

THE DEVELOPMENT OF A SCREENING INSTRUMENT
THAT IDENTIFIES AN ADOLESCENT'S STAGE OF
COGNITIVE DEVELOPMENT TO BE USED FOR
ASSESSING ADOLESCENTS MAKING A
DECISION ABOUT BIRTH CONTROL

Project for the Degree of M. S. N.
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CHARLYN LEVERNIER STRATTON

1988



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ABSTRACT

THE DEVELOPMENT OF A SCREENING INSTRUMENT THAT IDENTIFIES AN ADOLESCENT'S STAGE OF COGNITIVE DEVELOPMENT TO BE USED FOR ASSESSING ADOLESCENTS MAKING A DECISION ABOUT BIRTH CONTROL

by

Charlyn Levernier Stratton

The development of a screening instrument that identifies an adolescent's stage of cognitive development and an examination of how the instrument could be utilized in assessing, counseling and educating adolescents making decisions about birth control are the focus of this scholarly project.

The cognitive developmental theory of Jean Piaget provides the framework for the adolescent's cognitive development, while the conceptual framework for nursing intervention is based on Martha Rogers' Theoretical Basis of Nursing and Science of Unitary Man: A Paradigm for Nursing.

Finally, an integration of Piaget's theory of cognitive development and Rogers' theory for nursing with strategies and recommendations for the nurse in advanced practice are presented.

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Charlyn Levernier Stratton

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College of Nursing

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To my family and friends
with gratitude and love . . .

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CHAPTER I

INTRODUCTION

One of the major public health and social concerns of this century in the United States is unplanned adolescent pregnancy. As a result, this project presents a review of the literature that looks at adolescent cognitive development in relationship to the adolescent's decision about the use of birth control. The study includes the development of a cognitive screening tool and examination of how the screening tool could be utilized in assessing, counseling, and educating adolescents making decisions about birth control.

The evolution of the adolescent's cognitive stages in relationship to his environment is explored with the cognitive developmental stages being seen as a spiral. Each level of cognitive development encompasses and reintegrates into a higher form, the achievements of earlier cognitive levels. The spiraling cognitive process has a direct effect on the adolescent's mental ability to make decisions, especially those decisions that have future orientation.

This introductory chapter is divided into four sections. The first section presents the facts which

support the assertion that adolescent pregnancy is a major societal problem in the United States today. In the second section the project's goal, purpose, and the relevance to nursing practice, are defined. The concepts utilized in the study--adolescence, cognitive development, decision making and birth control--are defined in the third section. Finally, in the fourth section, the limitations, assumptions, and overview of the project are presented.

The United States has the highest birth rates among 15- to 19-year-old women in the western world (Rosenfield, 1981). High birth rate seems to be an "American phenomenon". There is less use of contraceptives, and more non-consistent use of contraceptives in the United States than in any of the other industrialized countries (The Alan Guttmacher Institute, 1986). Every single day in the United States more than 3,000 adolescents become pregnant (The Alan Guttmacher Institute, 1981). In 1985, there were nine million young women ages 15-19 years and 47% of this group were sexually active, 49% did not use birth control and 23% of this group became pregnant (Children's Defense Fund, 1988).

The use of contraceptives among adolescents has increased considerably but the trend of increased sexual activity of adolescents is rising so sharply that while there are effective contraceptive users within this group,

many continue to take their chances with withdrawal or no method at all. Nearly 50% of adolescents who are sexually active for the first time do not use a method of birth control, and two-thirds of the adolescents that do become pregnant report they never used birth control or were at least inconsistent with its use (The Alan Guttmacher Institute, 1981).

The health, social and economic consequences of these facts are monumental. The death rates for babies born of mothers under age 15 are twice the rates for babies born to mothers of age 20 to 35. Mental retardation, birth defects, epilepsy, birth injuries and low birth weight occur at a higher rate for adolescents. Less than half of these pregnant adolescents will graduate from high school. Their rate of suicide is seven times higher than adolescents without children and they are at lower income levels due to their lack of skills and inability to get a job (National Center for Health Statistics, 1977). The adolescent living in poverty and often as a single parent is handicapped in many aspects of life, as is the child.

In Michigan, the 1985 statistics showed that 32% of adolescent mothers under the age of 15 years received no prenatal care and 28% had less than five prenatal visits. These statistics demonstrate the need for real concern for those babies being born to adolescent mothers (MDPH, 1986). Despite this lack of prenatal care, the 1985 financial

burden of adolescent childbearing still cost the nation 6.6 million dollars (Center for Population Options, 1986).

Research completed by Zabin, Kantner and Zelnik (1979) and Zabin and Clark (1981) has shown that adolescents are sexually active an average of one year before they seek a method of birth control. They also found that close to half of all initial adolescent premarital pregnancies occurred within the first six months after initiating sexual intercourse.

"Young people will have sex whether we like it or not, whether they like it or not, whether there are restrictive laws or not, and whether there is sex education in the schools or not. The argument that the less teen-agers know about sex, the less they will act out is not valid. Evidence shows that the majority will engage in non-marital sexual relations no matter what adults think they should do" (Gordon, Scales & Everly, 1979, p. 3).

Health care providers and parents must increase their efforts to understand adolescent cognitive development and their subsequent behavior in order to provide the adolescent with appropriate decision-making skills, contraceptives knowledge and easier access to birth control methods early in their sexual experience.

Study Purpose

The purpose of this study is to review the literature that focuses on adolescent cognitive development and adolescents' use or non-use of birth control; to develop a cognitive screening instrument based on Piaget's theory of cognitive development that will identify an adolescent's

stage of cognitive development; to infer there is a relationship between the adolescent's stage of cognitive development and the adolescent's use or non-use of birth control; to explore the use of this instrument for assessing adolescents considering the use of birth control; and finally to offer strategies based on Rogers' theory for nursing so the nurses in advanced practice can appropriately direct sexually active adolescents towards making responsible decisions about the use of birth control.

Goal Statement

The goal of this study is to provide nurses in advanced practice, other health care providers and educators with an adolescent cognitive stage developmental screening tool; and to increase the professional's level of understanding of adolescent cognitive development so that the professional may facilitate the adolescent's use of birth control at the onset of the adolescent's sexual activity. This goal will ultimately result in a reduction of unintended adolescent pregnancies.

Relevance to Practice

The national concern over the high rate of adolescent unplanned pregnancy demonstrates the tremendous need for an easily administered assessment tool that can be used by health care providers and educators as they assess, counsel, and educate adolescents in the area of sexuality

and decisions regarding their future. One of the goals of the study is to increase the professional's level of understanding of adolescent cognitive development so that the professional may facilitate the adolescent's use of birth control as soon as the adolescent begins sexual intercourse.

Though there is much research investigating the multi-faceted variables related to the adolescent's non-use of birth control, few studies have explored the adolescent's cognitive development in relationship to the adolescent's mental ability to make decisions, particularly those decisions involving the future, such as the use of birth control. The results of this study will provide health care providers and educators with a cognitive stage developmental screening tool from which to assess, counsel, and educate the adolescent in becoming responsible decision-makers regarding their sexual role in society while ultimately decreasing unplanned pregnancies in adolescence. The educational system and the health care system offer the professional an excellent means of access to the adolescent.

Definitions of Concepts

Numerous definitions of adolescence are cited in the literature, all with similar characteristics. Adolescence, for this study, is defined as "a period of change, growth, and disequilibrium in terms of physical, social

and sexual maturity" (Kimmel & Weiner, 1985, p. 12). It is a critical period of human development because a child through physical maturity is suddenly identified as an adult but his cognitive processes may not yet have reached adult maturity.

Adolescent development is most often divided into stages of development by the adolescent's chronological age. However, the adolescent literature differs in its parameters of the adolescent's chronological age for the different stages. Neinstein and Stewart (1984, pp. 371-372) divide adolescence into three stages: early, 13-14 years of age; middle, 15-17 years of age; and late, 18-21 years of age. Adams (1983, p. 238) describes early adolescence, ages 12-14; middle adolescence, ages 15-16; and late adolescence, age 17 to adulthood. Greydanus and McAnarney (1981, pp. 3, 4) view early stage adolescence as 10-14 years of age, middle adolescence as 15-16 years of age, and late adolescence as 17-20 years of age, while Allphin and Nicholas (1984, p. 67) define early adolescence as ages 11-14, middle adolescence as ages 14-16 or 17, and late adolescence as ages 17-22.

Piaget, in his cognitive developmental theory, does not place much emphasis on chronological age; instead he identifies the cognitive developmental processes as the definition for stages of human development. Pulaski (1980) points out that stage theory, particularly

Piaget's, has often been misunderstood. Frequently critics argue about the number of stages or disagree with the age parameters of when specific structures appear.

The important point is that

"stages of development evolve in a broad continuous sequence. Each stage arises out of the one preceding it by a recognition of what has gone before, so that it is qualitatively different from the preceding stage" (Pulaski, 1980, p. 18).

As the structure becomes larger and more complex, a spiral of integration into higher forms of achievements becomes apparent. In this higher form of cognitive development, the adolescent begins to comprehend the real significance of the abstract. Even at this point, the distinction between what is logical and what is realistic often remains elusive. Life is a consequence of factors other than logic, and true understanding does not come about until the real world is sufficiently experienced to construct this comprehension (Figure 1).

