy. This is because nearly all drugs ingested by the pregnant woman eventually reach the fetus, due to the semi-permeable nature of the placental membrane, and which could cause deleterious effects on the pregnancy and fetus, and some possibly even causing irreversible teratogenic changes in the fetus resulting in various malformations and birth defects. (Hill & Stern, 1979; Shapiro, 1983; Woodward et al, 1982).

There is one unique study which, although limited, also found that concepts of the fetus of many pregnant women differed from available scientific information. Lumley (1980) interviewed 30 middle-class women

pregnant for the first time during the first trimester (which is the time period from conception to 12 weeks) to determine their concept (she called it image) of what the fetus is like at that point. The questions asked were: "What do you think the fetus is like now? What do you think the fetus can do now? How big is the fetus now?" Lumley found that in this group of well-educated women, most with backgrounds in biology, the women consistently underrated the extent and rate of fetal development at the end of the first trimester, with one third thinking it was shapeless and formless and could do nothing, but vastly overestimated the size of the fetus. In contrast, Nilsson (1977, p.71) wrote about an eight week fetus: "Everything that will be found in the fully developed human being has now been established. The fetal stage is a period of growth and perfection of detail. The heart has been beating for a month, and the muscles have just begun their first exercises." This research by Lumley is also an interesting contrast with Kreitler and Kreitler's (1966) research on the concept of birth who found that 4 to 5 1/2 year old children viewed the fetus as engaging in various activities (e.g., eating,, suffering, playing, sleeping, growing and developing).

Unfortunately, no other studies have looked at what pregnant women's conceptions of the fetus are later in pregnancy and what never pregnant women or men believe about the fetus.

The following two studies, while not looking specifically at pregnancy and birth concepts, also found interesting differences among pregnant women, differences which support the existence of alternative systems of knowledge about pregnancy and birth, one with everyday concepts and one with scientific concepts.

In Graham's study (1976), pregnant women were interviewed about cigarette smoking during pregnancy, and this was contrasted with how the medical profession views cigarette smoking during pregnancy. It was found that one group of women, who tended to be smokers and working-class women, especially those who lived in the area of their childhood or close to their relatives, took the advice and believed personally transmitted information from relatives and friends (thus a lay referral system) and also their own personal observations and experiences (thus "personal proof" in which women observed that babies born to smokers were normal and healthy), rather than abstract scientific

and medical advice from books, magazines, television or staff of the ante-natal clinic. Thus, the majority of working-class women believed that some smoking has no ill effect, smoking has no proven effect, or said they didn't know. On the other hand, another group of women, who tended to be nonsmoking middle-class women, believed and got their information from nonpersonal sources, such as the mass media and the medical profession, and so the great majority of this group believed that smoking is detrimental to the baby or mother. The medical profession, based on many studies, has found that there is a dose-related effect from maternal cigarette smoking during pregnancy, which results in an increased incidence of fetal death or damage in utero, spontaneous abortion, prematurity, neonatal death, and results in fetal growth retardation (Benson, 1984; Dwyer, 1983; Pernoll & Benson, 1987; Windsor et al, 1985).

Nelson (1982, 1983) studied the models of childbirth held by 322 middle-class and working-class women (based on their educational level) who gave birth in a New England hospital. She found two models of childbirth in which the two groups of women had different levels of knowledge about childbirth,

different attitudes toward childbirth, and desired different things during childbirth. Middle-class women prepared themselves for childbirth through reading and attending classes, while working-class women were more likely to say they relied on mothers and other relatives to provide them with information about childbirth. Nelson said that for the fifty percent of working-class women who did attend childbirth classes, their "model of childbirth" was closer to the middle-class model, than for those who did not receive instruction and prepare themselves by reading books and attending classes. Middle-class women tended to want and experience more active, involved births free from medical interventions, while working-class women generally wanted and experienced more passive births with more medications and medical interventions.

Several studies with a more narrow focus have found differences among groups of pregnant women in their scientific knowledge about reproduction by administering multiple-choice or true-false questionnaires. However, while these studies measure whether the women have knowledge of the specific scientific information tested, they do not accurately measure what the women actually know, and at what

level. It would be especially interesting to know what the women who score incorrectly believe, that is, what concepts they do have. Barclay and Barclay (1976) gave a 25 item pregnancy knowledge questionnaire (subjects had to answer true or false) to pregnant and never pregnant women and found that pregnant women (who had not yet attended childbirth classes) made significantly fewer errors than never pregnant women. In fact, on eight out of the 25 items, the majority of never pregnant women gave incorrect responses. Roosa (1983) surveyed (by multiple-choice questionnaire) never pregnant teenagers, teenagers pregnant for the first time, and adult mothers about their knowledge of human reproduction (physiology and contraception) and child development and their parenting attitudes. He found that pregnant and never pregnant teenagers scored virtually the same on knowledge of human reproduction and child development, but that older mothers scored higher on child development, and surprisingly, scored lower than the teenagers on the human reproduction questions. Johnson and Snow (1982), also using a questionnaire, found a lack of reproductive knowledge in low-income, poorly educated black women.

Other research, although not concerned with concepts of reproduction but relevant to this discussion, has documented the existence of socioeconomic differences in pregnancy and infant outcome. One consistent finding is that with lower socioeconomic status, there is a greater incidence of obstetrical complications (e.g., toxemia, prematurity, labor/delivery complications), and infant mortality and morbidity, including lower infant birthweight (Jacobson, 1975; Prager, Malin, Spiegler, Van Natta, & Placek, 1984; Greenberg, 1983). Some of the many explanations offered for these differences in outcome are nutritional and prenatal care differences, more potentially harmful maternal behaviors during pregnancy such as smoking and drinking alcohol, and younger ages at pregnancy in the lower socioeconomic groups (Prager, Malin, Spiegler, Van Natta, & Placek, 1984; Snow, Johnson, & Mayhew, 1978). Some of these differences in maternal behaviors during pregnancy, especially smoking, drug, alcohol consumption and nutrition, might really be a reflection of underlying pregnancy knowledge differences among different groups of women as was suggested in some studies. (Darby, Barr, Smith,

& Martin, 1983; Fried, Barnes & Drake, 1985; Snow, Johnson, & Mayhew, 1978).

Scientific Medical System and Pregnancy and Childbirth Classes

The scientific medical model of pregnancy and childbirth or scientific concepts of pregnancy and birth is a system of knowledge that is culturally formulated and shared by the medical community. It is a system of knowledge consisting of the latest scientific information to guide doctors and women during pregnancy and childbirth to best ensure a normal healthy pregnancy and baby. This system of knowledge can be characterized as viewing a pregnant woman as a "machine" in which she is a vessel for carrying a developing fetus, and needing medical care and treatment (Chard & Richards, 1977; Rothman, 1982; Wertz & Wertz, 1979).

The key components of the scientific system of knowledge of pregnancy and childbirth which is taught in medical courses, found in medical literature, and taught in pregnancy and childbirth education courses are: 1) anatomy and physiological processes (both normal and abnormal) of pregnancy and childbirth, including development of the fetus, 2) medical

management, which includes medical technology and procedures, for pregnancy and childbirth (e.g., amniocentesis, ultrasound, fetal monitoring, induction, labor and delivery medication, episiotomy, forceps) - each with a body of knowledge concerning it, and 3) prenatal care - which is concerned not only with monitoring the pregnancy and looking for problems, but also with how women should behave, that is, what they should and should not do during pregnancy so as not to harm the fetus, but instead to ensure optimal pregnancy and fetal health (e.g., maternal behaviors and nutrition during pregnancy) (Benson, 1984; Berkow, 1982; Dwyer, 1983; Shapiro, 1983). In the scientific-medical system of concepts about reproduction, there is a concern with causal explanations. Thus, a person having a system of pregnancy and childbirth scientific concepts would have a characteristic way of understanding relationships between certain aspects of pregnancy, such as specific causal relationships (e.g., specific maternal behaviors having effects on pregnancy or fetal outcome, the causes and significance of certain pregnancy symptoms), all aspects of prenatal care, knowledge about biological changes and processes, both normal and

abnormal, and medical management and procedures that occur throughout pregnancy and childbirth.

The last two decades has seen the publication of many pregnancy and childbirth books, as well as numerous articles in magazines and newspapers to inform would-be parents about the latest scientific information about pregnancy and childbirth. Another development has been the proliferation of formal instruction in pregnancy and childbirth, generally called pregnancy and childbirth education classes. These are also called a variety of other names, typically Prepared Childbirth Classes, Lamaze or Bradley classes, but their general purpose is the same (Shapiro, 1983). A major difference between the different types of courses is in the childbirth breathing and relaxation techniques taught to women. The classes meet in small groups of a few couples, may be held in hospitals or privately by individuals or organizations, and are taught by trained and certified "childbirth educators". Pregnant teenagers may sometimes even receive such classes in a school setting. Women generally attend with their spouses or another companion the series of classes held once a week for six to ten weeks, generally costing a fee

between $75. to $170. a couple. Presently, the majority of American women pregnant for the first time attend at least one series of such classes. The classes consist of lectures, interactive dialogue, pregnancy and birth literature to read, and perhaps a relevant film. In fact, many hospitals will allow the husband or a companion to be present at the birth only if the couple has attended childbirth education classes. The classes generally cover the following topics: anatomy, physiological processes of pregnancy and birth including the development of the fetus; various aspects of prenatal care to best ensure a normal healthy pregnancy and baby; pregnancy nutrition; causal effects of maternal behaviors such as cigarette smoking, drugs, and alcohol ingestion on the pregnancy and developing fetus; modern medical management of pregnancy and childbirth, and medical technology and procedures and the controversies surrounding them; what to expect during a normal and abnormal pregnancy and childbirth; exercises, especially relaxation and breathing exercises to help cope with childbirth; labor and delivery medication; and the postpartum period, especially bonding, rooming-in, and breastfeeding vs. bottlefeeding of the infant (Feldman, 1978; Parfitt,

1977; Shapiro, 1983). Thus, the women are taught the current medical view of pregnancy and birth, which is a comprehensive system of modern scientific, medical knowledge about pregnancy and childbirth with its terminology and interrelationships among concepts. An attempt is also made to dispel scientifically incorrect "commonsense" and cultural beliefs about pregnancy and childbirth. Many of the prepared childbirth classes try to encourage women to use fewer medications and interventions during childbirth, but the rationale for this advice is also based on scientific knowledge, for example, studies showing that labor/delivery medications cross the placenta and affect the fetus (Shapiro, 1983).

Studies have looked at the effects, if any, of prepared childbirth classes on pregnant women (as compared to women who did not attend childbirth classes), and while some studies found no effects, the overwhelming majority found positive effects from attending classes, such as lowering of anxiety, shorter labor and delivery times, and women receiving lower levels of labor and delivery medications (Gaziano, Garvis, & Levine, 1979). However, very few studies have looked to see if pregnancy and childbirth

education classes actually result in knowledge differences among the persons attending them. Also, the studies have not sought or proposed explanations for the mechanisms involved in any changes.

One of the few studies that looked at scientific knowledge differences was done by Gaziano, Garvis and Levine (1979). They compared scores from a knowledge about pregnancy, labor and delivery questionnaire between women who attended prepared childbirth classes and women who did not. They found that scientific knowledge scores significantly increased in the women after the classes, and that scores both before and after the classes were also significantly higher than in the group of unprepared women Similarly, a study by Walker and Erdman (1984) had subjects rate their knowledge of various aspects of pregnancy, labor and delivery, and hospital routines, prior to and after childbirth classes, and after childbirth. It was found that for all subjects, self-ratings of knowledge increased significantly for all topics after the classes, but then basically stayed the same even after delivery.

Recently, Hillier and Slade (1989) looked at levels of confidence and levels of knowledge about pregnancy, labor and the care of a new baby in nulliparous women prior to the start of pregnancy and childbirth classes and at the completion of 8 weeks of classes. They found that initial knowledge levels were associated with age, social class and educational level, but not final knowledge levels. They found a significant increase in knowledge and confidence levels in women after completion of classes and also suggested that "the impact of classes was to reduce the differences in knowledge attributable to an individual's social and educational background." An examination of the 12 questions asked to determine the knowledge score showed that these questions were based on specific medical (scientific) knowledge and scientific vocabulary (e.g., "What is an episiotomy?, What is an epidural?, What happens in the second stage of labor?"), rather than assessing what it is women actually do know, in their own words, about pregnancy and birth.

Other studies, using questionnaires, have found increases on parenting and reproductive knowledge in teenagers who attended teenage parenting programs, and

nutrition knowledge and dietary improvements in teenagers receiving pregnancy nutrition instruction (Perkin, 1983; Roosa, 1984).

Similarly, in interviews with women in their third trimester of pregnancy, this investigator (1983) found that women (generally middle-class and college-educated) who had sought out and received a large amount of scientific information about pregnancy and childbirth from medical authorities by attending childbirth classes and reading pregnancy literature had greater general and specific medical (scientific) knowledge about many aspects of pregnancy and childbirth, while women (generally working-class and high school educated) who did not use these specific information sources, but instead cited "myself", "just know" or people in their social networks as their major sources of information, had less knowledge, and at times, no knowledge at all or incorrect medical knowledge about some aspects of pregnancy and birth. This in turn affected their behaviors during pregnancy. Retrospectively, the results suggest that pregnancy and childbirth instruction resulted in more scientific concepts of pregnancy, while women who did not receive pregnancy

and childbirth instruction appeared to have more popular, commonsense or everyday concepts of pregnancy and birth.

These studies are important in demonstrating that classes offering formal instruction are important in transmitting scientific information about pregnancy and birth to adults and teenagers. However, once again it must be pointed out that what is needed are more studies using interviews with open-ended questions, and not just multiple- choice or true-false questionnaires to get at an accurate understanding of what the person does know about pregnancy and birth, and from what sources she received this information, not just what she does not know. A number of studies have found that there are some social class differences in methods and preparation for childbirth, with the percentage of women attending childbirth education classes increasing with higher social class and higher levels of maternal education (Cave, 1978; Moran & von Bargen, 1982).

Present Research

The present descriptive study attempted to characterize adult concepts of pregnancy and childbirth and how they change and develop in women with instruction about scientific, medical information about pregnancy and childbirth.

It was hypothesized that there would be a developmental change from a system of popular or commonsense knowledge of pregnancy and childbirth (everyday concepts) to a system of scientific knowledge (scientific concepts) in women exposed to pregnancy and childbirth instruction. Lev Vygotsky's scientific and everyday concepts provided a framework within which to study these two systems and to provide a mechanism for conceptual change.

Theoretical Framework

Lev Semenovich Vygotsky discussed concept development in the book Thought and Language (1962), in which he distinguished between two types of concepts: everyday or spontaneous concepts and scientific or non-spontaneous concepts. Everyday concepts evolve out of the person's experiences with his or her

environment; thus they develop upward from the concrete to the more abstract. Scientific concepts, on the other hand, are acquired through instruction, such as formal classroom instruction. These concepts are more abstract, and are presented as part of a larger culturally formulated hierarchical system. Thus, scientific concepts are presented as a series of inter-relationships with other concepts in a system. Vygotsky stressed the interrelationship and interdependence between the scientific and everyday concepts. The person can only absorb the scientific concept when the development of the related everyday concept has reached a certain level. But on the other hand, mastering a scientific concept raises the level of related spontaneous concepts. They both affect and transform one one another, for with exposure to instruction and scientific concepts, the everyday concepts are transformed upward, while the abstract scientific concepts are transformed downward to include a concrete component. The scientific concepts provide a system for the everyday concepts.

While Vygotsky discussed the development of scientific and everyday concepts in children, this also could be applied to adults who are acquiring scientific

knowledge in a specific domain, thus undergoing a shift from everyday concepts to a system of scientific concepts or knowledge. However, it must be recognized that Vygotsky was discussing how learning scientific concepts affected general development in children, while adults, unlike young children, already have well developed conceptual systems in many domains. Vygotsky stated that there is an absence of a system in everyday concepts, but if it is to be applied to adults, it is expected that there is a system of everyday concepts, although it is different from a system of scientific concepts. One would also expect adult everyday concepts to differ from children's concepts in that adults have greater intellectual development and verbal abilities, years of schooling, social interaction with others and their more extensive experiences with the concept in question.

An argument for the applicability of Vygotsky's notions of everyday and scientific concepts to adult conceptual development in the domain of reproduction, is that some studies and Vygotsky himself found that adults do not always think at the most abstract level (Green, Jund, & Seggie, 1979). Neimark and Stead (1981), in their analysis of journal entries of college

women, found that the women mainly thought about mundane trivia at a superficial and concrete level, and that abstract analytic thought, especially problem-solving, evaluative thinking, and hypothetico-deductive thought was rare. Similarly, Vygotsky has stated that adults frequently, on a daily basis, think and speak on the concrete level, at the level of pseudoconcepts and frequently even lower, and not on the level of abstract concepts.

Applying a Vygotskian framework to the study described here, pregnancy and birth were viewed as one system within which there are clusters of everyday concepts or a system of concepts within which are embedded related scientific concepts. The system would be different (that is, the relationship among concepts) when an individual has only everyday concepts of pregnancy and birth or when one also has scientific concepts of pregnancy and birth (the scientific medical system of knowledge). There would be a content difference, that is, the amount and types of knowledge would be different, and the structure of the system would be different . The knowledge in scientific concepts of pregnancy and birth is more abstract, generalizable, and organized. Scientific knowledge

would organize the concepts, with a reorganization and transformation of everyday concepts. Scientific concepts are based on present day medical knowledge, which, of course, is culturally formulated.

Overview of Research Design

Four groups of adult women, who were either high school educated or college educated, were interviewed: never pregnant women, women in the first half of pregnancy, women in their third trimester of pregnancy, and pregnancy and childbirth educators. The never-pregnant women, who were screened to select those without formal schooling or instruction in pregnancy and childbirth, were referred to as "pregnancy unschooled," while childbirth educators and those women in their third trimester of pregnancy who have attended childbirth education classes, read pregnancy and childbirth literature, or received scientific information via instruction in some other manner were referred to as "pregnancy schooled."

Women were asked to define and describe the concepts conception, pregnancy and childbirth as well as other concepts. They were asked open-ended questions followed by probes about many aspects of

pregnancy and childbirth to get at their knowledge (whether scientific information, personal observation or popular everyday knowledge), explanations, knowledge of causal relationships, and sources of information. In this manner they described pregnancy and childbirth at their own level of knowledge with their understanding of the relationships in the system. It was expected that this would elicit everyday concepts of pregnancy and childbirth as well as scientific concepts. The groups of women were given an attribute listing task (from Murphy & Wright, 1984) to get a more formal understanding of changing conceptual structure. At the end of the interview women were asked to define eleven scientific terms about pregnancy and childbirth to get a further understanding of the amount of scientific knowledge each woman had about human reproduction. They were also asked to respond to a list of beliefs about pregnancy and childbirth, which was another measure of everyday knowledge.

In a person with a system of pregnancy and childbirth scientific concepts, it was expected that there would be knowledge and understanding of scientific information about pregnancy and birth and interrelationships between 1) biological aspects,

including anatomy, physiological processes, and fetal development, 2) prenatal care, which includes knowledge of pregnancy nutrition, pregnancy behaviors, and causal relationships (e.g., specific maternal behaviors having pregnancy or fetal outcome effects), and 3) medical management of pregnancy and childbirth, which includes obstetrical technology and procedures. This knowledge would have been learned through instruction, whether pregnancy and childbirth literature, childbirth education classes or medical authorities.

It was expected that in a person with a system of everyday concepts would find more simple and concrete independent units without clear connecting relationships (e.g., the pregnancy nutrition concept being "eat well" without knowing the specifics or what the significance is for the fetus). It was also expected that there would be an absence of information on many topics. There would be a use of primarily nontechnical terms in a general way (e.g., saying "pains" instead of contractions). It is expected that there would be a focus on the appearance of a pregnant woman and a description of what a pregnant woman feels and experiences. (This has been discussed by Murphy and Medin (1985) as novices focusing on "surface features"

while experts focus on underlying connections and principles.)

In this study, it was expected that pregnancy unschooled women who had never been pregnant would have a system of knowledge consisting primarily of everyday pregnancy and childbirth concepts, that is, information about pregnancy and birth which would have been acquired in a concrete manner from their own experiences and observations of pregnant women, and from cultural norms and beliefs transmitted by others. It was expected that this knowledge may therefore be affect laden and the persons would frequently be unable to pinpoint how their information about pregnancy and birth was learned, for these concepts would have started to develop so early in life that no memory of the initial personal experience remains. Thus, when asked, sources of information for everyday concepts were expected to be: "commonsense, just know, my own experience", as well as information from their social network.

Looking at a group of women in their third trimester of pregnancy would reveal the effects of any pregnancy schooling on their pregnancy and childbirth concepts, and indeed, it was expected that women in

this group would have the most knowledge among the pregnant women of scientific information about pregnancy and childbirth from instruction. As a result of the process of acquiring scientific information, it was expected that this would have transformed and developed their preexisting concepts into a well developed system of interrelated scientific and everyday pregnancy and birth concepts. One expected to see a change even in everyday concepts for, as Vygotsky had stated, both scientific and everyday concepts affect and transform one another. On the other hand, pregnant women who remained pregnancy unschooled (e.g., they did not attend classes, read pregnancy literature) would not show an increase of scientific knowledge of pregnancy and birth, but only development of everyday concepts or "commonsense, popular" knowledge, especially when based on their own personal pregnancy experiences.

It was expected that the most well-developed system of pregnancy and birth knowledge would be in the pregnancy and childbirth educators. Closest to them would be the group of college-educated women in late pregnancy. This expectation was based on research done by Graham (1976), Nelson (1982, 1983), and this

researcher's preliminary data which found socioeconomic differences in certain aspects of pregnancy attitudes and knowledge among pregnant women, research showing that the percentage of women attending childbirth classes increases with higher levels of maternal education (Cave, 1978), and Heath's work (1983) which found socioeconomic differences in orientation toward literacy and schooling.

Thus, it was expected that there would be a progression of scientific knowledge about pregnancy and birth through the groups of women, with the least scientific knowledge in never-pregnant, high school educated women, and the most scientific knowledge in pregnancy and childbirth educators.

Method

Subjects

Sixty women between the ages of 20 to 30 years were recruited to participate in the study from the following three groups: 20 never pregnant women, 20 women in the first half of their first pregnancies, and 20 women in the third trimester of their first pregnancies. Women in the last trimester of pregnancy had completed a series of childbirth education classes (e. g., Lamaze, Bradley, Prepared Childbirth Classes), while women in the first half of pregnancy did not attend childbirth education classes. Each of these three groups was further divided into two subgroups, based on the educational level and occupation of the women and their husbands (if married). In addition, there was one group consisting of ten trained and certified pregnancy and childbirth educators. Thus there were seven groups in all, with ten women in each group which will be referred to as: 1) never pregnant high school educated women, (2) never pregnant college educated women, (3) early pregnancy high school educated women, (4) early pregnancy college educated

women, (5) late pregnancy high school educated women, (6) late pregnancy college educated women, and (7) educators.

The amount of formal school education each woman has received about biology, human reproduction, pregnancy and childbirth was assessed by questions on the demographic questionnaire (see Appendix A). Nurses, biology teachers, childbirth educators, physicians, and others with careers involving extensive knowledge of pregnancy and childbirth were not included in the first six groups, for they have had formal school instruction regarding human reproduction and pregnancy prior to conception.

Rationale for Subject Selection

The never pregnant women were interviewed because it was expected that since they had not received formal school instruction about pregnancy and childbirth (pregnancy unschooled), they would reveal primarily everyday concepts of pregnancy. These pregnancy unschooled persons were expected to have acquired their pregnancy and birth information in a concrete manner from their own experiences with pregnant women, from cultural norms and beliefs transmitted by others, and

from portrayals of pregnancy and birth in the mass media.

It was necessary to look at both high school educated and college educated women separately, for it was possible that college educated women, even prior to conception, had been exposed to more scientific information about pregnancy and birth, which in turn would result in the development of more scientific concepts (knowledge) of pregnancy and birth, both before and during pregnancy.

The women in the first half of pregnancy would have started to learn more about pregnancy and childbirth either from their own experiences or informally from others (friends, parents, etc.) and perhaps from formal instruction (books, doctors, etc.) and therefore it was expected that they would reveal a greater knowledge of everyday and scientific pregnancy and birth information than never pregnant women.

Looking at a group of women in their third trimester of pregnancy and at a group of childbirth educators would reveal the effects of pregnancy schooling on their pregnancy and birth concepts (thus becoming pregnancy schooled). It was expected that the group of pregnancy and childbirth educators would have

the most knowledge of scientific information about pregnancy and birth from formal instruction such as classes and literature.

Procedures

The sample of 70 women were interviewed once. The women were recruited by "word-of-mouth" through social networks and by notices posted on bulletin boards in maternity clothing stores, grocery stores, and a factory. The pregnant women were told they would be interviewed about various aspects of their pregnancy experiences, their pregnancy and childbirth information and information sources, and the never pregnant women and educators were told they would be interviewed on various aspects of pregnancy and childbirth and their information sources. The individual interviews, which lasted about 1 1/2 to 2 hours, were conducted in the homes of the women or in the interviewer's home. Each interview consisted of : (1) a questionnaire for demographic characteristics in which questions were asked regarding the woman's educational level, occupation, marital status, and husband's and parents' education and occupation, (2) an attribute listing task, (3) a structured interview, and (4) a list of

pregnancy and birth beliefs, and (5) a word list of pregnancy and birth terminology. (See Appendix A for Interview Schedule.) The entire interview was tape-recorded. Each subject was paid $10 for participating in the study.

Attribute Listing Task

The attribute listing task is the task used by Murphy and Wright (1984) in their study of psychopathological concepts, which in turn is based on the one used by Rosch and Mervis (1975) and Rosch et al (1976). In this task, groups of subjects with differing levels of expertise compile attribute listings for concepts, to assess whether there are changes of conceptual structure with increasing expertise and knowledge.

Three basic and commonly used concept labels: conception, pregnancy, and childbirth were used to generate the attribute lists.

All subjects were asked to verbally describe and list the "typical features" or "typical things" about conception, pregnancy and birth. Each subject was asked about each of these three concepts separately. They were instructed to be as specific as possible and

to list as many "things or features" as possible. To encourage completeness, each subject was told to consider "biological or scientific things, mental and physical things, what occurs, what a woman experiences and does." The verbal instructions were identical for each subject. Each subject's description of each concept was transcribed verbatim on a separate page. Then each subject's descriptions was divided into individual attributes (e.g., "feels fat", "gain weight", "lasts 9 months"). The number of women in each group who listed each attribute was also tabulated. As Murphy and Wright (1984) had done, the attributes which were listed by 25% or more of the subjects in each of the groups was included in the final attribute lists. This was done to examine the amount of agreement, that is, consensual attributes at each level of expertise, that are both manageable and large enough for various analyses. Murphy and Wright had examined possible structural differences between novices' and experts' concepts by looking at: (1) concept or category richness (as measured by the number of attributes listed, and which should increase with expertise), and (2) the distinctiveness of the concepts, which in their study decreased as expertise

increased (as expertise increased, there were more attributes shared by 2 or more concepts). Following their procedures, these analyses were also done in the current study as well as (3) the number of scientific consensual attributes, and (4) attribute organization. For the purposes of this study, consensual attributes scored as "scientific" are those attributes that: 1) typically are not directly observed or experienced by women, but which use medical or scientific information (e.g., hormonal changes, growth of the uterus, blood volume increases), and 2) include the use of scientific or medical terminology (e.g., transition, three trimesters, dilation, uterus, labor, delivery). This is in contrast with directly observable or experienced attributes which do not require the use of scientific or medical terminology or scientific concepts (e.g., weight gain, feel baby move, pain, husband is with her).

Interview

The structured interview consisted of the interviewer asking the woman specific open-ended questions. For most questions, after the subject

responded, the interviewer followed with structured probes (e.g., Why? How does this occur? Where or how did you learn this? When did you learn this?) to get at knowledge of a topic, causes, mechanisms, consequences, and sources of information. This is the interview format typically used in research on concepts of reproduction, illness and commonsense models of illness (Bernstein & Cowan, 1975; Carey, 1985; Goldman & Goldman, 1982; Meyer, Leventhal, & Gutmann, 1985). Vygotsky also used interviews in establishing knowledge of causal relations and sequence in his research on everyday and scientific concepts (1988). A list of the interview questions is provided in Appendix A.

Questions were asked about the following topics: Pregnancy - This includes, mental and physical changes during pregnancy; knowledge of anatomy and physiological processes of pregnancy, including development of the fetus; prenatal care which includes pregnancy behaviors to ensure a healthy pregnancy and baby, that is, how a woman should behave during pregnancy so as not to harm the fetus, but instead to ensure optimal pregnancy and fetal health; nutrition during pregnancy and maternal behaviors during pregnancy, such as maternal ingestion of alcohol,

drugs, caffeine, cigarette smoking, maternal emotions, exercise, and effect of these on the mother, pregnancy and fetus.

Childbirth - This includes biological processes, some aspects of medical management of birth, and what the woman experiences.

Instruction - Women were asked their sources of information for all topics. Source of information possibilities are: books, magazines, brochures, mother, TV, radio, public health messages, father, friend, co-worker, other relatives, pregnancy or childbirth education classes, doctor, nurse, midwife, myself/just know, and commonsense. Women were also asked their views of and about attendance at childbirth education classes.

Responses to interview questions about eight specific pregnancy topics (salt intake, nutrition, coffee and tea intake, ingestion of alcohol, cigarette smoking, smoking marijuana, exercise, non-prescription medications) were scored as scientific or everyday. For each response, the units of information in each utterance, which is typically a sentence, were looked at and coded according to a checklist. When the entire response had been coded, that is, responses to the

initial interview question plus probes (e.g., Why, How? What?), plus sources of information (Where or how did you learn this?), then the entire response was scored as scientific or everyday, if according to the checklist, the majority of the units of information met the criteria for scientific or everyday.

The possible criteria for a scientific response are: use of scientific facts (content of information), use of scientific terminology, mention of (underlying) causal relationships (e.g., between "x" and fetus), understanding mechanisms of action (e.g., "X" crosses the placenta to somehow affect the fetus), sources of information are from formal instruction (e.g., pregnancy and childbirth classes, documentaries, public service messages, reading pregnancy and childbirth literature, seminars, school, doctors, nurses, midwives), and abstract (not directly observed or experienced).

The possible criteria for an everyday response are: concrete (context-based) information, information based on personal experience or observation, use of nontechnical (non-scientific) terms, popular beliefs or popularly shared general information (e.g., "everyone knows about x"), isolated units of information (e.g.,

no mention or knowledge of underlying links or mechanisms of action), general response (not specific or detailed), information is not learned through formal instruction (e.g., social network, personal opinion), and statements such as "don't know", "no idea".

In the course of the interview, women will also be asked some opinion questions and questions specifically pertaining to their own pregnancies, such as their own pregnancy behaviors. This is a further attempt to get at their knowledge of the various topics, their sources of information, and also to see if their reported knowledge of the topics matches their own reported behaviors.

Reliability

Interrater reliability in coding was assessed by having a second coder independently code 25% of the 560 total responses to the eight interview pregnancy topics (nutrition, cigarette smoking, alcohol intake, smoking marijuana, coffee and tea intake, salt intake, nonprescription medications and exercise). Therefore 140 randomly selected responses from the 70 transcripts for the pregnancy topics were independently scored, using the scoring sheet, by the experimenter and a

second coder. The second coder did not know anything about the woman whose response was to be coded or whether the woman's response was judged to be scientifically correct or incorrect. Agreement between the experimenter and the second coder on whether the 140 responses were to be coded as scientific or everyday was 99.29%.