"The construction of social knowledge and historical knowledge has its roots in concrete experience. Experience remains crucial to knowledge" (Wadsworth, 1978, p. 189).

For the purpose of this study, the focus will be on adolescents 15-19 years of age. The decision to study adolescents in the middle and late stages of adolescent development is based on the adolescent's stage of cognitive development and the statistical documentation that this age group has the highest incidence of unplanned pregnancies (Blum & Resnick, 1982; Byrne, 1983;

Center for Population Options, 1986; Children's Defense Fund, 1984 & 1985; Cvetkovich & Grote, 1981 & 1983; Cvetkovich, Grote, Bjorseth & Sarkissian, 1975; Cvetkovich, Grote, Lieberman & Miller, 1978; Flavell, 1977; Kantner & Zelnik, 1972 & 1973; MDPH, 1986; Nadelson, Notman & Gillon, 1980; National Center for Health Statistics, 1980; Piaget & Inhelder, 1969; Pulaski, 1980; Rosenfield, 1981; Sachs, 1985 & 1986; The Alan Guttmacher Institute, 1981; The Children's Defense Fund, 1984 & 1985; Zabin & Clark, 1981; Zelnik & Kantner, 1978, 1979 & 1980; Zelnik & Kim, 1982; Zelnik & Shah, 1983).

For the purpose of this study, cognitive development will be seen as a continuous process that begins at birth.

"It follows a fixed course along a continuum. From birth through adulthood, the structures of intelligence, schemata, are constantly developing as the child spontaneously acts on the environment and assimilates and accommodates to an increasing array of stimuli in the environment" (Wadsworth, 1984, p. 29).

Piaget suggested four broad factors that are related to all cognitive development: "maturation, physical experience, social interaction and a general progression of equilibrium" (Wadsworth, 1984, p. 33). Each of these factors and their interaction is a necessary condition for cognitive development. Piaget's theory also centers on reasoning, remembering, perceiving, and believing, the mental processes of cognitive development. These cognitive activities allow the person to adapt to the

environment and organize the experience into a higher level of cognitive development.

Social development will be recognized as a part of cognitive development. The social development of a child follows the same general process as that of cognitive development. Social and cognitive aspects of behavior are in fact inseparable and parallel (Piaget & Inhelder, 1969). Adolescent decision-making will be viewed as "the act of deciding, a determination arrived at after consideration" (Webster, 1980, p. 293), a commitment to certain actions or inactions (Fishburn, 1972). A decision is a deliberate act of selection, by the mind; this selection leads to specific actions or inactions that satisfy basic needs and wants.

In this study, adolescent decision-making is investigated in this relationship: what effect does the adolescent's cognitive developmental stage have on the adolescent's decisions about birth control and which cognitive developmental stage distinguishes those adolescents who actively decide to use birth control, a future-oriented decision, from those adolescents who do not consider using birth control? Birth control (contraception, family planning) shall be prescriptive and non-prescriptive methods utilized by the adolescent to prevent pregnancy. All surgical procedures or methods that can be utilized to prevent or terminate pregnancy will be excluded.

Limitations of This Project

1. This study will include only those adolescents, male and female, 15 to 19 years of age; therefore, it cannot be generalized to all adolescents.
2. Cognitive development is but one dimension of adolescent development and is not intended to be all-inclusive.
3. There are many factors related to adolescent decision-making skills. Only the cognitive developmental stages as they relate to the adolescent's contraceptive decisions are a part of this study.

Assumptions

1. Health related decisions affect health related behaviors.
2. The effects of the variables of adolescent cognitive development on adolescent decisions are real and measurable.
3. Use of birth control is of benefit to the health and well being of the adolescent and of society.
4. Stages of adolescent cognitive development can be measured by the use of an assessment instrument.
5. The stage or stages of cognitive development of adolescents in this specific chronological age group can be accurately assessed by this instrument.
6. According to Piaget, children of all cultures develop through the same stage sequence (Wadsworth, 1978, p. 21).

7. The sequence of development of intellectual structures is the same in all persons though rate of development may vary from child to child (Wadsworth, 1978).
8. There will not be any major gender differences in the cognitive developmental sequence when viewed from the Piagetian perspective (Wadsworth, 1978, p. 21).

Overview of Remainder of Project

In Chapter II the conceptual framework for adolescent cognitive development and decision-making is presented and will be supported by pertinent literature. In Chapter III the review and critique of the literature relevant to this study are presented. Chapter IV describes the proposed methodology for implementation of this project, operational definitions and proposed screening instrument. In Chapter V a summary of the proposed study, Martha Rogers' conceptual framework for nursing and an integration of this framework with Piaget's theory of cognitive development, is presented. Finally, implications, strategies and recommendations for the nurses in advanced practice are presented.

CHAPTER II

CONCEPTUAL FRAMEWORK FOR ADOLESCENT COGNITIVE DEVELOPMENT

Overview

In this chapter, the main concepts of the study are further defined and discussed, and the interrelatedness of the concepts is established. The cognitive developmental theory of Jean Piaget provides the framework for the adolescent's cognitive development and for the study's concepts. The concepts pertinent to this framework that are discussed in detail, include: cognitive development, adolescence, decision-making and birth control. And, finally, the rationale for the use of a particular instrument will be discussed as it relates to Jean Piaget's theory of cognitive development.

Cognitive Development

Piaget's theory centers on cognitive development, the mental processes such as reasoning, remembering, perceiving, and believing. These cognitive activities allow the person to adapt to the environment and organize the experience. Cognitive development is seen by Piaget as a continuous process that follows a fixed course from birth through adulthood. The structures of intelligence

are constantly developing as the child acts on the environment and assimilates and accommodates to the stimuli in the environment. Intellectual activity is only a part of the overall process in which an individual adapts to the environment and organizes experience. Piaget's basic assumption is that the general course of development of intellectual structures is the same in all persons. This then becomes an essential assumption for researchers utilizing Piagetian theory for studying cognitive development.

Piaget's work was primarily concerned with describing and explaining systematically the growth and development of intellectual structures and knowledge (Wadsworth, 1984). His greatest contribution was

"his brilliant analysis of how human knowledge slowly develops beyond biologic, inherited origins through a process of self-regulation based on feedback from the environment leading to internal reconstruction" (Pulaski, 1980, p. 9).

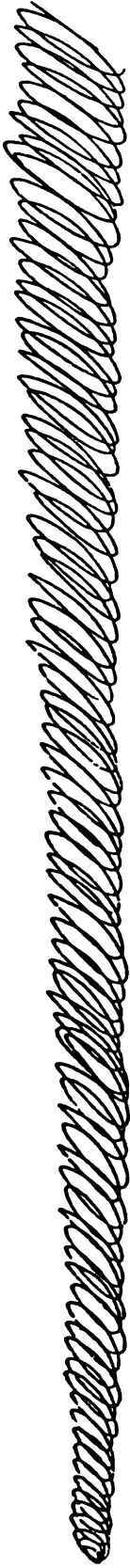
The ability of all living things to adapt to new situations through self-regulation is the basis for his biologic theory of knowledge (Pulaski, 1980). His studies have helped researchers and educators to understand the cognitive development of children; how they perceive the world at different stages of cognitive development, what intellectual structures to expect, and why children question and interpret information in ways unique to each stage of cognitive development.

Piaget insists that cognitive growth must be studied from its formation and its evolution in childhood. His work involved very careful analysis of the qualitative changes in the cognitive structures with age. However, he did not place much emphasis on chronological age; instead, he focused on the cognitive developmental structures that appear in a broad continuous sequence. He called these structures, stages of development. Each stage arises out of the preceding stage by reorganization of experiences so that the new stage is qualitatively different from the previous stage. Each structure is larger and more complex. Piaget calls it the "spiral of knowing" (Pulaski, 1980, p. xvi). The spiral could represent each level as it reintegrates in a higher form of complexity, differentiation and enrichment (Pulaski, 1980) (Table 1 and Figure 1).

Piaget conceptualized that the mind and the body do not operate independently, and cognitive acts were acts of organization and adaptation to the environment, inter-dependent processes of intellectual and biological activities (Wadsworth, 1984). From this conceptualization Piaget defined four basic concepts: "schema, assimilation, accommodation and equilibration." These concepts explain the how and why of mental development (Wadsworth, 1984, p, 10).

Table and Figure 1.