List of Beliefs

After the interview, a list of beliefs about pregnancy and childbirth was presented to each subject to give one measure of everyday knowledge. The interviewer started out by saying: "Many people give advice or information to pregnant women. For each of the following, I want to know if you've ever heard of this advice, and whether you agree, disagree, or have no opinion about it. That is, I want to know if you think this advice is true or false." Then, for each belief was asked: "Have you ever heard of this advice?" followed by "Do you agree, disagree, don't know, or have no opinion about it?" Only those statements which appear in the literature as beliefs (Kruger & Maetzold; Snow, Johnson & Mayhew, 1978) or beliefs women have reported in earlier research

(Silgailis, 1984) were included for data analysis. There may be specialized literature supporting some of these statements (e.g., food cravings), but they are dismissed or not discussed in general obstetrics and pregnancy and childbirth literature (Benson, 1984; Pernoll & Benson, 1987; Shapiro, 1983).

Word List

Finally, a word list of scientific terms commonly used was presented to the subject, one after the other, about pregnancy, childbirth, medical procedures and technology, and the subject defined each one if she could. The interviewer first told the subject that: "Sometimes people use the following terms to describe certain things about pregnancy and childbirth. For each of these terms, I want to know if you've ever heard of it and what the term means to you." Then, for each term, the interviewer asked "Have you ever heard of ____?" (If yes) "What do you know about ____?" The terms were: uterus, amniocentesis, placenta, umbilical cord, labor, transition, breech, episiotomy, forceps, external monitoring, and internal fetal monitoring.

Results

Sample

Twenty never pregnant and forty pregnant women, ranging in age from 20 to 30 years, plus ten childbirth educators were interviewed. The average age of the high school educated women was 25.8 years and the average age of the college educated women was 27.5 years. The average age of the childbirth educators was 35.9 years, due to the fact that educators typically have children before becoming educators and also because many train first as nurses or physical therapists (especially Lamaze educators), and then they receive further training to become educators. Sixty-eight of the interviewed women were white and two were black (one never pregnant and one pregnant woman).

With the exception of childbirth educators, all women were screened to make sure they hadn't specifically studied or trained in pregnancy and childbirth (e.g., weren't nurses, physicians, college biology or nursing majors, genetic counselors). All late pregnancy women had attended either Lamaze (high school educated - 60%, college educated - 70%), Bradley (high school educated - 30%, college educated - 20%),

or a Prepared Childbirth course (high school educated - 10%, college educated - 10%). Five of the childbirth educators were Lamaze educators and five were Bradley educators.

The average educational level of the high school educated women was 12.1 years, and the average educational level of the college educated women was 16.8 years. The average educational level of the educators was 15.9 years. Typical occupations of high school educated women were: secretary, sales clerk, manicurist, hairdresser, clerk, waitress, Black Jack dealer, and homemaker, while occupations of college educated women included engineer, systems analyst, student, social worker, CPA, attorney, teacher and architect. Some of the childbirth educators worked also as nurses (50%) or physical therapists (20%).

Six of the pregnant women were planning to give birth at a free-standing childbirth center and the other thirty-four pregnant women were planning to deliver at various hospitals, with the majority planning on using traditional labor and delivery rooms and a minority planning on using hospital birthing rooms. Educators who had between two and five children, had given birth to their children in a

variety of settings. Four women had at least one home birth, nine had given birth in hospitals - in both traditional labor and delivery rooms and birthing rooms, and one had used a birth center.

The pregnant women had largely uncomplicated normal pregnancies, with one woman also reporting gestational diabetes that was diagnosed in the third trimester. Planned pregnancies were reported by 70% of the high school educated and 100% of college educated early pregnancy women, and by 50% of high school educated and 70% of college educated late pregnancy women (therefore 60% of all high school educated and 85% of all college educated women).

Attribute Listing Task

There were group differences in the average number of attributes listed by each woman in each group for all three concepts. The fewest number of attributes were listed by never pregnant women. More were listed by early pregnancy women, and even more by late pregnancy women. The most were listed by the group of educators. As can be seen in Table 1, college educated

women gave more attributes than high school educated women in all groups, except in the group of never pregnant women.

The number of consensual attributes listed by women in each group, that is, attributes listed by 25% or more of the women in each group is listed in Table 2. Three lists of consensual attributes were arrived at for each concept for the never pregnant, early pregnancy, and the late pregnancy groups of women. The three attribute lists for these groups were: 1) high school educated women, 2) college educated women, and 3) all women, that is, high school and college educated women combined. One consensual attribute list for the educators was arrived at for each concept. See the Appendix for the complete consensual attribute lists for all groups.

The total number of consensual attributes listed for each concept is a measure of category richness. Lines 3,6,9,10 in Table 2 indicate that the number of consensual attributes for each concept (pregnancy, childbirth and conception) appear to show group differences, with greater numbers occurring in groups with high levels of pregnancy and childbirth schooling and experience. Educators have the richest concepts,

followed by women in late pregnancy, and then by early pregnancy women. The combined group of never pregnant women (line 3) provided the fewest number of attributes for the concepts. But when looking at women separated into high school and college educated groups (lines 1 and 4), it was found that never pregnant high school educated women listed basically the same number of consensual attributes as high school educated women in early pregnancy for the concepts of pregnancy and childbirth. In all groups with the exception of never pregnant women, college educated women appear to have more consensual attributes for the concepts of pregnancy and childbirth than high school educated women.

Concept attribute distinctiveness was computed, which Murphy and Wright had looked at, and which was adapted to this study to be the percentage of attributes that occur for each concept for only one subject group. It can be seen from Table 3 that no clear pattern emerged in concept attribute distinctiveness among the groups, although for the concept of childbirth, educators appeared to have a significantly greater percentage of distinctive attributes.

The number of consensual scientific attributes was counted in each group. As Table 4 shows (lines 3,6,9), the number of scientific attributes for the concepts of pregnancy, childbirth and conception showed increases among the groups of women with higher levels of pregnancy and childbirth education. But when college and high school educated women are looked at separately, the increase in the number of scientific attributes for pregnancy and childbirth appears to be solely among college educated women.

The way the women organized the attributes in their responses to the attribute listing task for the concepts of pregnancy and childbirth was examined. As can be seen in Table 5, with high levels of pregnancy and childbirth education, there were fewer responses that were unorganized or given in a random manner, and greater numbers of attributes listed in an organized manner. It was found that for the concepts of pregnancy and childbirth, organized attributes were generally either chronologically organized, that is, the women listed at least a portion of the attributes sequentially (e.g., "first there is...., and then.., and then.." and so on), or the attributes listed were organized chronologically and with scientific

terminology and organization. That is, for pregnancy, attributes were given chronologically by trimesters, and for childbirth, attributes were listed chronologically by stages of childbirth. Women spontaneously organizing the attributes they list for a concept in a scientific- chronological manner was evidence of these women having a system of scientific knowledge for that concept. In groups with higher levels of pregnancy and childbirth education, there were also several instances of women organizing attributes by domains (e.g., starting the task by saying that "pregnancy has several different aspects as I see it: physical, emotional and spiritual" and then listing all the attributes within these three domains.). Chi-square analysis of responses of all the groups to the concept pregnancy as "not organized responses" versus "some sort of organization", reveals a significant effect, $x^2(6, N=70)=20.49, p<.01$. Chi-square analysis of responses of all the groups to the concept of childbirth as "not organized responses" versus "some sort of organization", reveals a significant effect, $x^2(6, N=70)=13.38, p<.05$.

For the concepts of pregnancy and childbirth, in groups with progressively higher levels of pregnancy and childbirth education, high school educated women showed chronological organization, but only pregnant college educated women and educators listed attributes organized by domains.

As can be seen in Table 6, there was a decrease through the groups of women with greater levels of pregnancy and childbirth education, in the percentage of women spontaneously uttering "I don't know" or "I don't know because I haven't been through it yet" statements when listing attributes for the concepts of pregnancy and childbirth, Chi-square analyses indicated that this is a significant effect for the concepts of pregnancy, $x^2(6,N=70)=15.55,p<.02$ and childbirth, $x^2(6,N=70)=11.4,p<.10$. Fifty percent of the educators made statements during the attribute listing task such as "I could go on for hours - this is a summary", while none in the other groups made comparable statements.

At the beginning of the task, women had been instructed to list attributes ("typical things or features") for pregnancy and childbirth in general, and not for their own specific pregnancies and births.

Never pregnant women and educators did this, but among early pregnant women and especially late pregnancy women, a greater percentage discussed their own specific pregnancies and planned births when listing attributes, as measured by those who made more than two statements about their own pregnancies and planned births (see Table 6). Chi-square analyses indicated that this is a significant effect for the concept of pregnancy, $x^2(6, N=70)=29.17$, $p<.001$, and childbirth, $x^2(6, N=70)=15.55, p<.02$. It was as though with increasing pregnancy, the women were less able to distance themselves from their pregnancies to discuss pregnancy and childbirth in general.

Interview General Response Characteristics

Responses to interview questions about eight specific pregnancy topics (salt intake, nutrition, coffee and tea intake, ingestion of alcohol, cigarette smoking, smoking marijuana, exercise, and nonprescription medications) were scored as scientific or everyday.

It was found that with all topics, there were group differences in the number of responses scored as

scientific according to the level of pregnancy and birth schooling, with the fewest number of scientific responses and most everyday responses among never pregnant women and the most scientific responses among late pregnancy women. Childbirth educators, as expected, had even more responses scored as scientific. In each of the groups, college educated women almost always had more scientific responses to the specific topics than high school educated women (see Table 7).

Looking at the totals for the topics, it is evident that the number of scored scientific responses showed group differences, with the fewest given by never pregnant high school educated women, followed by never pregnant college educated women, then early pregnancy high school educated women, then early pregnancy college educated women, then late pregnancy high school educated women, with the most given by the late pregnancy college educated women, followed by educators. Chi-square analyses reveals these to be highly significant effects for all eight topics: salt intake, $x^2(6,N=70)=34.16,p<.001$; nutrition, $x^2(6,N=70)=30.02,p<.001$; coffee and tea, $x^2(6,N=70)=32.10,p<.001$; alcohol intake,

$x^2(6, N=70)=24.35, p<.001$; cigarette smoking, $x^2(6, N=70)=23.55$, $p<.001$; smoking marijuana, $x^2(6, N=70)=32.54, p<.001$; nonprescription medications, $x^2(6, N=70)=37.62, p<.001$; exercise, $x^2(6, N=70)=26.26$, $p<.001$.

In all groups, but especially in groups with higher levels of pregnancy and childbirth education, answers frequently contained both "scientific" and "everyday" statements. For example, a woman might respond to an interview question with many scientific statements, but will also include some everyday statements, such as her own personal opinion and experiences, or what she has personally observed in her friends. Never pregnant women were the most likely to not include any scientific statements at all in their responses.

Since answers were scored as "scientific" or "everyday" depending on whether the responses for each topic were predominantly scientific or everyday in nature, it is of interest to know how many "close calls" there were, that is, responses in which the majority of units were only one more than the minority of units. These were relatively few, for only 8% of

the responses of never pregnant women, 10% of the responses of early pregnancy women, 14.4% of the responses of late pregnancy women, and 1.3% of the responses of educators were "close calls". In summary, a total of 8.6% of all responses for all groups combined (out of a total of 560 responses) were close calls. Also, which women had the "close calls" varied by topic, with some topics eliciting more than others (e.g., half of all close calls among never pregnant women was for the topic of cigarette smoking during pregnancy, perhaps reflecting the fact that this topic is frequently discussed by the mass media so that even never pregnant women had some scientific knowledge reflecting this topic).

Responses also typically were lengthier, more complex, sophisticated and elaborate, in groups with greater levels of pregnancy and childbirth education and experience, reflecting actual greater knowledge, whether scientific or everyday, of the topic.

The actual content of the responses for these specific eight pregnancy topics was also examined. The following discussions also reflect the fact that with the pregnancy topics, women from all groups may be coded as having similar opinions, e.g., "No, a woman

shouldn't drink during pregnancy.", but their explanations of why this so, and the knowledge they bring to these opinions can be coded as scientific or everyday.

The following two examples illustrate this. The first example is a verbatim excerpt of a never pregnant high school educated woman's responses, which were coded as "everyday". The interview question followed by probes was: What do you think about a woman drinking beer or wine during pregnancy? How about other alcohol?

"I think it's no good."

Probe: Why not? "There could be no benefit for the mother and the child."

Probe: What could happen? "Healthwise, I just don't think it's any good."

Probe: Anything more specific? "No. I haven't heard anything more specific - what actually takes place or what should happen or....."

Probe: How did you learn this? "This is my own feeling. Like you would say - that would be commonsense."

Probe: When did you learn this? "I've thought about it before - years ago."

Repeat original question. "Avoid it totally."
Probe: Has anyone told you differently? "No."
Have you ever heard of Fetal Alcohol Syndrome? "No. What is it?"

In contrast is the following pregnancy and childbirth educator who also said to avoid alcohol during pregnancy, but gave responses coded as scientific.

What do you think about a woman drinking beer or wine during pregnancy? How about other alcohol? "There's been a tremendous amount of literature on the effects of alcohol on the fetus. Those people in the know who are heavily involved in it, really advocate none."
Probe: Why? "Because of the effects on the baby. Primarily on the baby's brain and facial formation. A lot of the effect is on the development of the baby's face and brain, so that there's a lot there. I think there are still a lot of physicians who say that a glass of wine occasionally is alright. If I were pregnant, I wouldn't drink."
Probe: At all? "No."
Probe: How do the effects you mentioned occur? "It crosses the placenta and interferes with the normal differentiation of cells."

Probe: How did you learn this? "Through research and a few seminars I attended."

Probe: When did you learn this? "Four years ago? Five years ago?"

Probe: Has anyone told you differently? "People in my classes tell me differently. The feel that, you know, "my sister drank and she was fine, so I'm going to."

Probe: Have you ever heard of Fetal Alcohol Syndrome? "Yes. Fetal Alcohol Syndrome is a syndrome that results...is a set of resulting effects on the fetus as the result of alcohol intake in the mother, primarily in facial development and brain development."

As was seen in these two examples, while holding similar opinions regarding alcohol intake during pregnancy, the reasons for the never pregnant women were based on "commonsense" or her "gut feeling" rather than knowledge of scientific facts, causal relationships, or mechanisms of action, while for the childbirth educator, her opinion was based on her knowledge and support of the current scientific literature.

Another example of a response coded as "everyday" is the following verbatim excerpt from the transcript

of a never pregnant high school educated woman. The interview question was:

What do you think about a woman smoking cigarettes during pregnancy? "I haven't thought about it because I smoke. I don't know. Definitely not the best thing. If you can quit - quit. I know so many who did smoke and had healthy babies that it unfortunately wouldn't make me as determined to quit. I've definitely heard it's not as healthy."

Probe: Why? "Just that it's not as healthy for the baby."

Probe: What could happen? "It could scrub their lungs. I don't know. Nothing more."

Probe: How does this occur? "I don't know."

Probe: Where or how did you learn this? "My sister, my mother, girlfriends. But they just say "don't smoke" and don't explain why."

Probe: When did you learn this? "Since I've been twenty."

Probe: Has anyone told you differently? "Yes. All my friends who smoke say it's no big deal."

In contrast, the following excerpt, from a college educated late pregnancy woman, was coded scientific.

What do you think about a woman smoking cigarettes during pregnancy? "I don't think they should."

Probe: Why? "Well, first of all, because I'm totally against cigarettes. Because it contributes to lower birth weight babies and it's also a drug. It's also an appetite suppressant. It can keep you from eating something."

Probe: How does this occur? "I guess the nicotine goes into the bloodstream. And, I imagine, goes through the lungs and is absorbed through the lungs into the veins and goes right into the bloodstream. And so reaches the baby."

Probe: Where or how did you learn this? "From health education courses and books."

Probe: When did you learn this? "I guess in high school. You learn cigarette smoking isn't very good for you."

Probe: Has anyone told you differently? "No, no one's ever. People have said it's OK to smoke occasionally, but if you're a pack a day person, no one has ever told me that's good or that's even OK. I've heard you definitely should try to limit yourself."

A Bradley childbirth educator answered this same interview question with a response also scored as scientific.

What do you think about a woman smoking cigarettes during pregnancy? "You should abstain. If a woman hasn't read that - it's in the papers. A woman, if she smokes and she wants to get pregnant, she should try to wean herself and stop before she gets pregnant. If she is pregnant and is still smoking, she should slowly wean herself or fast wean herself - however she can to get off. But she should make a real effort. If she can't get off them completely, she should absolutely decrease the number of cigarettes."

Probe: Why? "We've seen problems with the placenta not developing well. Sometimes it seems that the cord seems to be affected, but the biggest problem is the lack of oxygen because the carbon monoxide taking its place - over the oxygen - to the fetus. We know it's not good for the baby. And it also seems to increase the likelihood of small-for-date babies. Babies that are born full term, but tiny. Small-for-date babies are at greater risk, maybe that has to do with placental problems. At greater risk in problems in pregnancy, in labor and birth and afterwards. Many

women don't smoke now. There are some, but I think women are aware. They know it's not good. I once read an article that if she can't cut down, if she can cut down or stop the 48 hours or couple of days before she thinks she'll go into labor, then she increases the likelihood that the baby won't have as many problems in the labor. But in any event it's not good."

Probe: How did you learn this? "Reading."

Probe: When did you learn this? "When I was in Public Health."

Probe: Has anyone told you differently? "No. But I shouldn't say that. I hear stories all the time. A woman will come up to me: 'I did everything wrong. I smoked and watched my weight and a 7 pound baby.' So yeah, I've heard."

The pregnant women and childbirth educators in this study appeared to have been actively seeking pregnancy and childbirth information, for they overall cited a large and varied number of information sources for the eight pregnancy topics discussed. The number of different sources and actual sources were recorded for each topic. The five main categories of information sources that women reported were: reading (books, magazines, journals, brochures, newspapers),

television/radio/public service messages, social network (mother, father, friend, co-worker, relative, husband, sister, pregnant woman, etc.), medical authority (prepared childbirth classes, doctor, nurse, midwife, school, seminars), commonsense or common knowledge, and personal opinion (which includes "myself", "just know", personal opinion, personal observation or personal experience).

Unfortunately, due to study constraints, the women were asked the number of different sources and not the number of each kind of source. Therefore, when women were queried about their sources of information, no distinction was made between a woman reading one book or many books or one article versus many articles. In fact, women who had learned a great deal about a topic from many sources, had great difficulty stating where they had learned about the topic. For example, childbirth educators frequently said "reading and seminars", and when questioned further said this meant years of reading books, articles, journals, and attending seminars in which this topic was extensively discussed. On the other hand, pregnant women, especially in early pregnancy, were frequently quite specific in where they learned something, e.g., "I

remember asking my doctor this and this is what he said..." or "I read it in the pregnancy book that I bought."

Looking at Table 8, it can be seen that in groups with greater pregnancy and childbirth education, there were a greater number of total sources mentioned. It appears that this difference between groups has mainly occurred by a decrease in the number of social network, personal opinion and commonsense sources cited and an increase in the number of reading and medical authority sources (which includes childbirth classes) cited. It should be noted that many of the public service messages cited by never pregnant women consisted of reading the labels on cigarette packages and nonprescription medications which warn that pregnant women should not use these products or television commercials that warned against alcohol, cigarette or drug use in pregnancy, but without giving any specifics. Also, especially in never pregnant women, many of the responses in which a personal opinion source was cited, was a topic in which the woman only had a "gut feeling" or opinion about the topic, but no real scientific knowledge. Some of these women also reported that this was the first time they had ever

thought about the topic, and that they did not really know anything about that topic, but even so, they had an opinion about that topic.

Content of Responses

The actual content of the responses for these specific eight topics was examined.

One hundred percent of women said that nutrition is important during pregnancy. The more pregnancy and childbirth education a group had, the more women reported that extra calories need to be consumed daily during pregnancy (never pregnant high school educated - 40%, never pregnant college educated - 60%, early pregnancy high school educated - 70%, early pregnancy college educated - 70%, late pregnancy high school educated - 80%, late pregnancy college educated - 80%, educators - 100%). In contrast with current scientific information that states that a pregnant woman needs to have between 300 and 600 calories more daily (Pernoll & Benson, 1987; Shapiro, 1983), the rest of the women reported that a woman does not need more calories during pregnancy, but only needs to eat well.

When women were asked "How much weight do you think a woman should gain during pregnancy?", it was found that 50% of never pregnant women (both high school and college educated), reported this as being between 10 or 20 pounds or that they didn't know, while the other 50% gave numbers between 20 and 30 pounds. This is in contrast with other groups, who only gave numbers between 20 and 50 pounds, with the overwhelming majority of women giving weights, or a range of weights between 25 and 35 pounds, which is a range of weight gain supported by current scientific literature.[1]

With regard to questions regarding salt intake during pregnancy, it was found that the more pregnancy and childbirth education and experience a group had, the more women reported that "salt is OK" or "salt in moderate amounts in food is OK" during pregnancy (never pregnant high school educated - 30%, never pregnant college educated - 60%, early pregnancy high school educated - 30%, early pregnancy college educated - 40%, late pregnancy high school educated - 70%, late pregnancy college educated - 90%, educators - 90%). The rest of the women in the groups reported "don't know", or to "cut back" or "totally eliminate salt" from the diets of pregnant women, which is currently considered

scientifically incorrect and even potentially dangerous (Pernoll & Benson, 1987; Shapiro, 1983). Chi-square analysis of all the groups for the response of "salt is OK" versus, "cut back, restrict salt, or don't know" indicated that this is a significant effect, $x^2(6, N=70)=16.84, p<.01$. However, pregnant women reported that during pregnancy their own salt intake either: increased (early pregnancy high school educated - 10%, early pregnancy college educated - 10%), decreased (early pregnancy high school educated - 20%, early pregnancy college educated - 40%, late pregnancy high school educated - 40%, late pregnancy college educated - 20%), or stayed the same (early pregnancy high school educated - 70%, early pregnancy college educated - 50%, late pregnancy high school educated - 60%, late pregnancy college educated - 80%).

When women were questioned about the use of alcohol during pregnancy, it was found that both the number of women who had heard of Fetal Alcohol Syndrome and who correctly knew what it was increased with increasing levels of pregnancy and childbirth education (see Table 9). Chi- square analyses reveals this to be a significant pattern for the number of women hearing of Fetal Alcohol Syndrome, $x^2(6, N=70)=19.2, p<.01$,

and for the number of women who correctly knew what it was, $x^2(6, N=70)=34.69, p<.001$. The others who stated that they knew what it was, typically incorrectly said it was "a baby born an alcoholic".

Given the amount of scientific literature (Pernoll & Benson, 1987; Shapiro, 1983), the United States Surgeon General's 1981 advisory, and television and other mass media advertising advising pregnant women to totally eliminate alcohol consumption during pregnancy, it was surprising that in groups with high levels of pregnancy and childbirth education, fewer pregnant women responded that a woman shouldn't drink at all during pregnancy (see Table 9) but a chi-square analysis showed this to be not significant.

Similarly, when looking at reported alcohol intake (Table 9), in groups with higher pregnancy and childbirth education levels, fewer women reported that they didn't drink alcohol during pregnancy as compared with women in early pregnancy. A chi-square analysis did not find this to be significant. However, as can be seen in Table 9, none reported drinking heavily or even every day. All women reported cutting back or limiting their alcohol intake during pregnancy.

However, most women only cut back once they learned they were pregnant rather than once they started trying to conceive, which some researchers, such as Streissguth, Barr, Sampson, Darby and Martin (1989), have suggested is a cause for concern because of important fetal development taking place in the early weeks before a woman realizes she is pregnant. Women were not questioned about their alcohol intake prior to pregnancy or before they learned they were pregnant, but some spontaneously reported that they used to "drink wine with dinner" or "share a bottle of wine with their husband" every night until they learned they were pregnant. One woman also reported drinking about three glasses of wine for four days in her third trimester on the advice of her midwife to stop labor contractions.

The majority of women felt that daily intake of coffee and tea was acceptable. With the exception of educators, there appeared to be a slight decrease in groups with higher levels of pregnancy education in the number of women responding that a woman should not drink coffee or tea during pregnancy (see Table 10). The majority of women in the never pregnant and pregnancy groups reported that between one and two cups

of regular coffee and tea a day was acceptable during pregnancy. Many of the women used the term "in moderation" to describe drinking one to two cups of coffee daily. While the majority of pregnant women reported drinking some coffee and tea during pregnancy, and only a minority reported not drinking coffee and tea, a majority of women reported quitting or cutting back their intake during pregnancy.

The great majority of women stated that a woman should not smoke cigarettes during pregnancy. The rest of the women responded that smoking during pregnancy "may not be so bad", and in fact, may be alright, giving as evidence that so many women smoke during pregnancy and have "healthy, normal babies", which is in contrast to scientific evidence. Table 11 shows the number of women who reported smoking during pregnancy. All smokers, with the exception of two high school educated women in late pregnancy, reported cutting back during pregnancy. Of these two women, one increased her smoking during pregnancy because she reported that it "tasted better". Five women (two college educated and three high school educated) reported that they quit smoking as soon as they learned they were pregnant.

In agreement with the scientific literature on marijuana smoking during pregnancy, the overwhelming majority of women felt that pregnant women should not smoke marijuana. Table 12 shows that only a few felt it was acceptable behavior.[2] These same few women reported smoking marijuana occasionally during pregnancy. However, it is unknown whether these are accurate responses for marijuana is an illegal drug and these were taped interviews.

In agreement with the scientific literature on exercise during pregnancy, 100% of all women thought some exercise was good, e.g., walking or pregnancy exercises (Shapiro, 1983). However, almost all women also added a qualifier such as "but don't overdo it" or "don't do strenuous exercises".

Looking at Table 13, it was found that when women were questioned about whether a pregnant woman should take nonprescription medications, there were no differences across groups of the never pregnant and pregnant women who said "No, they shouldn't." In agreement with the scientific literature on nonprescription medications during pregnancy, most educators felt pregnant women should avoid nonprescription medications. Among women in late

pregnancy, as compared to early pregnancy women and never pregnant women there were greater numbers of women who responded "only if the doctor says it's OK", and no responses of "don't know" or "it's fine to take them".

Comparing early pregnancy to late pregnancy women, among college educated women, there were fewer late pregnancy women who reported taking nonprescription medications, but no differences among high school educated women. The number of nonprescription medications reported taken during pregnancy per person (calculated as a group average) was the least in the late pregnancy college educated women (early pregnancy high school educated - 1.6, early pregnancy college educated - 1.2, late pregnancy high school educated - 1.8, and late pregnancy college educated - .6 per person). Late pregnancy groups reported taking slightly fewer prescription drugs per person (calculated as a group average) than early pregnancy groups: early pregnancy high school educated - .6, early pregnancy college educated - .8, late pregnancy high school educated - .3, and late pregnancy college educated - .6 per person. Nonprescription medications that women reported taking during pregnancy included:

Tylenol, various laxatives, stool softeners, cortisone creams, aspirin, Dristan, various antacids, antihistamines, cough syrup, and Advil. Prescription medications included sulfa drugs and other antibiotics for urinary tract infections, cough medications, various asthma medications, penicillin, Keflex, Ampicillin, thyroid medications, Tylenol with codeine, progesterone suppositories, Flagyl, erythromycin, a general anesthesia, diuretics, Actifed, Monostat, stool softeners and antacids. Every pregnant woman reported taking vitamins, typically prenatal vitamins, but these were not counted as prescription medications in the above calculations.

In addition to the above discussed questions, all women were also asked if they thought pregnant women have food cravings. These answers were not scored as scientific or everyday because very little scientific research has been done on this topic, and there is little discussion of it in the scientific literature. However, food cravings are commonly discussed in popular American culture as being a part of pregnancy. Table 14 shows the number of women who thought that pregnant women have food cravings and the number of pregnant women who actually reported food cravings

during pregnancy. The majority of all women in all groups believed that pregnant women have food cravings. A slightly smaller number of women (but still between 50 and 70%) reported actual food cravings during pregnancy. The food cravings varied, but ice cream and sweets were frequently mentioned by pregnant women in both early and late pregnancy, and pizza by four women in early pregnancy.

In support of results from the attribute listing task, additional evidence about the organization of everyday and scientific attributes comes from several interview questions. All subjects were asked if they had ever heard of the term "the three trimesters of pregnancy" and if the response was "yes", then they were further asked: "What does it mean? Are any special things going on during the trimesters with the mother, pregnancy or baby? What are they?" In groups with progressively higher levels of pregnancy and childbirth education, there are larger numbers of women reporting that they had heard of this term, that "yes" - they knew what it meant, and also the number of women giving correct definitions and descriptions (see Table 15). A chi-square analysis on the groups of never pregnant women, early pregnancy and late pregnancy

women knowing what the term means, revealed that there was a significant effect, x^2 (2,N=60)=17.57, p<.001. Among all the groups, college educated women had more knowledge of the term "three trimesters of pregnancy" and also knowledge of what it meant, than high school educated women.

The interview question which asked specifically if the woman knew where the fetus or baby grows inside the mother during pregnancy ("Where does it grow?") found that in groups with higher levels of pregnancy and childbirth education, greater numbers of women were aware that the fetus or baby grows in the uterus and were less likely to answer "don't know" or give the incorrect scientific response of "stomach" (see Table 16). A chi-square analysis on the groups of never pregnant women, early pregnancy and late pregnancy women responding that the fetus or baby grows "in the uterus" vs "some other answer" showed a significant effect, x^2=(2,N=60)=8.02,p<.02. In every group, more college educated women than high school educated women gave the answer "uterus". In the never pregnant group, when the answer "womb" was given, there was no mention that this can also be referred to as the "uterus". In fact, four of these women, when probed further, said

they didn't know what the "uterus" was (three subjects) or said that the womb was the lining of the uterus (one subject). The two pregnant women who gave the answer "womb", on the other hand, also said that the "womb is the uterus". Thus, it was found that there is a progression through the groups of women in the use of scientific terminology in which the scientifically correct response is: "in the uterus" or more specifically "in amniotic fluid in the amniotic sac in the uterus" (20% of educators) and a decrease in everyday, non-scientific responses such as "in the womb" or "in the stomach".

To summarize, in groups of women with higher levels of pregnancy and childbirth education, there is greater consensus on the use of scientific information and terminology. This was demonstrated in the attribute listing task, and further supported by the above interview questions.

List of Beliefs

Women responded "agree", "disagree", or "no opinion" to statements on the belief list and these were scored to give one measure of everyday knowledge.

As can be seen in Table 17, in groups with higher levels of pregnancy and childbirth education, there are decreasing numbers of women who agree with the beliefs or who have no opinion about the beliefs. There were also differences between high school and college educated women, with more high school educated women agreeing with the beliefs than college educated women in every group, with the exception of late pregnancy women. It was found that everyday knowledge is characterized most strongly in never pregnant high school educated women.

Out of these 18 beliefs, which were scored as everyday knowledge, five of the beliefs were endorsed by some childbirth educators. These five beliefs are: 1) Pregnant women shouldn't get a hair permanent during pregnancy because it won't take. (40% agree, 10% no opinion) 2) You can tell whether a pregnant woman is expecting a boy or a girl by the way she carries. (10% agree, 20% no opinion) 3) You can tell whether a pregnant woman is expecting a boy or a girl by how fast the baby's heartbeat is. (10% agree, 20% no opinion) 4) A pregnant woman craves the foods her body needs. (70% agree, 20% no opinion) 5) "Dry labor" is more painful than normal labor. (10% agree, 10% no opinion).

Word List

As shown in Table 18, in groups with higher levels of pregnancy and childbirth education, there was an increase in the percentage of women having at least partial knowledge of the meanings of the eleven scientific terms, and a decrease in the percentages of women saying that they don't know what the terms mean. Chi-square analyses revealed highly significant patterns for the following terms: episiotomy, $x^2(6,N=70)=29.62$, $p<.001$; amniocentesis, $x^2(6,N=70)=22.36$, $p<.01$; placenta, $x^2(6,N=70)=17.41$, $p<.01$; transition, $x^2(6,N=70)=52.88$, $p<.001$; internal fetal monitoring, $x^2(6,N=70)=36.37$, $p<.001$; and external monitoring, $x^2(6,N=70)=23.61$, $p<.001$. The women had been instructed to give short definitions ("what the term means to you"), rather than to state all that they knew about the terms, so only the information given could be scored. However, many of the answers given were unclear, vague or very brief and the interviewer probed these further.