PIAGET'S SUMMARY OF THE STAGES OF COGNITIVE DEVELOPMENT



Sensori-Motor	Preoperational	Concrete Operations	Formal Operations
<p>Reflex activity.</p> <p>Hand-mouth coordination.</p> <p>Coordination of 2 schemata.</p> <p>New means through experimentation.</p> <p>Internal representation.</p>	<p>Problems solved through representation-language development.</p> <p>Thought and language both egocentric.</p> <p>Cannot solve conservation problems.</p>	<p>Reversibility attained.</p> <p>Can solve conservation problems.</p> <p>Logical operations developed and applied to concrete problems.</p> <p>Cannot solve complex verbal problems and hypothetical problems.</p>	<p>Logically solves all types of problems; thinks scientifically.</p> <p>Solves complex verbal and hypothetical problems.</p> <p>Cognitive structures mature.</p>
<p>Development proceeds from reflex activity to representation and sensori-motor solutions to problems.</p> <p>Primitive likes and dislikes emerge.</p> <p>Affect invested in the "self".</p>	<p>Development proceeds from sensori-motor representation to prelogical thought and solutions to problems.</p> <p>True social behavior begins.</p> <p>Intentionality absent in moral reasoning.</p>	<p>Development proceeds from prelogical thought to logical solutions to concrete problems.</p> <p>Development of the will and beginnings of autonomy appear.</p> <p>Intentionality is constructed.</p>	<p>Development proceeds from logical solving of concrete problems to logical solving of all classes of problems.</p> <p>Emergence of idealistic feelings and personality formation.</p> <p>Adaptation to adult world.</p>
0-2 years	2-7 years	7-11 years	11-15 years

Adapted from Wadsworth, B. 1984. Piaget's Theory of Cognitive and Affective Development. New York: Longman, Inc.

Piaget stated the mind had structures just as the body has structural continuity. Piaget used the word "schema" (singular) or "schemata" (plural) to identify these mental structures. Individuals use these structures (schemata) to intellectually adapt to and organize the environment. Schemata adapt and change with mental development from childhood into the schemata of adulthood. Schemata are the intellectual structures that organize an individual's experiences into groups according to common characteristics. Man processes and identifies incoming stimuli by use of his schemata. Schemata are more than the individual's behavior; they comprise the internal structure from which the appropriate behavior is derived (Wadsworth, 1984).

The infant has very few schemata or mental structures. His schemata at this point are reflexive, precursors to later mental activities. As the child develops, schemata become more differentiated, less sensory, more numerous and more complex as his contact with the environment stimulates adaptation and organization. Adult schemata therefore are different from those of a child and the processes of assimilation and accommodation are responsible for this change.

"Assimilation is the cognitive process by which a person integrates new perceptual, motor, or conceptual matter into existing schemata or patterns of behavior" (Wadsworth, 1984, p. 14).

Assimilation is continuous, a process of assimilating multiple stimuli at any given moment. It affects the growth of schemata and consequently cognitive development. The individual cognitively adapts to and organizes the environment through assimilation.

Accommodation is employed when assimilation is not possible. It causes a change in the schema. When stimuli cannot be identified, the individual can create new schema or modify existing schema, therefore accommodating. Accommodation allows a change to occur in the mental structure (schema) to incorporate new stimuli incongruent with existing schemata. Schemata reflect the individual's level of understanding and knowledge of the world. The schemata are constructed by the individual. During assimilation the person imposes his available structure on the stimuli being processed. In accommodation, the person is forced to change his schema to fit the stimuli. Both of these processes are necessary for cognitive growth and development (Wadsworth, 1984).

Equally important is the relative amount of assimilation and accommodation. A balance between them is as necessary as the processes themselves. Piaget calls this balance "equilibrium". Disequilibrium is a state of imbalance and equilibration is the process of moving from disequilibrium to equilibrium. "Equilibration allows external experience to be incorporated into the internal

structures (schemata)" (Wadsworth, 1984, p. 17). Conceptually, cognitive growth and development proceeds in this way from birth through adulthood. Intellectual development is also the process of adaptation.

Piaget viewed intelligence as having three components: content, function and structure. Content is what children know about; function includes the processes of assimilation and accommodation (intellectual activity) and structure relates to the organizational properties that explain a particular behavior. The components content and structure change, the changes in structure are known as intellectual development. Piaget's primary concern and studies focused on the structure of intelligence (Wadsworth, 1984).

Piaget's system required that a child must act in the environment if cognitive development is going to progress. This action becomes the construction of knowledge. Piaget defines three types of knowledge: "physical knowledge, logical-mathematical knowledge, and social-arbitrary knowledge" (Wadsworth, 1984, p. 22). Each requires action by the child but for different reasons. Physical knowledge is the knowledge about the event or objects' properties (size, shape, color, weight). Logical-mathematical knowledge is knowledge derived from thinking about experiences with objects and events, while social-arbitrary knowledge is knowledge about things created by

cultures (rules, laws, morals, values, ethics, and language systems). Each type of knowledge requires either physical or mental action; this creates disequilibrium. Assimilation and accommodation occur to re-establish equilibrium. The process of equilibration is the regulator of cognitive development.

Four critical variables in cognitive development are maturation, active experience, social interaction and equilibration. Their interaction is necessary for continuous cognitive development. Two of the variables, maturation and equilibration, are usually not subject to external control while the other two variables, experience and social interaction, are in part determined by external events. Experience and social interaction can be structured so the individual such as the adolescent has opportunities to act on things and interact with others, but depending on the internal process of equilibration these experiences may or may not be assimilated and accommodated. If the relevant mental structures are not available the experience may not be comprehended appropriately (Figure 2).

While cognitive development is a continuous lifetime process, Piaget for ease of understanding and analysis divided cognitive development into four stages. Piaget noted that children at specific ages exhibited certain structures. These organizations of behavior appeared so

reliably that he used them to demarcate stages of development.

"These stages of development evolve in a broad continuous sequence. Each stage arises out of the one preceding it by a reorganization of what has gone before, so that it is qualitatively different from the preceding stage" (Pulaski, 1980, p. 18).

Each stage is larger and more complex than the preceding stage. Each level encompasses and reintegrates into a higher form, achievements by earlier levels, a spiral of knowledge (Figure 1). Miller (1983) further identifies five characteristics of stage theory applicable to Piaget's theory (Table 2). Miller sees the stages as structured wholes that emerge from and transform a previous stage, following an invariant and universal sequence, and proceed from an unstable period of transition into a final stable period (Miller, 1983, pp. 40-41).

Piaget's four stages of cognitive development are broadly summarized as follows: sensori-motor, pre-operational, concrete operations, and formal operations. By the time a child is born the development of the mind has already started. Yet during the sensori-motor period (age 0-2 years) the newborn infant's behavior is almost entirely reflexive in nature. The infant is locked into egocentrism and is unaware of anything beyond self. The infant's focus is almost entirely sensory perceptions and motor activities. The infant's behavior is mostly reactionary, interacting only with the persons with whom there

Table 2

FIVE CHARACTERISTICS OF STAGE THEORY
APPLICABLE TO PIAGET'S THEORY

1. A stage is a structured whole in a state of equilibrium.
The schemes or operations of each stage are interconnected to form an organized whole. Each stage has a different structure, which allows a different type of interaction between the child and the environment, and consequently provides fundamentally different views of the world.
2. Each stage both derives from the previous stage and incorporates and transforms that stage.
The previous stage paves the way for the new stage. In the process of achieving this new stage, the previous stage is reworked.
3. The stages follow an invariant sequence.
The stages must proceed in a particular order.
4. Stages are universal.
The stages that humans do achieve are achieved in the predicted order by everyone.
5. Each stage includes a coming-into-being and a being.
There is an initial period of preparation and a final period of achievement in each stage.

Adapted from P. Miller, 1983, Theories of Developmental Psychology. New York: W. H. Freeman and Company.

is direct contact. The infant also does not think perceptually. If an object is hidden, the infant cannot or does not perceive that the object still exists on its own.

During the pre-operational stage (age 2-7 years) a child evolves from one who functions primarily in a sensori-motor mode to one whose functions are increasingly more conceptual and representative. The child is beginning to talk and is beginning to think. Through internal representation the child can now perform behaviors that will permit obtaining an end. Gradually combinations of behaviors are telescoped into thought being internalized into mental images as memory. The child is also less dependent on sensori-motor actions for direction of behavior. The child can also play a game of pretending (a block of wood may represent a car). This behavior is called "symbolic play". The child of this stage is still very egocentric and does not see another view except his own. There is no reflection so the child never questions his own thinking. Play is primarily a non-social activity. The child most often plays alone without perception of rules, so he plays any way he wants.

The child, through the development of spoken language, has the verbal ability to represent objects and events. This representation allows for the development of conceptual capabilities, though pre-logical. The child at this point in cognitive development cannot reverse, that

is, to follow a line of reasoning back to its start; nor can the child conserve, holding one dimension invariant while another dimension changes. Conservation is the conceptualization that the quantity of matter stays the same regardless of a change in an irrelevant dimension. For example, if one were to move 10 apples from a tall basket to a short basket, there would still be 10 apples.

The first social feelings arise during the pre-operational stage. Representation, especially spoken language, is primary in the development of social feelings. Representation allows images of experiences to be created including affective (feeling) experiences. For the first time, the child can recall feelings and his feelings acquire some stability and duration. The pre-operational child also shows more consistency in liking and disliking when the past is remembered. The child now wants to play with other children, but usually older children. The child may imitate other children but the child does not socially interact or reason; consequently his play remains asocial and without true cooperation. Moral reasoning, an aspect of social development, also begins during the pre-operational stage. The child becomes aware of the existence of rules in games and believes everyone can win, the rules are fixed. By the age of seven, when the child is moving into the concrete operations stage, he is beginning to reason and his schemata have improved and changed.