It was apparent from the responses that for many of the scientific terms, many women only had partial

knowledge or understanding, but these were scored as "some knowledge" or "correct". In groups with higher levels of pregnancy and childbirth education, women mentioned more and different functions of each scientific term, and used more scientific terminology rather than everyday terms in the definitions. For example, for the term "placenta", 30% of both high school and college educated never pregnant women had some correct knowledge of what a placenta was, but for 20% of the high school educated women and 10% of the college educated women, this consisted solely of the knowledge that it was the "afterbirth" or "something that comes out after the birth of the baby". On the other hand, 100% of the educators focused on the nutritional function of the placenta (e.g., "organ that grows and attaches to the uterus and acts to help supply the baby with nutrients from the mother"). Overall, in groups with higher levels of pregnancy and childbirth education, there are greater numbers of women correctly defining the term placenta by its nutritional function.

For all never pregnant and pregnancy groups, but not the educators, there was some confusion with scientific terminology, e.g., women confusing placenta

with the amniotic sac (by defining the placenta as the "sac the baby is in"), or confusing the placenta with the umbilical cord, blood, or amniotic fluid.

"Episiotomy" was a scientific term which a large number of women said they had never head of and didn't know what it was (80% high school and 60% college educated never pregnant women, and 60% high school and 20%, college educated early pregnancy women), but when probed in everyday terms if they had heard that "a woman gets cut during the birth", a large number reported that they had heard something about this (50% high school and 30% college educated never pregnant women, and 30% high school and 20% college educated early pregnancy women). Any knowledge was generally discussed in everyday non-scientific terms, e.g., "heard they cut the skin where the baby comes out" or "probably cut the women in the vagina or stomach so the baby can come out" or "just heard they cut down there". This is in contrast with 90% high school and 100% college educated late pregnancy women and 100% of educators who had more extensive knowledge of this procedure, most of whom also described it in scientific terms (e.g., "small to moderately small to large incision made in the perineum to widen the outlet").

Discussion

This descriptive study attempted to characterize adult concepts of pregnancy and childbirth among women with different levels of pregnancy schooling and experience. However, it must be stressed here that this study was completed using interviews in which an interviewer asked questions, as opposed to informal private conversations between the women and their mothers, or friends, or even doctors. Thus, the women may have had different responses to the questions depending on the context they were in.

. The results support the hypothesis that there is a system within which are everyday concepts and a system of concepts within which are embedded scientific concepts. All the results from the various methods converged to get results that indicate that the system is different when an individual has only everyday concepts of pregnancy and birth, or when an individual also has scientific concepts of pregnancy and birth, that is, the scientific medical system of knowledge. Not only was there a content difference, that is, the amount

and types of knowledge were different, but the structure of the system was also different. The everyday concepts were best characterized by never pregnant women, especially never pregnant high school educated women, and the scientific concepts were best characterized by the educators. Among pregnant women, the scientific concepts were best characterized by late pregnancy college educated women.

The results confirm that everyday concepts have several distinctive characteristics. There is the use of nontechnical (non-scientific) terms. They are concrete or context based, that is, information is directly observed or personally experienced or consists of popular beliefs or popularly shared general information (that is, "commonsense" or "common knowledge"). Information is not learned through formal instruction, but through social networks, personal observation, experience or just personal opinion. There is an absence of information on many topics - therefore, the frequent use of "don't know", "no idea", or other general responses. Structurally, they differ from scientific concepts in that they consist of simple

and concrete independent units of information, with no discussion or understanding of underlying links, mechanisms of action or principles. Thus, as was especially revealed by the attributes listed in the attribute listing task, there was a focus on the appearance of a pregnant woman and descriptions of what a pregnant woman feels and experiences (e.g., "gain weight", "get fat", "pain"). This supports Murphy and Medin's view (1985) that novices (here called pregnancy unschooled women, which is best characterized by never pregnant women) focus on "surface features", rather than on underlying connections and principles, which is what experts focus on (in this study, these were pregnancy schooled women, best characterized by educators and late pregnancy women).

The following are four excerpts of everyday knowledge from verbatim transcripts of the attribute listing task. The first two examples are from never pregnant college educated women for the concept of pregnancy, while the last two examples are from never pregnant high school educated women for the concept of childbirth. Each example lists the

attributes immediately given after the interviewer gave task directions.

(1) "Gain weight. Probably feel different. Feel fat. Eating different foods, like milk. Probably get more tired. Get emotional. Maybe get edgier. Get happier. ...mmm...Can't think."

(2) "Nine months long. Maternity clothes. A woman waddling along. Babies. This is a hard question... I guess when you see someone who's pregnant or you think about it, you wonder how maybe far along the baby is-how far along in pregnancy it is. Picking out furniture. Picking out a color for the nursery."

(3) "I think of childbirth classes. I'm just the opposite of my sister. I want to be knocked out cold and dead and wake me up when it's all over. I don't want to go through unnecessary pain and screaming and embarrassment, because that's what I think it is." ..."I've been told that there's a lot of pain involved, but when it's over, it's worth it so it's no big deal. I guess that's about it."

(4) "...mmm...Features...uh... Well, she's experiencing labor pains...mmm...great pain... If she's having it natural, I think it happens quicker. I'm not sure, but I think it does. ...mmm...You know, it comes out"..."Well, emotional-she's probably ecstatic. And...mmm ...I don't know."

The results confirm that in a system of pregnancy and childbirth scientific concepts, the concepts are more abstract, and they are part of a series of interrelationships with other concepts (including everyday concepts) in a system. The concepts are not directly observed or experienced. There is the use of scientific or medical

terminology and the use of scientific or medical facts. Structurally, they differ from everyday concepts in that there is a discussion of causal relations (e.g., between "x" and the fetus) and an understanding of mechanisms of action (e.g., knowing how and why something occurs). Finally, the sources of information are from formal instruction, such as books, pregnancy and childbirth classes, seminars, and doctors.

The results of the attribute listing task, interview questions, and scientific word list showed evidence for the existence of a scientific system of knowledge. In the attribute listing task, the scientific system of knowledge was revealed not only in the kinds of attributes the women listed, but also how they spontaneously organized these attributes in their responses. It was found that in groups with higher levels of pregnancy and childbirth education, greater numbers of women spontaneously organized attributes for the concepts of pregnancy and birth. But interestingly, only the college educated pregnant women organized them in a scientific-chronological manner (e.g., by stages of birth) or by domains, while high school educated

pregnant women showed only chronological organization of the attributes. The following three excerpts from verbatim transcripts from educators illustrate this for the concepts of pregnancy (examples 1 and 2) and childbirth (example 3). Each example lists the attributes immediately given after the interviewer gave task directions.

(1) "Basically, pregnancy is a normal, healthy, life occurrence that involves basically forty weeks. Or more commonly, nine months. We divided it into three trimesters-each of which trimester has typical anatomical, or physiological and emotional stages. In the first trimester, which consists of the early pregnancy stage-most of which is spent unaware of the pregnancy for many women, but not all women. Most of the growth and development of the fetus is done in the first trimester, again I think, basically unaware on the mother's part."

(2) "I see it as nine months, but automatically my mind would break it down into the three trimesters. I could go on for hours... Well, I would just say for the first trimester-it's from conception on. Morning sickness, nausea, bloated. Frequency to the bathroom. Swelling of the breasts. Initial visits to the doctors."

(3) "Labor and delivery. I think of the three stages of labor. And the process of labor and delivery. And the first stage which is the opening of the passageway to the baby-basically dilation and effacement. The second stage is the delivery of the baby-the actual expulsion. And the third stage which is the delivery of the placenta or afterbirth."

The presence of the scientific system of knowledge was also revealed by the number of

responses judged scientific (versus everyday) for the eight pregnancy interview questions. In groups with higher levels of pregnancy and childbirth education, there were greater numbers of responses judged to be scientific, but scientific responses predominated only among late pregnancy college educated women and educators. The interview question: "Have you ever heard of the term three trimesters of pregnancy?" was informative in that it revealed that many women, especially never pregnant high school educated women, had never heard of the term or did not know what it meant. On the other hand, the scientific term was known and correctly defined by most pregnant women and even served as an organizer for some women for the concept of pregnancy in the attribute listing task. Again, the results from the scientific word list show that women with the greatest levels of childbirth education have the most knowledge of the eleven scientific terms and in fact, frequently gave different functions of the terms in their definitions than women with less scientific pregnancy and birth education.

Overall, in women with a system of pregnancy and childbirth scientific concepts, there was knowledge of scientific information about pregnancy and birth, scientific terminology, and the interrelationships between biological aspects (including anatomy, physiological processes and fetal development), prenatal care (which includes knowledge of pregnancy behaviors and causal relationships), and medical management of pregnancy and birth. These women focused on underlying connections and principles (e.g., in the attribute listing task, listing attributes for pregnancy according to a scientific-chronological organization of three trimesters or by domains), rather than on just surface or superficial features (e.g., listing attributes for pregnancy randomly in the attribute listing task, that is, attributes that were experientially based on general cultural knowledge, such as "gets fat", "gains weight", "gets moody"). Similarly, for the interview questions, responses judged to be scientific were those in which women discussed the underlying reasons for doing or not doing something. For example, responding that one should not engage in a behavior such as drinking

alcohol or taking medications because it reaches the fetus via the placenta and umbilical cord and so affects the fetus (a scientific response) rather than saying "Don't drink" or "Drinking alcohol is OK.", but not knowing or being able to give any reasons for this other than "don't know why", "my opinion" or "I've personally observed this." (an everyday response).

Of course, it must be repeated here that the current scientific medical model of pregnancy and childbirth knowledge is a system of organized knowledge that grew out of medical practices in our culture. Thus, this system of knowledge can and will undergo change with advances in research, and cultural and social changes.

The educators with scientific concepts were "experts" in the sense Murphy and Wright (1984) and Susan Carey (1988) had used the term, while the never pregnant women with everyday concepts were "novices", and the other two groups were intermediate, with the late pregnancy group being more expert than the early pregnancy group. In Carey's discussion of conceptual change and restructuring of scientific knowledge, she had said

that acquisition of scientific knowledge in a domain in an individual occurs along two dimensions - structure and content. Similarly, this study of pregnancy and birth concepts has found both structure and content differences among the groups of women. For with pregnancy and childbirth schooling, not only was there acquisition of knowledge and thus content changes, but there was restructuring of existing knowledge and thus structural changes of pregnancy and birth concepts.

It was hypothesized that there is a developmental change from a system of popular or commonsense knowledge of pregnancy and childbirth (everyday concepts) to a system of scientific knowledge (scientific concepts) in women exposed to pregnancy and childbirth schooling or instruction. This was supported by the findings that with higher levels of pregnancy and childbirth schooling and experience, there is an increase in scientific knowledge, with the least scientific knowledge in never pregnant women, then slightly more in early pregnancy women, and even more in late pregnancy women. The most scientific knowledge was revealed by educators.

When looking at the results, it must be stressed that while in this study the groups of never pregnant, early pregnancy, late pregnancy women and educators were looked at and compared, the educators differed from the other groups on more than the one dimension of amount of pregnancy and childbirth schooling. Educators not only had taken pregnancy and childbirth courses, attended professional seminars and meetings, read professional literature, but also had several years experience of teaching other women about pregnancy and childbirth, and all had at least one child.

As expected, the results showed that in groups with greater levels of pregnancy and childbirth education, there is an increasing consensus on scientific terminology and use of scientific information. But with this scientific knowledge also came an increasing knowledge of the controversies about various aspects of pregnancy and childbirth (especially the pros and cons of various medical interventions and technology). However, it must be pointed out that only among the educators was there comprehensive knowledge. Interestingly, among the educators, this scientific knowledge and

awareness of the controversies also led to some of them having more radical views regarding the routine use of medical interventions during pregnancy and birth (such as rejection of these routine interventions) and even resulted in forty percent of the educators having home births, which is a radical departure from the current norm of hospital births.

Language or terminology differences between the groups of women were also unexpectedly revealing throughout the interviews about scientific and everyday knowledge. Many of the scientific terms and their definitions (thus, areas of knowledge) were only known to late pregnancy women and educators (who were pregnancy and birth schooled) as revealed by the interview questions and the word list, such as the "three trimesters of pregnancy", "amniotic sac", "Fetal Alcohol Syndrome", "internal fetal monitoring" and "transition". Other topics could be described two ways - using everyday or scientific terms, each with its own meanings and body of knowledge. Some examples of everyday terms used by pregnancy unschooled women as contrasted with scientific terms used by pregnancy schooled women were: Mongoloid - Down's syndrome, womb -

uterus, pains - contractions, baby - fetus or embryo, operating room - labor and/or delivery room, afterbirth - placenta, cord - umbilical cord, opening where the child comes out - birth canal, a test - amniocentesis, a picture - sonogram, cut the woman - episiotomy, they say or they claim - research shows or the studies show, dry labor - labor in which premature rupture of the membranes has occurred. As was discussed in the results, for many of these terms, e.g., "episiotomy", women using the everyday term did not know the scientific term or any further details other than "a woman gets cut down there", while women using the scientific term episiotomy generally knew the purpose for the procedure, when and how it's done, and the area where it's done (the perineum). On the other hand, for a few of the terms, e.g., "Down's syndrome", the women may be aware of the scientific term, but prefer to use the everyday term. As could be seen from the examples, the everyday terms are based on the experiential and concrete (e.g., "a picture", "the cord", "afterbirth").

It appears that Lev Vygotsky's two types of concepts: everyday or spontaneous concepts and

scientific or nonspontaneous concepts provides a preliminary framework within which to study pregnancy and childbirth concepts and to provide a mechanism for conceptual change. Vygotsky stressed the interrelationship and interdependence between the scientific and everyday concepts. The person can only absorb the scientific concept when the development of the related everyday concept has reached a certain level. But on the other hand, mastering a scientific concept raises the level of related spontaneous concepts. They both affect and transform one another, for with exposure to instruction and scientific concepts, the everyday concepts are transformed upward, while the abstract scientific concepts are transformed downward to include a concrete component. The scientific concepts provide a system for the everyday concepts.

As was discussed earlier, Vygotsky discussed the development of scientific and everyday concepts in children,but this can also be extended and applied to adults who are acquiring scientific knowledge in a domain, thus undergoing a shift from everyday concepts to a system of scientific concepts or knowledge. It was hypothesized that unlike

Vygotsky's statement that there is an absence of a system in everyday concepts in children, there would be a system of everyday pregnancy and birth concepts in adults even though it would be different from a system of scientific concepts - both in content and structure. The results support the hypothesis that the everyday system would be one in which there are clusters of everyday concepts which focus on surface features, while the other system of concepts is one within which are embedded related scientific concepts. The results supported the expectation that all women would therefore express some everyday knowledge, whether pregnancy schooled or unschooled.

It also became clear from the results, e.g., number of attributes listed and answers to interview questions, that all knowledge, both scientific and everyday, increases with greater levels of pregnancy and childbirth schooling and experience. This is because not only do women experience pregnancy, but they also meet and talk with other pregnant women and new mothers, read pregnancy and childbirth literature, receive prenatal care, and attend pregnancy and childbirth classes.

The presence of everyday knowledge in all women was especially salient in the results of the belief list, the attribute listing task, and some of the interview questions, including the one concerning the existence of food cravings among pregnant women. As mentioned before, everyday knowledge (e.g., as measured by the support of beliefs) was characterized most strongly by the never pregnant high school educated women. In all the groups of women, including the educators, there was support for the existence of food cravings during pregnancy and for at least some of the beliefs. For educators, this everyday knowledge occurred for topics about which there isn't currently a comprehensive body of scientific literature and which could, within the current existing system of scientific knowledge, turn out to be scientifically correct if it were to be studied.