The next two stages, concrete operations and formal operational thinking, are pertinent to adolescents and this study. In concrete operations, age 7-11 years, the child uses logical thought that can be applied to existing problems (concrete). The concrete thinker relates to present reality (the here and now) and is able to do all the cognitive operations that limited the pre-operational child's intellectual activity. The world, however, is viewed in very concrete terms. The child focuses on only one aspect of a situation with past experiences being used to solve current problems. "Cause and effect are not linked but placed in juxtaposition" (Sachs, 1987). The concrete thinker can transform, reverse and conserve. Seriation, the ability to arrange objects according to a change in their characteristics and classification (color, size and shape), as well as the concepts of causality, time and speed develop with superior accuracy for the concrete thinker. The concrete thinker develops a will, learns to become more autonomous, constructs values and is now able to cooperate socially (Table 3).

The final stage of development Piaget refers to as the stage of formal operations. This stage occurs around the ages of 11-15 years. However, full development may continue beyond the age of 15. The variability in the rate of development of formal operations is greater than that of earlier stages. Acquisition of formal operations

Table 3

PIAGET'S THEORY OF COGNITIVE DEVELOPMENT

Stage	Age	Characteristics	Example of Thought
Concrete Operational Thinking	7 - 11	<p>Relates to world concretely, here and now; empirical thinker.</p> <p>Begins with reality, moves reluctantly to possibilities.</p> <p>Sees issues, problems, solutions in terms of what has been previously experienced.</p> <p>Uses inductive approach.</p> <p>Infers about underlying situations.</p> <p>Centers on one relationship in a situation; intrapropositional thinker.</p> <p>Becomes more autonomous.</p> <p>Socially cooperative.</p>	<p>I have a cold because my mother told me not to play in the rain and I did.</p>
Formal	11 Years to Adult	<p>Generates multiple abstract options to resolve problems.</p> <p>Begins with abstract possibilities.</p> <p>Hypothesizes explanations for problems.</p> <p>Makes logical inferences from previous experiences.</p> <p>Deduces from hypothesis to reality; a hypothetico-deductive thinker.</p> <p>Introspective.</p> <p>Considers consequences of options; future-oriented.</p> <p>Interpropositional thinking; comprehends all relationships among logical elements.</p>	<p>I have a cold because there are lots of viruses going around school and my resistance is low. I've been very tired with school, sports, and part-time job.</p>

Adapted from Flavell, J. Cognitive Development. 1977. Englewood Cliffs, NY: Prentice-Hall, and Wadsworth, B. 1984. Piaget's Theory of Cognitive and Affective Development. New York: Longman, Inc.

is the least "automatic" of the stages (Wadsworth, 1978, p. 20). Some people never develop formal thought; possibly as many as 50% of the adult population (Kohlberg & Mayer, 1972). Elkind (1972) and Schwebel (1975) found large numbers of college students who had not attained complete formal operations.

"A large percentage of individuals of normal intelligence and of average social background, not only at the age of adolescence but also in adult-operational stage" (Blasi & Hoeffel, 1974, p. 348).

The formal operational stage has only been reached when full development of thought processes has reached maximum potential.

Like adults with formal reasoning, adolescents with formal reasoning do not always use it, but once the reasoning is developed, adolescents have the same capabilities for reasoning as adults. The major difference between adult and adolescent reasoning capabilities is the number of schemata or structures. As the adolescent gains experience, such as in terms of sexuality, more schemata are developed and reasoning powers are increased.

Piaget saw the unique characteristics of adolescent thought and personality as normal outgrowth of development. Much of the adolescent's thought and behavior were explained by prior development. The development of cognitive structures before and during adolescence then

helps account for the characteristics of behavior during the adolescent period (Wadsworth, 1978).

The adolescent is typically one who has entered the stage of formal operations and is developing, or has developed, the cognitive skills and affective reasoning characteristic of that stage. The adolescent now has the ability to think through complex problems, deal with abstractions, and solve hypothetical problems. Hypothetico-deductive thinking is used, hypotheses are listed, and the adolescent is able to comprehend all the relationships among logical elements and can also think about thinking (Sachs, 1987). The adolescent applies combinatorial reasoning and can exclude the variables that have no effect. The adolescent now considers future ramifications of present actions with thinking and reasoning extending into the future (Table 3). Abstract alternatives for decision-making are considered by the adolescent and potential consequences of each choice are contemplated before action is taken (Sachs, 1987). The adolescent is emerging from an idealistic approach and moving into a realistic approach.

The adolescent, while able to think logically, often still thinks differently from the adult. Piaget believed that the characteristics of adolescent thought that make the adolescent unique are in part due to the level of cognitive development and the accompanying egocentrism of

thought (Wadsworth, 1978). Egocentrism is a constant companion of cognitive development. At each new stage of cognitive development, the child's inability to differentiate assumes a different form and is expressed in a new set of behaviors. Each newly acquired cognitive structure has associated with it egocentrism, a by-product of mental development which may distort the initial use of the newly acquired cognitive structures. At each new stage of development egocentrism is manifested in a unique form (Wadsworth, 1978).

The adolescent, in a sense, is possessed by his new-found powers of logical thought. The egocentrism of adolescence is the inability to differentiate between the adolescent's world and the real world. What is logical in the eyes of the adolescent is always right and what is judged illogical is always wrong. The adolescent is emboldened with the egocentric belief in the omnipotence of logical thought. The adolescent feels the world should submit itself to logical schemes rather than to systems of reality. The adolescent just does not understand, at this stage of development, that the world is not always logically or rationally ordered, as he/she perceives that it should be.

"The adolescent . . . thanks to his budding personality, sees himself as equal to elders, yet different from them. . . . He wants to surpass and astound them by transforming the world. That is why the adolescent's systems or life plans are at the same time filled with generous sentiments and

altruistic or mystically fervent projects and with disquieting megalomania and conscious egocentricity" (Piaget, 1967, p. 66).

Adolescents are frequently involved in idealistic crises. They have the powers of formal reasoning but they cannot distinguish between the new powers and their application to real problems. The egocentrism of adolescence does subside when the adolescent learns to use logic effectively in relation to the real world. Only after the adolescent's behavior becomes similar to adult experiences does his thinking become more realistic.

The adolescent at this stage becomes truly a social being. Communication is no longer centered on self but egocentrism takes on another dimension, the adolescent de-centers and begins to notice the world around him. The adolescent is able to structure relationships with others and the peer group becomes the central focus of the emerging adolescent formal operational thinker. The rapid body changes and unfolding sexual identity cause the adolescent to seek those relationships with persons who are most like him and experiencing the same uncertainties (unknowns). This increasing awareness of the world and questioning extends to the adolescent's perceptions of his family's judgments allowing the peer group who shares his ideals conceptually to become his major referent in his social learning system.

As the adolescent begins to think about his own thinking and the thinking of other persons, he gains the

ability to recognize possibilities as well as actualities. These new cognitive powers extricate the adolescent from one form of egocentrism, but entangle him in another form. While the adolescent can think about his own thinking and the thinking of others, he cannot differentiate the object of his own thought from the object of the thoughts of others. Thus, he assumes that other persons are thinking about the same things that occupy his thinking. The young adolescent is preoccupied with himself. Elkind (1967) suggests two particular aspects of adolescent egocentrism are related to the adolescent's contraceptive use.

The "imaginary audience" (Elkind, 1978, p. 131) is the adolescent's anticipation of the reactions of others to him, believing that everyone in his social network is as preoccupied with his behavior and appearance as he himself is. The imaginary audience aspect of egocentrism may relate to sexual activity. The adolescent is yet uncertain of his sexual role. The use of contraceptives requires premeditation and objective thinking, for which the adolescent may not be ready, cognitively or emotionally. To use birth control is to admit to oneself and the imaginary audience that he/she is sexually active, and for many adolescents, this is a cognitive reality they are not ready mentally to process or accept.

If the adolescent fails to differentiate self-concerns from the concerns of others, he also tends to

over-differentiate the uniqueness of his emotions and affect. The adolescent feels special and immortal, not yet subject to reality; this is called the "personal fable" (Elkind, 1978, p. 131). For instance, many adolescents evidently believe that they are immune to death, while many adolescent women hold the notion that they cannot become pregnant. The possibility of pregnancy is just not part of their cognitive reality, and the chances of getting pregnant are often considered to be cumulative across incidents of intercourse rather than being independent.

This whole concept of invulnerability is a unique characteristic of the young adolescent and gradually diminishes by late adolescence. The adolescent begins to apply the operations of formal logic to himself to think about himself objectively. First the imaginary audience and then the personal fable begin to recede as he tests against reality the hypotheses he has about others' reactions. The adolescent learns to discriminate the difference between his own preoccupations and the concerns of others. According to Piaget (1972), cognitive development occurs through this active role of interpretation and doing.

Social interaction is the principal liberating factor, particularly social interaction with peers. As the child and adolescent interact with their peer groups

they find themselves forced to re-examine their own precepts and concepts in the light of those of others and by doing so cognitive egocentrism gradually diminishes. Piaget sees social development as a factor and a variable in cognitive development. By social interaction there is an interchange of ideas giving rise to social schemata. Intellectual and social development do not evolve on separate schedules but are seen by Piaget as interrelated and parallel. Piaget saw four critical variables in cognitive development--"maturation, experience, social interaction and equilibration" (Wadsworth, 1984, p. 179). He felt none of these variables alone were sufficient to assure cognitive development but it is their interaction that determines the course of the individual's cognitive development.

Piaget (1972) explains that formal thought is especially affected by social interaction. The varying speed with which intellectual stimulation in quality and frequency is received from adults and significant others may promote or retard development especially in the adolescent's development. "This does not mean formal structures are exclusively the result of a process of social transmission" but would mean "in principle all normal individuals are capable of reaching the level of formal structures on the condition that the social environment and acquired experience provide the subject

with the cognitive nourishment and intellectual stimulation necessary for such construction" (Piaget, 1972, p. 8).

However, the current trend towards earlier sexual activity does not allow for the younger adolescent to cognitively view the sexual experience abstractly nor have the ability to consider the myriad of consequences involved in this behavior. It is not the lack of relevant information or education but the inability of the adolescent to cognitively process it hypothetically and use realistic decision-making skills. It is therefore of primary importance that the educators and health care providers for adolescents consider adolescent cognitive development first when assessing and helping the adolescent with sexual decisions.

Cognitive development thus is seen as a continuous process that begins at birth.

"It follows a fixed course along a continuum. From birth through adulthood, the structures of intelligence (schemata), are constantly developing as the child spontaneously acts on the environment and assimilates and accommodates to an increasing array of stimuli in the environment" (Wadsworth, 1984, p. 29).

The cognitive activities of reasoning, remembering, perceiving, and believing allow the person to adapt to the environment and organize experience into a higher level of cognitive development. Each structure becomes larger and more complex. A spiral would represent each level as it

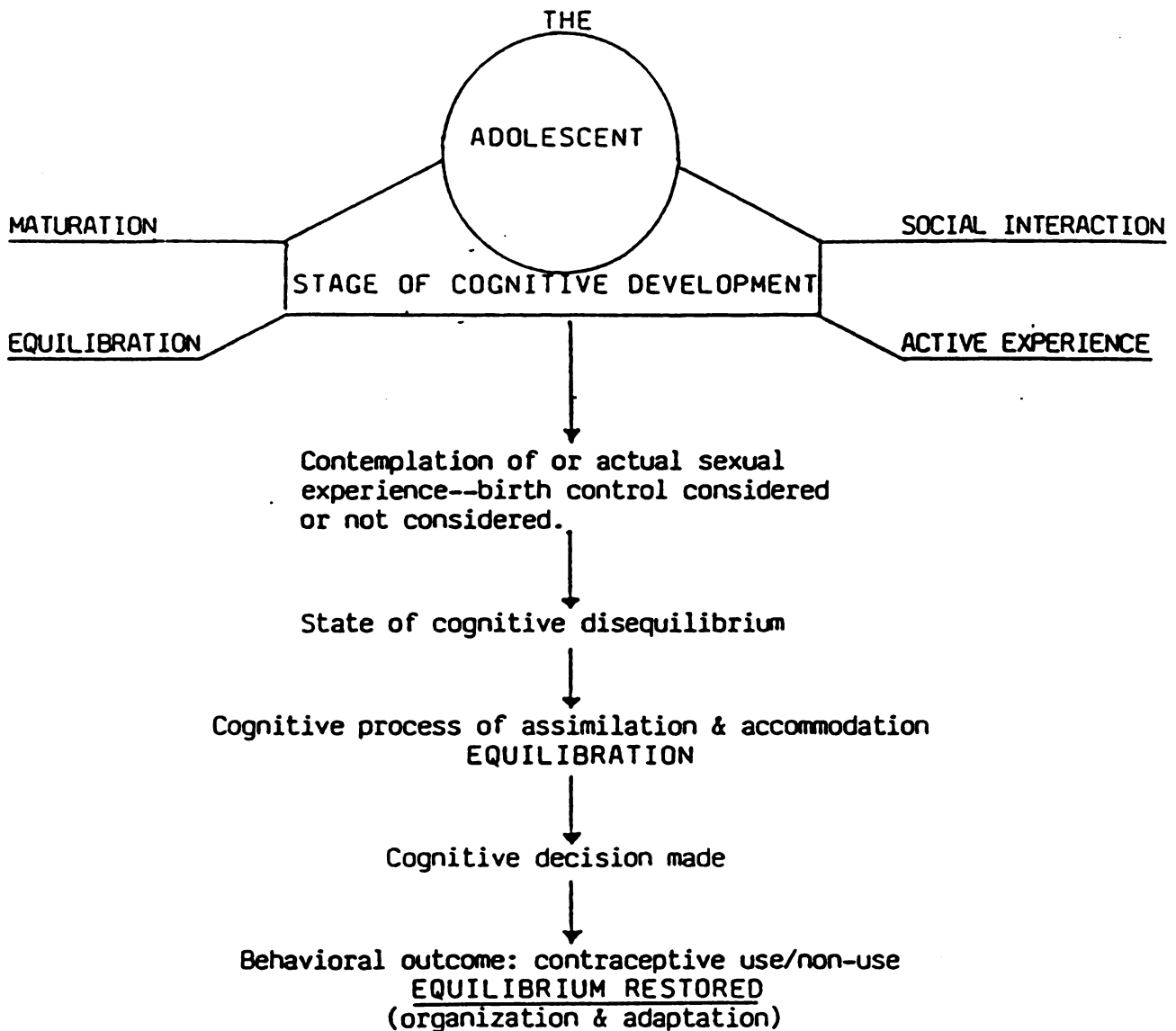
reintegrates into a higher form of complexity, differentiation, and enrichment (Pulaski, 1980) (Table 1 and Figure 1).

For a schematic illustration of Piaget's theory of cognitive development as it relates to this study see Figure 2, which reflects the interaction of the four critical factors that Piaget identified as essential to cognitive development. When the adolescent's cognitive action on or confrontation with the environment causes a cognitive disequilibrium, such as a sexual experience, the process of equilibration occurs. The restoration of balance through assimilation (forcing the stimuli to fit the structure) or accommodation (forcing the structure to fit the stimuli) occurs when a decision is made and cognitive equilibrium is restored. This balance represents the construction of or reconstruction of the adolescent's cognitive structures (schemata). When the adolescent has achieved a balance with his environment, a cognitive organization and adaptation has occurred, with a subsequent behavioral outcome of contraceptive use or non-use.

Adolescence in primitive cultures was marked by an earned transition from childhood to adulthood. Children were accepted into adult society only after they had passed through a testing and teaching ritual, known as a "rite of passage" (Jones, 1978, p. 113). Typically there were three stages: a separation of the initiate from the

Figure 2

A SCHEMATIC ILLUSTRATION OF PIAGET'S THEORY OF COGNITIVE DEVELOPMENT IN RELATIONSHIP TO THE ADOLESCENT'S DECISION MAKING REGARDING THE USE OR NON-USE OF BIRTH CONTROL.



previous social group, a transition where arduous and sometimes dangerous learning ordeals were experienced, and finally re-integration where the individual was incorporated into society on a new set of conditions as an adult. The distinctive power of these rites was that they accomplished and celebrated transformation in a single stroke.

Adolescence is described by Kimmel (1985, p. 2) as a developmental stage that refers to "the period of life between childhood and adulthood". Adolescence today is most often viewed from biological, psychological, social or legal parameters. The precise ages at which adolescence begins or ends are debated in the literature. The most obvious signs of adolescence are the physical changes associated with puberty; less obvious are the changes in cognitive development.

Adolescent development has always been a matter of concern to parents, educators, and health care providers. Many theorists have tried to account for the unique characteristics of adolescence. Freud (1946) and Erickson (1959) gave rationale for affective and social aspects of adolescent behavior, behaviorists often avoided adolescents, and educators and psychologists, while writing volumes on the subject of adolescence, paid little attention to the intellectual development that Piaget identified in adolescence. Piaget recognized the roles

that maturation and sexual awareness play in adolescence but he felt these variables were inadequate explanations of adolescence. Piaget viewed pubertal changes as secondary to the cognitive development of an adolescent. His explanation of adolescent behavior is consistent with the rest of his theory. He saw adolescent thought and personality as a normal outgrowth of development. His description of cognitive development before and during adolescence accounts for the unique characteristics the adolescent exhibits. He believed that these characteristics were in part due to the child's level of cognitive development and egocentrism of thought (Wadsworth, 1984).

However, the most frequently used dimension for identifying adolescence in the educational and psychological literature is chronological age with accompanying physical signs that are observed through the growth and development of secondary sexual characteristics. These physical signs include rapid height and weight gain, growth of pubic and axillary hair, nocturnal emissions and increased size of the testes and penis in males and the development of breasts, height increase, growth of pubic and axillary hair and first menstruation in females (Table 4). Since the age range of onset and completion of puberty is so varied for both sexes the Tanner staging for males and females is frequently used by health care providers (Tables 5-A and 5-B).

Table 4

THE SEQUENTIAL PHYSICAL CHANGES OF PUBERTY

<u>Adolescent Female</u>	<u>Adolescent Male</u>
1. Breast bud (Thelarche)	1. Early testicular growth
2. Pubic hair development (Pubarche)	2. Pubarche
3. Height velocity peak	3. Testicular and penile growth
4. Menarche	4. Nocturnal emissions
5. Axillary hair	5. Height velocity peak
6. Final pubertal changes	6. Marked voice changes
	7. Facial hair growth and final pubertal changes

Greydanus, D. E., & McAnarney, E. R. 1981. Chapter on Adolescence.
 Unpublished manuscript. The University of Rochester School of
 Medicine and Dentistry. Division of Biosocial Pediatrics and
 Adolescent Medicine, Rochester, NY.