Scientific concepts providing a system for the everyday concepts was clearly seen in the consensual attribute lists and responses to the eight pregnancy topic interview questions. For example, women answered the interview questions with responses that were judged to be predominantly scientific or

everyday, for only a minority of responses were exclusively one or the other. While some women (typically never pregnant women) answered questions that were completely everyday in nature (according to a checklist), questions were typically answered by the woman voicing her opinion on that topic, followed by reasons for her opinion, which might incorporate her own personal experience, observations and currently accepted medical knowledge. For women whose responses were judged to be scientific, the everyday components were integrated within the scientific framework. On the other hand, responses coded as everyday may have scientific elements, such as using a scientific term or a scientific fact, but these are typically not integrated into a cohesive framework, but are isolated units. Also, in the attribute listing task, even in women who were coded as having organized the attributes within a scientific chronological system, there were descriptive attributes listed that women with only everyday attributes also listed, e.g., "weight gain" and "morning sickness". However, as expected, according to a Vygotskian framework, these attributes were

organized within a system of scientific concepts (e.g., the framework of "first trimester of pregnancy") rather than randomly listed.

All the results also support the hypothesis that in all groups, in all tasks, college educated women have more scientific knowledge than high school educated women. Since the average age of the two groups was so similar across groups, and both groups had equal exposure to formal pregnancy and childbirth schooling (that is, whether or not they had attended pregnancy and childbirth classes), one interpretation is that it is perhaps due to socioeconomic and educational differences in orientation towards literacy and schooling, as has been suggested by Heath (1983) and others. This view was further supported in the current study by looking at what the women said were their sources of information for the eight pregnancy interview topics. In all the groups of women, more college educated women cited reading sources (e.g., books, brochures, magazines, journals) than high school educated women. In fact, for all groups except never pregnant women, more college educated women cited reading sources than any other source.

There is another interpretation of the finding that in all tasks, college educated women have more scientific knowledge than high school educated women. It is as if high school educated women are more resistant to the scientific medical model with its terminology, perhaps due to their greater reliance on social networks for information rather than on reading materials or medical authority with its reliance on the medical model for information. Also, as was suggested by the larger numbers of attributes listed by never pregnant high school educated women than never pregnant college educated women, it suggests that the high school educated group may be more focused on or interested in pregnancy and childbirth than the never pregnant college educated women (who perhaps are preoccupied with college) in their early twenties. Thus, when they actually do become pregnant, high school educated women may be starting their pregnancies with more pregnancy and birth information than the college educated women, but it's everyday knowledge rather than the scientific knowledge of the medical model of pregnancy and birth. The college educated women, on the other hand, with less pregnancy and

birth knowledge, may seek out and be more receptive to the scientific, medical model with its terminology, that is presented in literature, by medical authorities, and in childbirth classes.

With regard to everyday knowledge, it appears from the results that an everyday body of knowledge has evolved in our culture, complete with its own terminology, and which is held by many women, especially the pregnancy unschooled. However, this everyday knowledge has been neglected in the scientific literature with a few exceptions, which are mainly the few studies that looked at the existence of pregnancy beliefs. One notable exception, St. Clair and Anderson's study (1989) of low-income, inner city women, supports the finding of the existence of beliefs and a body of knowledge, which consists of information that is both supported and not supported by current medical knowledge about pregnancy and birth, and that is transmitted through social networks. They also discussed that many women received prenatal care advice from others that was supported by current medical knowledge (e.g., eat a balanced diet, avoid or cut down alcohol or drug consumption), but the rationale for this advice

was often not understood or misunderstood (e.g., walking and other exercises were advocated for pregnant women - one of the reasons being to "prevent the afterbirth or baby from sticking to the uterine wall). Similarly, in the current study, in many women with answers coded as everyday to interview questions, answers were given that were in agreement with current medical scientific knowledge, but the reason for this was unknown or misunderstood. For example, "I've heard that you shouldn't drink alcohol when you're pregnant, but I don't know why."

In general, looking at the results of the interview questions, the content of both everyday and scientific knowledge about pregnancy and birth prenatal care was consistent with current scientific knowledge. Most women reported that during pregnancy: nutrition is important, extra calories need to be consumed, women need to gain weight, drink coffee or tea in moderation (meaning 1-2 cups a day or less), don't smoke cigarettes, avoid smoking marijuana, only take nonprescription medications if the doctor approves it, and some exercise is good. The two main areas where the

views of the majority of women except for the educators differed from current medical advice was in alcohol intake (current medical advice is to avoid all alcohol during pregnancy) and salt intake (current medical advice is that a moderate salt intake is necessary during pregnancy).

Reported behaviors of women was generally consistent with their opinions for all topics. Interestingly, some women reported being slightly more conservative in their behaviors than in their opinions (e.g., more women reported that it's OK for a pregnant woman to drink coffee than actually reported drinking regular coffee during pregnancy), while a very few women reported in engaging in behaviors that they did not think a pregnant woman should do (e.g., cigarette smoking).

Vygotsky has discussed how scientific concepts are presented as part of a larger, culturally formulated, hierarchical system. Thus, one would expect changes in scientific knowledge over time. Similarly, over the past century in the United States, there have been many changes in the scientific medical model of pregnancy and childbirth of what is best and proper to do during pregnancy

and childbirth (Rothman, 1982; Martin, 1987; Wertz & Wertz, 1977). Some examples are: midwife attended social births at home early in the century to doctor attended births in hospitals; what drugs physicians use during labor and delivery (ether, chloroform, scopalamine and general anesthesia used to be popular, but now other drugs are considered safe to use); separation of mother and infant immediately after birth (nowadays a short period of togetherness for the mother and baby is allowed to ensure "bonding"); salt intake during pregnancy (salt intake was earlier restricted because it was thought to lead to toxemia, but now it is believed that a moderate intake, is necessary during pregnancy); weight gain during pregnancy (after World War I and until the 1960s and the early 1970s, doctors encouraged women to restrict their pregnancy weight gain to no more than 15 to 20 pounds, but now the medical profession encourages weight gains of 24 to 35 pounds); whether or not medications get to the fetus and affect it (earlier, it was thought that the placenta acts as a "placental barrier", while now the scientific view is that almost all medications cross the placenta and travel to the

fetus); and a change from breast-feeding early in the century to bottlefeeding to the current encouragement of breastfeeding by the medical profession as being "better" for the baby. It is therefore to be expected that there will be changes in what is now currently accepted as the scientific medical model of pregnancy and childbirth with advances in scientific and medical research and various cultural and social changes.

Some of the interview questions (e.g., regarding salt intake during pregnancy, weight gain during pregnancy) in this study appeared to elicit opinions from some of the women, especially never pregnant women, that would have been viewed as scientifically correct several decades ago, but not currently. These were women that had reported their sources of information for these topics as being their social network (especially their mothers who had received this advice several decades ago) or "common knowledge" or "commonsense". It appears that there is a time lag in the culture at large in the transmission of some aspects of currently correct scientific information of pregnancy and

childbirth and it is manifested by women who have not received current pregnancy schooling.

Others, in disciplines such as anthropology and sociology, have brought up the issue of pregnancy and birth and the language used in describing them, and have discussed this topic in different ways. They offer us a context, that is, a broader framework, in which to interpret findings such as those found in the current study.

Emily Martin, in her book The Woman in the Body (1987), discusses her interest in the issue of how language structures experience. Consequently, use of scientific medical terms for pregnancy and birth shapes how women themselves perceive these experiences. For example, she states that: "If uterine contractions are involuntary, then of course women talk about them as if they are distinct and separate from the self, and of course women describe labor as something that one goes through rather than something that one does." (page 10). She stresses that current medical "facts" are not "brute, final, unquestionable facts but rather cultural organizations of experience." (page 10). In her discussion of how metaphors organize experience and

practices, she points out that current Western scientific, medical opinion with its reliance on scientific technology regards the body as a machine and that it describes birth as mechanical work done by the uterus (in which the uterus is also a machine). Specifically, she writes that "...medically, birth is seen as the control of laborers (women) and their machines (their uteruses) by managers (doctors), often using other machines to help." She also writes about how difficult it is for women to resist current medical, scientific language along with modern technology and medical treatment of pregnancy and birth, and discusses the need for alternative (that is, not the medical model) metaphors or symbols of birth. For example, "positive birthing" in which birth is viewed as a positive life-giving experience or "birth as a journey", in which pregnancy and birth are viewed as journeys inward and thus opportunities for psychological growth.

Barbara Kath Rothman (1982, 1989) has also written on how some of the "facts" of pregnancy and childbirth are really the result of medical practices and management of pregnancy and birth and

so are not really "facts" at all. She also suggests that pregnancy and birth be discussed in other than medical terms so that we would perceive the experience of pregnancy and birth in new ways. Rothman states that the scientific model sees pregnancy as a disease or stress situation in which there is a "diagnosis" and the physical changes are called "symptoms" (which are then treated). The fetus is seen as a patient, in fact, a parasite in the mother's body, while the mother's body is seen as a machine. Childbirth is seen as a surgical event or operation, in which the doctor delivers the baby rather than the woman. Consequently, "natural childbirth" has been defined to include all sorts of medications, forceps, induced labor, episiotomy - in fact, everything except a Cesarean. Rothman offers the midwifery model as an alternative way to view pregnancy and birth. This model views pregnancy as healthy and a normal condition for women. A consequence would be that the language (either the terms or their definitions) used to describe reproduction would be different.

In conclusion, it appears that using the framework of everyday and scientific concepts is a

good starting point for exploration of the concepts of pregnancy, birth and other reproductive concepts in women in our culture.

Implications

There are several implications from the results of this study.

First, it was clear from the results that both the woman's social network and public service messages were important sources of pregnancy and birth information to pregnancy unschooled women. Public service messages, which were shown on television commercials, radio commercials, billboards and on cigarette packages were frequently cited as a source of information for various topics (e.g., alcohol, drugs, cigarette smoking). Because these messages frequently did not say more than "don't drink or smoke when pregnant", pregnancy and birth unschooled women frequently did not understand the rationale to avoid or do certain things. However, the message was remembered. Since most women start out their first pregnancies without attending pregnancy or childbirth classes, reading extensively, or even receiving adequate prenatal care, it is important that there is some way to present the messages of various aspects of scientifically accepted good prenatal care to these women.

Also, since it is clear from the results that with pregnancy and childbirth schooling there is an increase in scientific knowledge in this domain, then attendance at childbirth education classes should be started much earlier, perhaps as soon as a woman starts prenatal care. For it is not in the last trimester that a woman first needs to learn about the importance of nutrition and other aspects of prenatal care or even what her choices are regarding birth settings and medical technology, but in the very beginning, ideally even before conception.

This study also pointed out the language and stylistic differences among those pregnancy and birth unschooled and schooled. An implication from this is that for public service messages or other advice given to pregnancy unschooled women to be most effective, they should not be couched in scientific or medical terms, but in everyday terms to get their attention and to make the message comprehensible.

Also, research needs to be done in areas not currently examined in the scientific literature, e.g., food cravings, taste changes, mood changes, and examination of various (everyday) beliefs, for these

are topics about which there is cultural everyday knowledge, but no real scientific discussion or knowledge.

TABLES

Table 1

Mean Number of Attributes Listed by Each Woman in the Four Groups for Each Concept

	Concepts		
Groups of Women	Pregnancy	Childbirth	Conception
Never pregnant:			
High school educated	14.1	11.0	3.7
College educated	10.0	7.9	4.0
Combined	12.1	9.5	3.9
Early pregnancy:			
High school educated	13.8	8.5	4.1
College educated	21.8	18.1	7.8
Combined	17.8	13.3	6.0
Late pregnancy:			
High school educated	16.8	14.4	7.5
College educated	21.7	18.2	7.2
Combined	19.3	16.3	7.4
Educators	47.8	38.6	10.5

Note: The mean number of attributes listed is taken from the total number of attributes given by each woman, regardless of whether or not other women in the same group also gave those attributes.

Table 2

Number of Consensual Attributes for Each Group of Women for Three Concepts, as a Function of Pregnancy and Childbirth Schooling

Groups of women	Concepts		
	Pregnancy	Childbirth	Conception
Never pregnant:			
1) High school educated	15	11	4
2) College educated	6	9	6
3) Combined	12	9	6
Early pregnancy:			
4) High school educated	14	10	5
5) College educated	24	22	10
6) Combined	19	15	6
Late pregnancy:			
7) High school educated	20	18	10
8) College educated	31	24	9
9) Combined	24	19	9
10) Educators	46	50	11

Note: The mean number of consensual attributes is the number of attributes listed by 25% or more of women in each group for each concept. (At least 3 out of 10 women listed the attribute in groups 1,2,4,5,7,8,10). (At least 5 out of 20 women listed the attribute in groups 3,6,9).

Table 3

Percentage of Distinctive Attributes per Concept as a Function of Pregnancy and Childbirth Schooling

	Concepts		
Groups of women	Pregnancy	Childbirth	Conception
Never pregnant:			
High school educated	26.7	27.0	25.0
College educated	0.0	0.0	0.0
Early pregnancy:			
High school educated	7.1	0.0	20.0
College educated	12.5	4.8	10.0
Late pregnancy:			
High school educated	9.5	16.7	40.0
College educated	25.8	13.6	11.1
Educators	26.1	56.0	9.1

Note: The distinctive attributes for each concept in each group are those consensual attributes not given by women in other groups. Consensual attributes are those attributes listed by 25% or more of women in each group for each concept.

Table 4

Number of Scientific Attributes Listed by the Four Groups of Women for Each Concept

Groups of women	Concepts		
	Pregnancy	Childbirth	Conception
Never pregnant:			
1) High school educated	0	3	2
2) College educated	0	1	2
3) Combined	0	2	2
Early pregnancy:			
4) High school educated	1	1	1
5) College educated	3	10	3
6) Combined	2	4	2
Late pregnancy:			
7) High school educated	1	3	4
8) College educated	5	8	3
9) Combined	3	8	2
10) Educators	10	32	4

Note: The mean number of scientific attributes is taken from the consensual attribute lists, which are attributes listed by 25% or more of women in each group for each concept.

Scientific attributes are those attributes not directly observed or experienced by women and/or attributes in which scientific or medical terminology is used.

Table 5

Organization of Attributes for the Concepts of Pregnancy and Childbirth by Percentages of Women in the Different Groups

	Groups of women						
	Never pregnant		Early preg.		Late preg.		
Organization	H.S.	College	H.S.	College	H.S.	College	Educators
PREGNANCY							
Not organized	100	90	100	60	80	70	30
By domains	0	0	0	0	0	10	20
Chronological	0	10	0	20	20	0	0
Scientific-chronological (by trimesters)	0	0	0	20	0	20	50
CHILDBIRTH							
Not organized	70	60	70	60	30	30	10
By domains	0	0	0	0	0	10	0
Chronological	30	40	30	0	70	10	30
Scientific-chronological (by stages)	0	0	0	40	0	50	60

Table 6

Percentage of Women in the Different Groups Who Made "Don't Know" and Personal Statements When Listing Attributes for the Concepts of Pregnancy and Childbirth

Groups of women	CONCEPT OF PREGNANCY		CONCEPT OF CHILDBIRTH	
	Don't Know[a]	Personal[b]	Don't Know[a]	Personal[b]
Never pregnant:				
High school educated	50	0	40	0
College educated	50	0	40	10
Combined	50	0	40	5
Early pregnancy:				
High school educated	30	30	50	20
College educated	20	70	50	30
Combined	25	50	50	25
Late pregnancy:				
High school educated	10	80	20	60
College educated	0	50	10	50
Combined	5	65	15	55
Educators	0	10	0	10

Notes:
[a] Percentage of women who made a "don't know" statement.
[b] Percentage of women who made more than 2 statements about personal experiences.