Table 5-A

TANNER STAGING IN MALES

Stage	Testes	Penis	Pubic Hair	Range (yrs.)
I	No change. Testes 2.5 cm or less.	Prepubertal	None	Birth to 15 years
II	Enlargement of testes, increased stippling and pigmentation of scrotal sac.	Minimal or no enlargement.	Long, downy hair often occurring several months after testicular growth. Variable pattern noted with pubarche.	10-15 years
III	Further enlargement. Peak height spurt usually between III-IV.	Significant penile enlargement, especially in length.	Increase in amount, now curling.	10.5 - 16.5 years
IV	Further enlargement. Axillary hair develops, as well as some facial hair.	Further enlargement, especially in diameter.	Adult type, not distribution.	Variable; 12-17 years
V	Adult size. 20% have peak height velocity now.	Adult size. Body hair, increase in musculature and others continues for several months to years.	Adult distribution (medial aspects of thighs, linea alba)	13-18 years

Tanner, J. M. 1978. Fetus Into Man: Physical Growth from Conception to Maturity. Cambridge, MA: Harvard University Press.

Table 5-B

TANNER STAGING IN FEMALES

Stage	Breasts	Pubic Hair	Range (yrs.)
I	None	None	Birth to 15 years
II	Breast bud (Thelarche): areolar hyperplasia with small amount of breast tissue. Peak height velocity often occurs soon after Stage II.	Long, downy pubic hair near the labia. May occur with breast budding or several weeks or months later (Pubarche).	8.5-15 years (some use 8 or 8.5 years)
III	Further enlargement of breast tissue and areola. 25% develop menarche in late Stage III.	Increase in amount of hair with more pigmentation.	10-15 years
IV	Double contour form: areola and nipple form secondary mound on top of breast tissue. Most develop menarche in Stage IV, 1-3 years after thelarche.	Adult type, not distribution.	10-17 years
V	Larger breast with single contour form. 10% develop menarche in Stage V.	Adult distribution.	12.5-18 years

Early adolescence is identified by the multiplicity of marked, rapid physical changes that occur during this period. Very early development or very late development can cause a state of disequilibrium for the adolescent, both physically and socially. Early adolescence is often characterized by a quest for identity and a level of comfort with the body's physical changes. Friends, especially friends of the same sex, become important as adolescents compare their growth and development with the growth and development of their peers. Dependent and independent struggles occur, as the adolescent begins separation from parents. The adolescent vacillates between adult and childlike behavior, demonstrated by criticism of parents, resisting discipline, ignoring favorite hobbies, and often refusing family activities.

Middle adolescence is marked by fads, music, and experimentation. Experimentation allows the adolescent to experience adult behaviors and prove oneself, especially to one's peers. The peer group as identified earlier becomes a mini-societal system where the adolescent can test his or her new image. This feedback mechanism from the peer group acts as a proving ground for the adolescent's self-concept, cognitive development, social behavior, independence and emotional stability (Piaget, 1932, 1965). The peer group plays a major role in bringing the adolescent's development to a higher level.

This group is a primary influence as the parental role declines and independence is sought. The peer group gives the adolescent a sense of belonging during a time when the adolescent is neither a child nor an adult. Within the peer group there exists an intense pressure to conform to its particular culture. It is the peer group that influences specific adolescent behaviors such as sexual experimentation.

Late adolescence is most characterized by the adolescent's advanced cognitive abilities. With more advanced formal operational thinking the adolescent looks at the abstract, questions values, life, death, war, and religion. The adolescent has an awareness of others' strengths and limitations while developing their own value system and philosophy of life. The peer group loses its importance as the adolescent moves towards total independence. Decisions about the future take precedence as a need for continued education and a search for a life profession become important.

When does adolescence end? Some sources state it is the social age that determines adulthood; when one has committed himself to definite social roles, value systems, and life goals. Piaget notes adulthood is attained only when a final equilibrium is attained by the adolescent--that is:

" . . . when the adolescent strives to enter the adult world and works at a real job. This effort

necessarily generates disequilibrium as the logical adolescent is confronted with the view of others who have adapted their reasoning to a world not always ordered so simply" (Wadsworth, 1984, p. 171).

Adolescent decision-making begins with a challenge of making a choice. Decision-making is a process going on in people's minds, as expressed by Fishburn in the following statement.

"A decision is a deliberate act of selection, by the mind, of an alternative from a set of competing alternatives in the hope, expectation, or belief that the actions envisioned in carrying out the selected alternative will accomplish certain goals. Decision is the selection of mental state: it is a commitment to certain actions or inactions. Other people may observe our actions but they do not directly observe our decisions" (Fishburn, 1972, p. 21).

Janis and Mann (1977, p. 11) did an extensive literature review and extracted seven major criteria for making ideal decisions. The decision-maker:

1. looks at full range of alternative choices.
2. surveys the objectives to be fulfilled and the values implicated by the choice.
3. weighs the risks/benefits.
4. searches for new information relevant to the alternatives.
5. correctly assimilates new information even when not consistent with his own course of action.
6. re-examines the risks of all the alternatives.
7. makes detailed provisions for chosen course of action.

While this current study examines adolescents' ability to make decisions in relationship to their use of birth control, very few studies were found to examine

adolescent decision-making as related to the adolescent's stage of cognitive development and ability to make future-oriented health decisions. Maskay and Juhasz (1983) state that adolescents must first be able to process information relative to their sexual behavior before making responsible sexual decisions. Piaget also felt in order to understand cause-and-effect relationships, form hypotheses, think in the past and present, and predict the future, one must be in the stage of formal operations of cognitive development. Cognitive development, specifically the stage of cognitive development, is seen as an integral part of appropriate decision-making. (Refer to Figure 1, p. 16, for illustration of these concepts.)

Birth control is any method used to control the number of children conceived. This includes devices used by male and female through the use of prescriptive or non-prescriptive methods. These methods include oral contraceptives, diaphragm, condom and vaginal contraceptives such as foam, jelly, cream, and suppositories. The permanent methods, such as sterilization, vasectomy, abortion or non-prescriptive method of fertility awareness, will not be included in this study. The age of the adolescents and the possible psychosocial implications of these methods make them inappropriate for this project. The terms "birth control", "contraception" and "family planning" are used interchangeably within the study.

Rationale for use of a cognitive developmental screening tool. Most frequently chronological age is used as the criterion for judging readiness for learning. Grade level and school achievement are also used, while others depend on direct interaction with the adolescent to determine ability to understand and utilize information. Too often, though, the level of cognitive development is not considered, nor is it systematically screened by any criterion.

Inhelder and Piaget (1958) proposed that the formal operations stage is characterized by thinking about thought and a reversal of relations between what is real and what is possible. "Thus reflective thought and the ability to consider all possible combinations of events are central ingredients of adolescent thought" (Leskow & Smock, 1970, p. 412). The adolescent now becomes capable of reasoning correctly about propositions he does not believe. This ability marks the beginning of hypothetico-deductive reasoning.

As a result of this reasoning (the beginning of formal thought), the adolescent is able to establish any relations or classes by bringing together any elements singly, in twos, threes, etc., culminating in a combinatorial system or permutation (Piaget & Inhelder, 1969). The Leskow and Smock 1970 Permutation Task is a combination task used to determine the level of cognitive

development. This instrument has been infrequently used in health care although it has existed since 1970. Leskow and Smock in 1970 (Leskow & Smock, 1970) and Sachs in 1985 (Sachs, 1985) successfully used this instrument in their research. The instrument was shown to be valid and a systematic measurement of adolescent cognitive development.

One of the major public health and social concerns of this century in the United States is unplanned adolescent pregnancy. The United States has the highest birth rates among 15- to 19-year-old women in the western world (Rosenfield, 1981). As a result of this statistic, one of the national health objectives for the 1990s is the prevention and reduction of unintended adolescent pregnancy. A standardized tool for measuring the adolescent's stage of cognitive development would promote adolescent counseling and education at the appropriate cognitive level, facilitating the national health objective. Consequently in this study the proposed assessment tool for measuring the adolescent's stage of cognitive development will be the Leskow and Smock Permutation Task Instrument.

Summary

In summary, a conceptual framework adapted from Piaget's theory of cognitive development, illustrating the relationship between adolescent cognitive development and ability to make appropriate decisions concerning the future (birth control), is presented. The rationale for use of the proposed research instrument (Leskow and Smock Permutation Task Tool) is also presented. Literature pertinent to this framework and adolescent cognitive development as it relates to health decisions, specifically the use of birth control, will be reviewed in Chapter III.

CHAPTER III

LITERATURE REVIEW

Introduction

In this chapter, literature relevant to the major areas of study is reviewed. The chapter is divided into the following literature categories: an overview of the problem of adolescent pregnancy, and the older, adolescent research that served and may serve as a basis for current adolescent studies and future studies, adolescent decision-making as related to health issues, and those studies that looked at adolescent cognitive development and the influence on the adolescent's use or non-use of birth control. It is beyond the scope of this study to review all the literature that pertains to adolescent decision-making and adolescent birth control risk-taking behavior. Therefore this review of the literature is concept specific to the framework of this study. A literature review summary is included which clearly illustrates the need for this study and future research.