Table 7

Number of Women Responding With Everyday and Scientific Responses for Eight Pregnancy Topics

Topics	Groups of women: Never pregnant H.S.	Never pregnant College	Early preg. H.S.	Early preg. College	Late preg. H.S.	Late preg. College	Educators
Salt intake							
Everyday	10	10	10	5	7	4	1
Scientific	0	0	0	5	3	6	9
Nutrition							
Everyday	10	10	7	5	5	5	0
Scientific	0	0	3	5	5	5	10
Coffee and tea							
Everyday	10	10	7	7	7	4	0
Scientific	0	0	3	3	3	6	10
Alcohol							
Everyday	9	6	8	4	5	2	0
Scientific	1	4	2	6	5	8	10
Cigarette smoking							
Everyday	9	8	7	5	4	3	0
Scientific	1	2	3	5	6	7	10
Smoking marijuana							
Everyday	10	10	9	8	8	8	1
Scientific	0	0	1	2	2	2	9
Nonprescription medications							
Everyday	9	10	9	9	9	3	1
Scientific	1	0	1	1	1	7	9
Exercise							
Everyday	10	10	9	10	8	6	3
Scientific	0	0	1	0	2	4	7
TOTALS:							
Everyday	77	74	66	53	53	35	6
Scientific	3	6	14	27	27	45	74

Table 8

Frequency of Sources Mentioned by Women for Eight Pregnancy Topics

Sources	Groups of women: Never pregnant H.S.	Never pregnant College	Early preg. H.S.	Early preg. College	Late preg. H.S.	Late preg. College	Educators
Reading	13	27	38	48	34	53	74
Medical authority	6	14	16	24	42	33	47
TV/Radio/Public service messages	13	24	5	9	16	4	3
Social network	39	28	37	29	20	17	2
Common knowledge; Commonsense	21	8	9	8	10	16	5
Personal opinion	30	31	22	18	15	13	5
Totals:	122	132	127	136	137	136	136

Table 9

Frequencies of Responses by Women to Questions About Alcohol Consumption During Pregnancy

	Groups of women						
	Never pregnant		Early preg.		Late preg.		
Questions	H.S.	College	H.S.	College	H.S.	College	Educators
I. No. of drinks that are OK?:							
Don't drink	4	5	4	4	2	1	10
Occasional Drink is OK	0	2	1	2	4	4	0
1-2/mo is OK	0	0	1	0	1	0	0
1-2/wk is OK	1	0	2	2	0	2	0
1-2/day is OK	4	0	2	0	2	1	0
OK 1st 2 months, then don't	0	1	0	0	0	0	0
OK in moderation	1	1	0	2	1	2	0
Alcohol is OK	0	1	0	0	0	0	0
II. Heard of Fetal Alcohol Syndrome?							
Yes	2	4	3	8	5	5	10
No	8	6	7	2	5	5	0
III. Correctly know what FAS is?	0	1	1	3	1	5	10
IV. Reported # of drinks consumed							
None			6	7	3	4	
Occasionally			0	1	3	1	
1 a month			2	0	0	0	
1 every other wk.			0	0	3	0	
1-2 every wk.			2	1	0	4	
3-4 every wk.			0	1	0	1	
1st trimester- several a day, Now one a week			0	0	1	0	

Table 9

Frequencies of Responses by Women to Questions About Alcohol Consumption During Pregnancy (cont.)

Questions	Groups of women: Never pregnant H.S.	Never pregnant College	Early preg. H.S.	Early preg. College	Late preg. H.S.	Late preg. College	Educators
V. Alcohol intake changed during pregnancy			10	10	10	10	
Changed before conception			3	4	0	2	
Changed since learning of pregnancy			7	6	10	8	

Table 10

Responses by Percent of Women to Questions About Coffee and Tea Consumption During Pregnancy

Questions	Groups of women: Never pregnant H.S.	Never pregnant College	Early preg. H.S.	Early preg. College	Late preg. H.S.	Late preg. College	Educators
I. How much coffee and tea is OK?:							
Don't know	10	0	0	0	0	0	0
None	30	20	30	10	10	20	50
1-2 cups a day in moderation	40	60	50	70	90	70	40
Less than 4 cups a day	10	10	10	0	0	10	10
All is OK	10	0	10	0	0	0	0
1 a week	0	10	0	0	0	0	0
Only decaffeinated	0	0	0	20	0	0	0
II. How many cups of coffee and tea do pregnant women report drinking?							
None			20	20	40	30	
Occasionally			10	0	0	0	
2-3 cups a week			0	10	10	20	
1-2 cups a day			50	50	40	20	
3-5 cups a day			10	0	0	0	
5-10 cups a day			10	0	10	0	
Only decaffeinated everyday			0	20	0	30	
III. Reported cutting back or quitting during pregnancy?			60	70	50	70	

Table 11

Responses by Percent of Women to Questions About Smoking Cigarettes During Pregnancy

Questions	Never pregnant H.S.	Never pregnant College	Early preg. H.S.	Early preg. College	Late preg. H.S.	Late preg. College	Educators
	Groups of women						
I. Should women smoke during pregnancy?							
Don't	90	90	90	100	70	100	100
Maybe it's OK	10	10	10	0	30	0	0
II. Reported # of cigarettes smoked							
Doesn't smoke			80	80	70	90	
Smokes up to 1/2 pk./day			20	10	10	10	
Smokes 1 pk./day			0	10	10	0	
Smokes 1-1/2 pk./day			0	0	10	0	

Table 12

Responses by Percent of Women to Questions About Smoking Marijuana During Pregnancy

Questions	Groups of women						
	Never pregnant		Early preg.		Late preg.		
	H.S.	College	H.S.	College	H.S.	College	Educators
Should women smoke marijuana during pregnancy?							
Don't know	30	10	0	0	0	0	0
Don't	70	90	100	90	90	90	100
Don't, but maybe it's OK	0	0	0	10	10	0	0
It's OK	0	0	0	0	0	10	0
Pregnant women reporting smoking marijuana during pregnancy							
None			100	90	90	90	
Occasionally			0	10	10	10	

Table 13

Responses to Questions About Nonprescription Drug Use During Pregnancy by Percentage of Women in Different Groups

	Groups of women						
	Never pregnant		Early preg.		Late preg.		
Questions	H.S.	College	H.S.	College	H.S.	College	Educators
I. Is it OK to take nonprescription medications?							
No	30	20	20	20	20	30	80
Only if Dr. says it's OK	40	50	40	30	50	70	20
Only knows that Tylenol is OK (aspirin is not)	20	10	40	20	30	0	0
It's OK	10	10	0	30	0	0	0
Don't know	0	10	0	0	0	0	0
II. Women reporting taking nonprescription medications			90	60	90	40	
III. Women reporting taking prescription medications			40	50	30	50	

Table 14

Percent of Women Reporting That Pregnant Women Have Food Cravings

	Groups of women						
	Never pregnant		Early preg.		Late preg.		
Questions	H.S.	College	H.S.	College	H.S.	College	Educators
I. Do pregnant women have food cravings?							
Yes	90	80	80	80	70	90	100
No	10	0	10	20	30	10	0
Don't know	0	20	10	0	0	0	0
II. Percentage of women reporting food cravings			60	60	50	70	

Table 15

Percentage of Women in the Different Groups Expressing Knowledge of "Three Trimesters" of Pregnancy

	Groups of women						
	Never pregnant		Early preg.		Late preg.		
Questions	H.S.	College	H.S.	College	H.S.	College	Educators
I. Heard of term "three trimesters" of pregnancy?							
Yes	20	80	90	100	80	100	100
No	80	10	10	0	10	0	0
Don't know	0	10	0	0	10	0	0
II. Know what it means?							
No	80	40	20	10	10	0	0
Yes	20	60	80	90	90	100	100
Yes-but incomplete	20	50	70	30	50	40	0
Yes-correct	0	10	10	60	40	60	100

Table 16

Frequency and Types of Responses of Groups of Women to the Question of Where the Fetus Grows During Pregnancy

	Groups of women						
	Never pregnant		Early preg.		Late preg.		
Question	H.S.	College	H.S.	College	H.S.	College	Educators
I. Where does baby grow?							
Response:							
In uterus	3	8	7	10	8	10	10
In stomach	2	1	1	0	2	0	0
In womb	5	1	0	1	0	1	0
In sac	1	1	0	0	0	0	0
In placenta (in uterus)	0	0	1	1	0	1	0
Don't know	1 (A)	2 (B)	2 (A)	0 (B)	0	0 (B)	0

Notes: (A) One woman gave more than one response.
(B) Two women gave more than one response.

Table 17

Percentage of Women in the Different Groups Responding With Agree, Disagree or No Opinion to a List of Beliefs

Groups of women	Responses		
	Agree %	Disagree %	No opinion %
Never pregnant:			
(1) High school educated	22.2	65.6	12.2
(2) College educated	12.2	74.4	13.3
(3) Combined	17.2	70.0	12.8
Early pregnancy:			
(4) High school educated	13.3	71.7	15.0
(5) College educated	9.4	80.6	10.0
(6) Combined	11.4	76.1	12.5
Late pregnancy:			
(7) High school educated	8.9	81.1	10.0
(8) College educated	13.9	75.6	10.6
(9) Combined	11.4	78.3	10.3
(10) Educators	7.8	86.7	5.6

Table 18

Percentage of Women in the Different Groups Correctly Defining Eleven Scientific Terms

Groups of women	Responses		
	No Knowledge %	Scientifically Incorrect %	Some Knowledge %
Never pregnant:			
High school educated	40.9	10.9	48.2
College educated	34.6	11.8	53.6
Early pregnancy:			
High school educated	29.1	6.4	64.5
College educated	14.5	8.2	77.3
Late pregnancy:			
High school educated	10.9	9.1	80.0
College educated	.9	6.4	92.7
Educators	0.0	0.0	100.0

Note: The eleven scientific terms women were asked to define were: uterus, amniocentesis, placenta, umbilical cord, labor, transition, breech, episiotomy, external and internal fetal monitoring, and forceps.

APPENDIXES

Appendix A

Interview Schedule

Part I Background Questionnaire

Part II Attribute Listing Task

Part III Interview

- A) Preliminary presentation of interview in which are included sources of information
- B) Content of interview

Part IV Beliefs about Pregnancy and Childbirth

Part V Pregnancy and Childbirth Word List

Part I

QUESTIONNAIRE

Date of birth_____
Town presently residing in _____
Occupation_____
Highest educational level completed:
Grade school_____ 2 year college graduate _____
Some high school_____ 4 year college graduate _____
High school graduate____ Some graduate school _____
Trade school_____ Graduate school degree_____
Some college_____ Other (specify)_____
Have you ever had any biology classes? (If yes, specify) __
_____
Have you ever had any sex education classes? (If yes, specify)_____
Have you ever had any classes dealing with pregnancy and/or childbirth? (If yes, specify)_____
_____
If married, date you were married_____
If married, your husband's educational level_____
If married, your husband's occupation_____
How many brothers do you have?_____Sisters?_____
Your mother's educational level_____
Your mother's occupation_____
Your father's educational level_____
Your father's occupation_____

If you are now pregnant, please answer the following:
Expected date of birth_____
Job before pregnancy_____

Part II

Attribute Listing Task

Interviewer: "Describe and list the "typical features" or "typical things" about conception, pregnancy and childbirth. We will do each one separately. For each one, be as specific as possible and list as many "things or features" as possible. List biological or scientific things, mental and physical things, what occurs, and what a woman experiences and does."

Repeat instructions for each of the three concepts.

Part III

Sources of information

Interviewer says: "Here are some examples of where you might have received pregnancy and childbirth information."

Interviewer reads the list out loud:

Books
Pamphlets
Newspapers
Magazines
Television
Radio
Husband
Friends
Other pregnant women or new mothers
Sisters or brothers
Father
Mother
Grandmother
Grandfather
Mother-in-law
Father-in-law
Other relatives
Co-workers
Doctor
Nurse
Midwife
School
Teacher
Prepared childbirth class
"Just know" "Myself"
"Commonsense"

At end of list, interviewer asks: "Where did you get most of your pregnancy and childbirth information?

INTERVIEW

Ask pregnant women:

A) Did you experience or are you still experiencing any physical changes or problems during your pregnancy? For example: heartburn, backaches, swelling nausea and vomiting. (If yes) What are they?

B) Did you plan for this pregnancy?

C) How far along in your pregnancy were you when you realized you were pregnant? Have you seen a doctor or midwife yet? Since when?

Ask all women:

1) What do you think are (typical) mental and physical changes or symptoms that a woman experiences when she is pregnant?
What do you think causes these symptoms?
How does this occur?
How did you learn this?

2) Do you know anything about how a baby (that is, the fetus) grows inside the mother during pregnancy? What?
Where does it grow? What is its size?
What do you think a baby can do or does inside the mother?
What do you think it looks like?
How does it get its food and nourishment?
How did you learn all this?

3) Nowadays, doctors use a lot of medical technology and procedures during pregnancy and childbirth. What do you think about all this?
Can you describe what happens when a woman goes to a hospital when she has a baby?
What is the purpose of (insert procedures or technology mentioned)?
How did you learn this?

4) Some people use the term "the three trimesters of pregnancy".
Have you ever heard of this term?
(If yes) What does it mean to you?
(If yes) Are any special things going on during them with the mother, pregnancy or baby? What?
How did you learn this?

5) Sometimes infants are born very large or very small. What do you think causes this or why do you think this is so?
How or where did you learn this?
How big do you think an average baby is when it's born?

6) Sometimes babies are born with a birth defect. What do you think causes this? or Why do you think this is so?
How or where did you learn this?
How frequently do you think they occur?

7) Do you think that in any way, a woman can influence during pregnancy the outcome of the pregnancy? For example, in what she does or doesn't do whether the baby will be healthy or not, big or small, etc.
How?
Why?
Where did you learn this?

8) Do you think it is better to let nature take ts course and your own commonsense guide the pregnancy or to do a lot of research and to follow guidelines set by others of pregnancy do's and don't and how you should behave during pregnancy?
Why?
How did you learn this?

9) Do you think that pregnancy is something a woman has to specially prepare for and learn all about before she becomes pregnant or is once she actually becomes pregnant soon enough to learn the details about pregnancy and childbirth? Why?

10) Some people now attend pregnancy or childbirth classes such as Lamaze or Bradley classes during pregnancy. What do you think about such classes?
What do you think is their purpose?
How did you learn about them?

(For never pregnant women) Would you ever attend such classes?
Why or why not?
Where would you have a baby if you were pregnant? A hospital? The tradition way in a labor and delivery room? A birthing room? A childbirth center? At home? Somewhere else?

(For pregnant women) Will you attending or did you attend pregnancy or childbirth classes?
Why or why not?
(If yes) Where are they held? How frequently do they meet? How do you feel about, that is, what is your opinion of these classes?
Where are you planning to deliver the baby? Hospital? Labor and delivery room? Birthing room? Somewhere else?

11) Do you think pregnant women have food cravings?
(If yes) Why? What causes them?
How did you learn this?
(If pregnant) Did you or do you have any food cravings?
(If yes) What are they?

12) What do you think about a woman eating salt during pregnancy?
Why?
Where did you learn this?
Did anyone tell you differently?
(If pregnant) Do you use salt more, less or the same as before pregnancy?

13) Do you think nutrition, that is what a woman eats and drinks, is important during pregnancy?
Why? How?
How did you learn this? When did you learn this?
Did anyone tell you differently?

Do you think that there are any special foods a woman should eat during pregnancy or any foods that a woman should avoid during pregnancy?
What are they?
Why?
Where or how did you learn this?

Some people say that during pregnancy a mother has to "eat for two", but many other people disagree with this view. What do you think? Do you think a woman needs to have more calories?
Why?
Where or how did you learn this?

Some people think that it is important for a woman to keep her weight down during pregnancy, but other people disagree with this view. What do you think? Why? How much weight do you think a woman should gain during pregnancy? Why this amount? Where or how did you learn this? Did anyone tell you differently? (If yes) What did they say?

14) What do you think about a woman drinking coffee or tea during pregnancy? Why? Where did you learn this? (If pregnant) How much coffee and tea do you drink? (daily, weekly etc.) Has this changed since you became pregnant? Why? Do you now drink sodas? (colas, diet, etc.)

15) What do you think about a woman drinking beer or wine during pregnancy? How about other alcohol? Why? (What? How does this occur?) How did you learn this? When did you learn this? Has anyone told you differently? If yes, what did they say?

(If pregnant) How much do you drink? (daily, weekly, etc.) Has this changed since you became pregnant? Why? How? Have you ever heard of Fetal Alcohol Syndrome? (If yes) What?

16) What do you think about a woman smoking cigarettes during pregnancy? Why? (What? How does this occur?) Where or how did you learn this? When did you learn this? Has anyone told you differently? If yes, what did they say?

(If pregnant) Do you smoke cigarettes? How many a day? Has this changed since you became pregnant? How? Why? What?

17) Repeat last question, but ask about marijuana.

18) Do you think that a mother's emotions or stress can have or has an effect on the pregnancy or the baby? For example, if the mother is frightened or angry or nervous or relaxed. (If yes) What effects? Why? (What? How does this occur?) How did you learn this? Has anyone told you differently? (If yes) Who? What?

19) What do you think about a woman taking non-prescription medications during pregnancy? For example: aspirin, Tylenol, antacids for heartburn, laxatives for constipation. Why? (What? How does this occur?) Where or how did you learn this? Has anyone told you differently? (If yes) Who? What?

(If pregnant) Have you taken any non-prescription medications during the pregnancy? (If yes) What were they? Why? How frequently? Did they help? Has this changed since you learned you were pregnant? (If yes) How? Why?

20) What do you think about a woman taking medications during pregnancy if the doctor prescribes them? Why or why not?

(If pregnant) What medications have been prescribed for you since you became pregnant? What are they for?

21) What do you think about exercise during pregnancy? Why? (What? How does this occur?) Where or how did you learn this? Has anyone told you differently? (If yes) Who? What?

(If pregnant) Do you exercise now? Has this changed since you became pregnant? (If yes) How? Why?

Part IV

Beliefs About Pregnancy and Childbirth

Interviewer: "Many people give advice or information to pregnant women. For each of the following, I want to know if you've ever heard of this advice, and whether you agree, disagree, or have no opinion about it. That is, I want to know if you think this advice is true or not."

For each belief ask: "Have you ever heard this advice?" (If yes) "Do you agree, disagree, or have no opinion about it?"

1) If a pregnant woman lifts her arms above her head, it may cause the cord to wind around the baby's neck.
2) If a pregnant woman has heartburn, the baby will have a lot of hair.
3) You shouldn't fill cavities during pregnancy because the fillings will fall out.
4) Pregnant women shouldn't get a hair permanent during pregnancy because it won't "take".
5) You can tell whether a pregnant woman is expecting a boy or a girl by the way she carries.
6) A woman loses a tooth with each pregnancy.
7) If a pregnant woman sees violence, accidents or ugly animals, she could have a deformed baby.
8) You can tell whether a pregnant woman is expecting a boy or a girl by how fast the baby's heartbeat is.
9) A pregnant woman craves the foods her body needs.
10) "Dry" labor is more painful than normal labor.
11) If a pregnant woman has "ugly" or "unkind" thoughts, her baby may develop the same kinds of thoughts.
12) If a pregnant woman touches or strikes her body in surprise or fright, it could result in the baby having a birthmark at that spot.
13) If the pregnant woman has a lot of good thoughts and looks at lovely objects, the infant may turn out to be beautiful.
14) If a pregnant woman doesn't eat a food that she craves, her baby might get a birthmark or be harmed.
15) You can tell whether a pregnant woman is expecting a boy or a girl by dangling a metal object over her stomach and watching the movements it makes.
16) If you start out the pregnancy being overweight, then you should gain very little weight during the pregnancy.
17) A pregnant woman should eat little so that the baby will stay small and so she'll have an easy delivery.
18) It doesn't matter what a woman eats during pregnancy as long as she takes vitamins.

Part V

Pregnancy and Childbirth Word List

Interviewer: "Sometimes people use the following terms to describe certain things about pregnancy and childbirth. For each of these terms, I want to know if you've ever heard of it and what the term means to you."

For each term ask: "Have you ever heard of ____?"
(If yes) "What do you know about____?"

uterus
amniocentesis
placenta
umbilical cord
labor
breech
episiotomy
external monitoring
forceps
transition
internal fetal monitoring

APPENDIX B

CONSENSUAL ATTRIBUTE LISTS

PREGNANCY

NEVER PREGNANT WOMEN:

High school educated	College educated
emotional time	emotional time
weight gain	weight gain
baby growing inside woman	baby growing inside woman
last 9 months	last 9 months
discomfort	discomfort
food cravings	morning sickness
happiness; joy	
watching your diet	
get larger, bigger	
irritable	
swelling	
have to prepare emotionally for child	
a change in her appearance	
ends with birth of a baby	
anxious; nervous	

Combined

baby growing inside of woman
lasts 9 months
weight gain
discomfort
irritable
watch your diet
emotional
food cravings
ends with birth of baby
happiness
get larger, bigger
anxious; nervous

CONSENSUAL ATTRIBUTE LISTS

CHILDBIRTH

NEVER PREGNANT WOMEN:

High school educated

her water breaks
nervous; scared
goes into delivery room
husband is with her
joyful time; happiness
pain
pains
labor
have a baby
afterbirth
can do it natural

College educated

nervous; scared
an emotional time
feel discomfort
pain
contractions
goes to the hospital
screaming
have a baby
joyful time; happiness

Combined

her water breaks
pain
screaming
contractions
labor
goes to the hospital
nervous; scared
have a baby
joyful time; happiness

CONSENSUAL ATTRIBUTE LISTS

CONCEPTION

NEVER PREGNANT WOMEN:

High school educated	College educated
involves sperm and egg	involves sperm and egg
sperm meets egg	sperm meets egg
sex	sex
a new life starts	can be planned
	can be unpleasant
	you can't tell when you actually get pregnant

Combined

sex
sperm meets with egg
involves sperm and egg
a new life starts
can be planned
you can't tell when you actually get pregnant

CONSENSUAL ATTRIBUTE LISTS

PREGNANCY

EARLY PREGNANCY WOMEN:

High school educated	College educated
ends with birth of baby	ends with birth of baby
lasts 9 months	lasts 9 months
morning sickness	morning sickness
nausea	nausea
weight gain	weight gain
body changes	body changes
hormonal changes	hormonal changes
happiness	happiness
emotional changes	mood changes
excitement	physical changes
physical changes	worries, anxiety
fear	fear
it's amazing	change in your physical appearance
visit doctor	feel baby move
	feel tired
Combined	visit doctor
last 9 months	belly grows
morning sickness	breasts enlarge
nausea	eating habits often change
weight gain	fetus
body changes	baby develops
hormonal changes	happy one minute, cry the next
happiness	(emotional ups and downs)
emotional changes	baby grows inside the mother
excitement	think about being a mother
physical changes	(about life afterwards)
worries; anxiety	
fear	
feel tired	
think about being a mother (about life afterwards)	
it's amazing	
visit doctor	
baby develops	
happy one minute, cry the next (emotional ups and downs)	
ends with birth of baby	

CONSENSUAL ATTRIBUTE LISTS

CHILDBIRTH

EARLY PREGNANCY WOMEN:

High school educated	College educated
pain	pain
delivery	delivery
ends with birth of baby	ends with birth of baby
(baby is born)	(baby is born)
happiness	some are easy and some are hard
can take a long or short time	can take a long or short time
water breaks	water breaks
have your husband there	labor
fear	she dilates; dilation
nervous; anxiety	the baby positions itself for the birth
nervous because she doesn't know what to expect	all women and births are different
	natural childbirth
	have your husband there
	it's wonderful
	fear
	contractions
	an emotional time
	different states of labor
	stage of labor: beginning of labor
	state of labor: heavier labor
	breathing
	push (at certain point)
	Lamaze

CONSENSUAL ATTRIBUTE LISTS

CHILDBIRTH (CONT.)

Combined
the water breaks
pain
labor
contractions
delivery
happiness
it's wonderful
natural childbirth
some are easy and some are hard
can take a long or short time
nervous because she doesn't know
what to expect
have fear; frightened
births are all different
have your husband there
ends with birth of a baby (baby is born)

CONSENSUAL ATTRIBUTE LISTS

CONCEPTION

EARLY PREGNANCY WOMEN:

High school educated

can occur easily, quickly
can take a long time
timing is important
can be unplanned
it's amazing

Combined

making a baby
can occur quickly, easily
can take a long time
timing is important
sperm meets the egg
can be unplanned

College educated

can occur easily, quickly
can take a long time
timing is important
can be unplanned
sperm meets the egg
between a man and a woman
no one can tell you the moment they conceived
sexual intercourse
trying to conceive is nerve-wracking
moves into the uterus

CONSENSUAL ATTRIBUTE LISTS

PREGNANCY

LATE PREGNANCY WOMEN:

High school educated	College educated
emotional time	emotional time
weight gain	weight gain
body changes	body changes
physical changes	physical changes
feel baby move	feel baby move
mood changes; moody	happiness
happiness	prepare a nursery
it's wonderful	others give you attention
nausea	nausea
swelling; water retention	swelling; water retention
nervous	nervous
last 9 months	lasts 9 months
morning sickness	tired
it's not what you expect	ends with birth of baby
stomach grows; big belly	stages of pregnancy
tired	baby develops
ends with birth of baby	baby grows
baby develops	maternity clothes
baby grows	three trimesters
wonder if you'll have a healthy baby	need good nutrition
	heartburn
	hormonal changes
	feel as though you have no control over your body
	looking forward to getting back to old body (self)
	become "motherly"; baby oriented
	feel like a different person
	a miracle; amazing
	think about the birth
	think about after you have the baby
	feel unattractive; fat
	have mental attitude of wanting healthy lifestyle during pregnancy for the baby

CONSENSUAL ATTRIBUTE LISTS

PREGNANCY

LATE PREGNANCY WOMEN:

Combined

emotional time
feel baby move
body changes
weight gain
lasts 9 months
baby develops
mood changes
physical changes
happiness
nausea
water retention; swelling
nervous
tired
think about the birth
think about after you have the baby
baby grows
wonder if you'll have a healthy baby
it's wonderful
others give you attention
ends with birth of baby
concern with healthy life-style that's good for baby
need good nutrition
become "motherly", baby oriented
pregnancy has stages

CONSENSUAL ATTRIBUTE LISTS

CHILDBIRTH

LATE PREGNANCY WOMEN:

High school educated	College educated
pain	pain
contractions	contractions
baby is born	baby is born
labor	labor
doesn't know what it'll be like until you go through it	delivery
some women scream	dilation
for each woman it is different	doesn't know what it'll be like until you go through it
natural childbirth	doctor
pushing	husband gives support to his wife
woman may scream at or curse her husband	Lamaze
once baby is born, you forget all the pain	have transition in labor
once baby is born, you're happy	husband is present
husband gives support to his wife	go to the hospital
husband is present	happiness; joy
happiness; joy	anticipation
anticipation	excitement
worry; anxiety	worry; anxiety
great, amazing experience	scared; terrified
	breathing techniques
	great, amazing experience
	can have pain medications
	stages in childbirth
	fetal monitors
	it's at the end of 9 months

CONSENSUAL ATTRIBUTE LISTS

CHILDBIRTH

LATE PREGNANCY WOMEN:

Combined

have stages
labor
pain
contractions
dilation
have transition in labor
delivery
pushing
baby is born
once the baby is born, you're happy
don't know what it'll be like until you go through it
worry; anxiety
happiness; joy
great, amazing experience
anticipation
husband present
husband gives support to the woman
Lamaze
breathing techniques

CONSENSUAL ATTRIBUTE LISTS

CONCEPTION

LATE PREGNANCY WOMEN:

High school educated	College educated
sperm meets the egg	sperm meets the egg
sperm	sperm
egg	get pregnant
cell divides	can be unplanned
get pregnant	intercourse
can be unplanned	many ways to prevent conception
miss (don't get) period	can take a while to get pregnant
some people know exactly when they conceive	results in a baby
don't know exactly when you conceive	have to do it at the right time to conceive
exciting	

Combined

intercourse
sperm
sperm meets the egg
get pregnant
results in a baby
can be unplanned
many ways to prevent conception
some people know exactly when they conceive
don't know exactly when you conceive

CONSENSUAL ATTRIBUTE LISTS

PREGNANCY

EDUCATORS:

concern with what's good for the baby
last 9 months
has three trimesters
each trimester has different changes
can be planned or unplanned
good nutrition is important
gain weight
inner development of mother
physical symptoms or complaints
darkening of the nipples
feel good
tremendous growth and development of the baby
ends with birth of a baby
feeling of ambivalence
change of lifestyle
it's a great, wonderful experience
women think of the baby all the time
about 40 weeks long
growth of the uterus
blood volume increases
a lot of physical changes take place
maternity clothes
visits with physician
creates a role change (mother)
it's easier for a woman if there is a supportive husband
fetus
gestational period

First trimester:	nausea
	morning sickness
	frequency of urination
	swelling of the breasts
	woman can feel ambivalent about the pregnancy
Second trimester:	feel movement
	notice your belly growing
	women generally feel very good
	women now look pregnant--rather than just heavy
	emotionally stable time

CONSENSUAL ATTRIBUTE LISTS

PREGNANCY (CONT.)

EDUCATORS:

Third trimester:	baby gets to maximum size
	belly gets to maximum size again, frequency of urination
	woman is slowing down
	the woman is getting ready-- preparing for birth
	childbirth education or classes
	feeling more physical complaints
	more fearful now

CONSENSUAL ATTRIBUTE LISTS

CHILDBIRTH

EDUCATORS:

involves discomfort
pain is involved
has stages of labor
it's the end of pregnancy
hard work
satisfying and rewarding
the husband is involved
husband gives support to the wife
should be a life experience that we deal with
have some indication of the onset of labor
indications of the onset of labor are:
    --breaking of the waters
    --a bloody show
    --contractions
go into birth center or hospital as two,
    leave as three (as a family)
labor
delivery
First stage is labor
First stage: contractions start out slowly,
    but then get closer together
contractions fall into some
    sort of pattern
during labor, have to make yourself
    comfortable
contractions get strong, more painful,
    more frequent and last longer
    as labor progresses
go to hospital or birth center
movement into late, advanced first
    stage of labor
more intense contractions
transition
transition is the hardest part
contractions come back to back
transition is an important time to stay
    in control
transitional stage leads to pushing
can have medications in labor
can deal with labor by using breathing
    techniques
husband can rub her back

CHILDBIRTH (continued)

EDUCATORS:

husband can help woman visualize baby's progress and that it'll be over soon
labor can be easy or hard for women
women need support in labor
difficulty women have in dealing with labor is dealing with fear
dilation
the uterus contracts
the cervix opens
Second stage is the delivery
Second stage: the baby moves down; descends
push the baby out
a lot of physical work
pushing
birth of the child
woman gets excited over the birth
Third stage is the immediate postpartum
Third stage is the delivery of the placenta or afterbirth
getting the baby is the wonderful part
hopefully the baby is all right

CONSENSUAL ATTRIBUTE LISTS

CONCEPTION

EDUCATORS:

timing - have to figure out the right time of the month
wait for the time of ovulation
have intercourse
sperm meets the egg
embeds into the uterus
hoping and wondering if it'll happen that month
now you're pregnant
can be planned
can be unplanned
can have trouble conceiving
some women know the exact moment they conceived

APPENDIX C

FOOTNOTES

[1] Current scientific literature advocates a range of "ideal" pregnancy weight gains, but it is typically somewhere between 22 and 35 pounds, with all references using a weight gain of over 20 pounds for best pregnancy and maternal outcomes (Abrams & Lares, 1986; Pernoll & Benson, 1987; Shapiro, 1983).

[2] Some of the scientific literature on smoking marijuana during pregnancy suggests that there is an increase in smaller infants, and a dose-related effect on several infant behaviors (Lester & Dreher, 1989; Shapiro, 1983; Zuckerman & Hingson, 1986), while other literature makes statements such as: "Little is known about the effects of marihuana on the fetus, but major deleterious consequences have not been reported." (p.176, Pernoll & Benson, 1987).

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