Overview of Adolescent Pregnancy Problem

Over the past decade adolescent pregnancies in the United States have continued to increase and raise the consciousness of this nation to a level of real concern.

Research focusing on adolescent pregnancy and the use or non-use of birth control have increased and health care practices have been modified in an attempt to reduce the number of adolescent pregnancies.

Twelve million adolescents are sexually active in the United States today; approximately five million are female and seven million are male (Davis & Harris, 1982; News and Reports, 1981; Zelnik & Kantner, 1980). The average age that adolescent girls become sexually active is currently sixteen. Over one million, or one in ten below the age of 20, of these sexually active girls become pregnant each year (Jaffe & Dryfoos, 1980). Four percent of the pregnant adolescents give their infants up for adoption (News and Reports, 1981; Reynolds & Birch, 1977; Roosa, Hiram & Carson, 1982; Smith, 1982; Smith, Weiman & Mumford, 1982; Wallace & Medina, 1982). Of the 96%, adolescent mothers who keep their babies, less than half marry, which means the majority are single parents. Younger teens get fewer abortions; consequently the birth rate of 14- to 15-year-old adolescent girls is rising (Morrison & Jensen, 1982) and over 11,000 single mothers are age 14 and younger (Davis, 1980).

Adolescents represent 18% of the sexually active population in the United States who are capable of becoming pregnant. These adolescents account for 46% of all out-of-wedlock births and one-third of all legally

induced abortions (News and Reports, 1981). Adolescents have one-fifth of all births in the United States each year (Davis, 1980; Morrison & Jensen, 1982).

The consequences of adolescent pregnancy are not always bad but there are sufficient adverse health, economic, social, and emotional outcomes currently documented to warrant a greater commitment to the prevention of unintended adolescent pregnancies. Adolescent pregnancy is given as the major reason that no more than 50% of adolescent parents graduate from high school. Of school-age mothers under the age of 15, four in ten do not complete eighth grade; nine in ten never finish high school. Of school-age mothers 17 and under, eight of every ten never complete high school (Morrison & Jensen, 1982). These adolescent mothers consequently lack job skills and resources to competitively enter the job market. Their income is one-half that of those mothers who first gave birth in their 20's. One-half of ADC's nine million dollars invested in 1979 went to these adolescent mothers (Wallace, Weeks & Medina, 1982).

Adolescent mothers often suffer alienation from their families and negative social pressure (Morrison & Jensen, 1982). Higher marriage failures of adolescent parents account for some of the changes in the American family structure. One in five adolescent marriages breaks up in the first year, one in three dissolves in two years, and

three in five of these couples divorce or separate within six years (Morrison & Jensen, 1982).

The American society has always been reactive to rather than preventive of social problems and adolescent pregnancy is no exception. Reaching sexually active adolescents becomes particularly important when one considers that one-fifth of teen pregnancies occur in the first month after initiation of intercourse and one-half occur in the first six months of intimacy (News and Reports, 1981). Merely providing information is not enough. Davis and Harris (1982) suggest that there seems to be little relationship between measured knowledge about reproduction and contraceptive behavior among adolescents.

A Historical Review of Adolescent Literature

Prior to the late 1960s there was virtually no social or psychological research on adolescent sexual development and cognitive development as related to adolescent health behaviors and only a few studies used adolescents as respondents for any of the research. However, in the mid-60s a rise in the number of babies born to adolescents outside of marriage stimulated a flurry of adolescent research that focused on contraceptive non-use and unplanned pregnancy.

Chilman (1980), in her article on social and psychological research concerning adolescent childbearing (1970-1980), identifies Ira Reiss as a pioneer in the field of

adolescent sexuality research with the 1967 publication of a large study of attitudes towards various kinds of pre-marital sex behaviors by male, female, white, black, high school and college students. By 1971 Zelnik and Kantner launched their national probability samples of 15- to 19-year-old women and their contraceptive use. Zelnik and Kantner (1971) surveyed 4,600 females, focusing on the incidence and frequency of intercourse, pregnancy, abortion, contraceptive use and knowledge about reproduction with the demographic variables being considered during the data analysis. This early study, while an excellent source for female sex and contraceptive behavior, has little theoretical base because the study leaves out attitudinal and psychological factors. Simple percentages are used instead of more elaborate statistical analysis, and males are also excluded. Zelnik and Kantner replicated their study in 1976 and reported their findings in 1977, 1978 and 1979. Finally, in 1979, Zelnik and Kantner surveyed a male sample with Ira Reiss.

In 1972, Sorenson studied over 400 boys and girls of high school age. Though serious bias exists due to loss of more than half of the sample because of parental objection, Sorenson did show important data about adolescent males and offered clues to further research. Vener, Stewart and Hager (1972) and Vener and Stewart (1974) studied 1,000 white high school students in a

Michigan community over a three-year period (1970-1973) for changes in sex behavior. Again these studies were not theoretically focused but the research did provide significant information on the differences between adolescent groups as related to intimacy behaviors. Jessor and Jessor (1975) presented a four-year longitudinal study involving primarily white high school and college students, based on Rotter's social learning theory. A variety of environmental and personality variables were surveyed annually. Though 50% of the study's sample was lost by attrition during the three-year period, its theory-based research design and rigorous statistical analysis provided an excellent model for further social and psychological research.

Lindemann (1974) interviewed a non-random sample of 2,500 girls between the ages of 13 and 16, considering ages of contraceptive use but the convenience sampling hindered generalizing the results. Luker (1975) posited a decision-theory model of contraceptive behavior. He used the subjective expected utility model (SEU) for the framework of decision-making. He used 500 middle-class females, almost all of whom were white, from a California abortion clinic. While all respondents were a convenience sampling of mostly white, middle class females, and only some of the study's population were adolescents, the research does offer valuable insight into cost/benefit

decisions by female use or non-use of contraceptives.

Furstenberg (1976) conducted a five-year, also non-random, sociological study of primarily black, low-income females as they progressed through their life events, but the small sample size convenience sampling and demographics hindered the generalizability of his findings. Cvetkovich and Grote, in 1975 and 1976, used a convenience sample of black and white, male and female adolescents to investigate sexual and adolescent behaviors, demographics, values, attitudes and feelings about self. Though the sample may be biased secondary to being a convenience sample, sophisticated multivariate analysis was used, offering important clues to cost/benefit decision-making by adolescents.

Several of the most consistent findings in the early 1970 literature were: an awareness of self being sexually active as a precondition necessary for adequate contraception with negative personality characteristics and lack of knowledge being responsible for ineffective contraceptive practice. The early adolescent research frequently had methodological problems related to control or comparison groups, sampling procedures, sample size, objectivity of variables, timing, and study duration. Of interest, and a very important finding for this study is that few researchers addressed the relationship of the

adolescent's level of cognitive development to contraceptive attitudes, decision-making or behavior.

Yet some researchers did cite or infer there were cognitive reasons for adolescents' difficulty with contraceptive decision-making. Cvetkovich (1975) and Rutherford (1976) indicate that adolescents lack critical skills for self-analysis. Nadelson, Notman and Gillon (1980) stated adolescents lack futuristic thinking. Diamond, Steinhoff, Palmore and Smith (1973) believe that rational decision-making is not part of the adolescent's repertoire, while Cobliner (1974) claims this adolescent irrationality is due to the adolescent's level of cognitive development. Kantner and Zelnik (1973), Zelnik and Kantner (1977), Cvetkovich, Grote, Liebermann and Miller (1978), and Chilman (1980) found the older the adolescent at the time of first intercourse the more likely that birth control would be used. Zabin, Kantner and Zelnik (1979) agree, in their study conclusion, that the younger the adolescent begins sexual intercourse the less likely birth control will be used. However, none of these researchers correlated findings with the adolescent's stage of cognitive development. This neglect of the adolescent's cognitive development may be due to the researchers' focus on concrete, observable behaviors and immediate change, rather than change over time. Yet cognitive developmental theory is basic to achieving an understanding of

adolescent development, adolescent interpersonal problem-solving and adolescent decision-making.

Finally, in 1978, legislation was passed by Congress to address the specific problem of adolescent pregnancy: the Adolescent Health Services, and Pregnancy Prevention and Care Act, Title IV of the Health Services and Centers Amendments (P.L. 95-626). Under this act, the Office of Adolescent Pregnancy Programs was organized in the Health Services Administration of the Department of Health and Human Services to administer grants to comprehensive pregnancy programs with linked curative services on one site. Congress authorized \$60,000,000 for these services but during the first year (1980) only \$1,000,000 actually was appropriated and only \$10,000,000 in 1981, a clear indication of the low priority the government set for the problem of adolescent pregnancy (Dryfoos, 1982).

During this same time period, Congress recognized the importance of expanding the scope of family-planning services for adolescents and related education programs. Consequently, family planning clinics are supported by project grants through Title X of the Public Health Service Act (P.L. 94-63). These funds also support the Center for Population Research of the National Institute of Child Health and Human Development, National Institutes of Health. Medicaid Title XIX and social service moneys, Title XX of the Social Services Act, state funds and fees

are also funneled into family-planning services. Family life programs and sex education programs are supported through the Department of Education and the Office of Health Education (Center for Disease Control) (Dryfoos, 1982).

Though many family planning programs exist, they are often fragmented and uncoordinated. Even the research in family planning lacks a unifying model or methodology. Despite investigations done regarding the relationship of demographics, personalities, environmental and learning factors to adolescents' use of birth control, questions still remain about their inter-relationships. Historical trends in sexual mores and an ambivalence in society about who is responsible--parents, schools, or health care clinics--have also caused conflicts that have consequently thwarted many efforts aimed at finding a resolution.

Contraceptive technology adds to the confusion as controversy about failure rates, side effects, and efficacy of use is compounded by the psychology of their use. The birth control pill requires long-term planning and while the pill is the most effective birth control method available, excluding sterilization or abstinence, the adolescent does not always recognize the need for future-oriented planning as identified by Piaget's theory on cognitive development. Early intervention is the key to assisting adolescents to prevent pregnancy and handle

their sexuality in a responsible way. A strong need for comprehensive and especially coordinated research on adolescent cognitive development as related to their sexual behavior has been identified. None of the prevailing theories or approaches up to this time has resulted in a method, a program, or an approach which has significantly altered the contraceptive behavior of sexually active adolescents towards preventing unintended pregnancies.

Adolescent Decision-Making Process

A decision is a deliberate act of selection by the mind, a selection of a mental state, a commitment to certain actions or inactions. Other people may observe our actions but they do not directly observe our decisions (Fishburn, 1972). Decision making can also be portrayed as a process going on in the minds of people. The process develops a plan with a proposed course of action towards a specified or desired goal. Applied to adolescents, active decision-making is defined as the adolescent consciously taking cognitive action in making the decision. The passive decision-making process occurs when the adolescent does not consciously participate in the cognitive process of making a decision. The sexually active adolescent must first recognize that there is a problem to be solved and that non-use of birth control may result in a pregnancy. The adolescent making an active decision (regarding birth

control) must (1) expect to have sex, (2) possess knowledge about birth control and pregnancy prevention, (3) know where to obtain birth control and acquire the necessary birth control materials, and (4) apply the birth control method to his/her body. This decision then becomes a public proclamation that he or she is indeed sexually active.

The four critical factors that Piaget identified as necessary for cognitive development are maturation, equilibration, social interaction, and active experience. The interaction of these variables which may differ from individual to individual, are essential for the adolescent's cognitive development. These factors define the stage of the adolescent's cognitive development and impact the cognitive process of decisions about birth control (Figure 2).

Few investigations on decision-making have exclusively studied adolescents and even fewer have related adolescent decision-making to adolescent cognitive development and contraceptive use or non-use. The Ajzen and Fishbein Behavioral Model (1972) has been useful in predicting behavior. Ajzen and Fishbein (1972) contend the best predictor of a behavior is a person's intention to engage in that behavior. However, many of the sexually active adolescents in the concrete thinking stage do not have the ability to cognitively comprehend their future

intentions. Cognitive comprehension calls for thinking about the abstract, a component of formal operational thinking, often not attained until late adolescence or even adulthood.

Jaccard and Davidson (1972), Werner and Middlestadt (1979), McCarty (1981), and Pagel and Davidson (1984) all utilized the Fishbein model in some way, looking at contraceptive use by college students. These four studies found positive correlation between women's attitudes towards and intention to use contraceptives. Their positive attitudes towards birth control influenced their intent to use birth control. However, two problems are observed when relating these investigations to the current study. One, the women are older (college age) and the level of cognitive development is probably more advanced, making their decision-making skills different from those of the younger adolescent. Two, an assumption of knowledge about contraceptives was made which may not be true of the younger adolescents.

Luker, in her book Taking Chances: Abortion and Decision Not to Contracept (1975), proposed a theoretical structure for explaining contraceptives risk-taking among women of all ages. She determined that the informed decision not to use birth control is being made consciously and rationally. While an interesting study, the shortcomings of this work lie in the small sample

size, the wide age range, purposeful selection of subjects, and a sample that consisted entirely of abortion recipients, making it impossible to generalize to adolescents or any specific age grouping of women other than the childbearing years.

Rogel, Peterson, Richards, Shelton and Zuehlke (1979) tested Luker's 1975 theory that contraceptive decision-making results from application of rational decision-making through a cost/benefit approach. They studied 120 predominantly black adolescents, 12 to 19 years of age, and found adolescents just "took a chance", concluding that though cost/benefit analysis was a factor in adolescent contraceptive decision-making, adolescents cannot make effective decisions because they are not able to identify all the potential alternatives available. The adolescents' cognitive level limits their ability to weigh cost/benefit factors and generate multiple options. This finding supports the theory that adolescents in the concrete stage of cognitive development cannot think abstractly and project into the future.

Cvetkovich and Grote (1981) investigated developmental factors influencing adolescent women's contraceptive decision-making with their first sexual partner. A discriminant function analysis of 87 randomly and non-randomly sampled 17- to 19-year-old high school females was utilized for cost/benefit decision-making. They

analyzed decision-making, communication, and psychosocial maturity as related to contraception and found that use was characterized by developmental factors and psychosocial costs of contraception. The findings from this study are supportive of the current study in that the older the age of the adolescent's sexual debut (presumably more mature), the greater likelihood that the adolescent will use birth control. However, there were five biases in the research: the sample was (1) relatively small, (2) only partially random, (3) all female, (4) all in late adolescence, and (5) the study was not longitudinal.

Rosen, Ager, and Martindale (1979) investigated the relationship between preconception and postconception decision-making among women who have unplanned pregnancies. Two dimensions of self-concept were used as factors in decision-making patterns: perceived competence, and female role orientation. This study was done in Michigan in 1974-1975. The sample consisted of 1,746 women with unwanted conceptions, selected by means of a two-stage, stratified sampling design. A standardized questionnaire was used for demographics and background information, and two scales measuring feminism and competence were utilized. Important predictors of pregnancy resolution decisions included prior use of contraception, traditional attitudes, mother's influence, partner's influence; significant demographic predictors were age and race.

While the Rosen, Ager, and Martindale research does not consider the adolescent's stage of development in relationship to decision-making regarding the use of birth control, they did find in their research that the older the woman (average age 22.4 years), the more likely she was to report past contraceptive use with the intent to use birth control in the future. In the group of women who were younger (average age 18.3 years), less than half reported having used birth control in the past. This finding again indirectly supports the theory that the older the woman (presumably at a higher level of cognitive development), the more likely she is to use birth control, thus demonstrating concern for her future.

Rosen and Ager (1981) studied the extent to which two dimensions of self-concept, perceived competence, and attitudes towards the female role, are factors in pre-conception decision-making on contraceptive usage among women who have unwanted conceptions. They used the same sample they had used in their 1979 research. Contraceptive usage was positively associated with perceived competence and negatively associated with traditional attitudes toward the female role. In the step-wise multiple regression analysis these variables were second only to age as predictors of the preconception decision. Once again they found age to be the best predictor of prior birth control use. The most contraceptive usage

was reported by women over 18 years of age and the least contraceptive usage was reported by the women under 18 years of age.

Five possible research biases were identified: the inclusion of only women, women who were already pregnant, married and unmarried women, covering a large age span (no age parameters were noted), and consisting mostly of women seeking abortion. These limitations reduce the generalizability of the study to the current problem under study but indirectly support maturity as a factor in the use of birth control.

Kastner (1983) utilized 12 scales assessing social permissiveness, costs and benefits of contraception, parent communication, boy friend support, sex education and knowledge, attitudes about pregnancy and contraception, and access to contraception services that might predict adolescent contraceptive use. The study was conducted in 1978 on the East Coast. The sample of 230 predominantly black females, 15 to 18 years old, was drawn from a comprehensive health care program for low-income families. The research findings indicate parent communication, boyfriend support, and perceived costs and benefits as the best scales for predicting regular use of contraception. However, Kastner does postulate that adolescent developmental and emotional issues involved in sexuality may be influential in the use of contraceptives.

Blum and Resnick (1982) examined sexual decision-making and development in a non-random sample of 206 adolescents (female, average age 17.1 years) already sexually active. The researchers recognized six developmental factors: ego development, locus of control, future time perspective, moral development, sex role socialization, and irrational beliefs. The developmental factors were then correlated with those successful adolescent contraceptors, aborters, currently pregnant adolescents and those adolescents already mothers. Findings showed aborters to have the most developed future time perspective, and adolescent mothers had the least developed future time perspective. No distinguishing findings were evident in the pregnant adolescents, possibly because pregnancy leaves several viable options. Contraceptors also had highly developed future time perspective, higher ego development, modern sex role orientation, and more internal locus of control. These findings may indicate that adolescents in the cognitive developmental stage of formal operations make better decisions and more future-oriented choices than those adolescents whose developmental stage is less advanced. Though the researchers allude to this possibility, they have not included this aspect of adolescence in the research cited.

Of particular significance to the current study is the research in which Sachs (1985) investigated contraceptive

decision-making of 86 black, unmarried adolescents (age 14 to 19 years) in relationship to cognitive development. The sample subjects were from working-class families and from three urban family-planning clinics. The Sachs (1985) study investigated how cognitive development affects contraceptive decision-making.

Hypotheses for this study were ordered hierarchically with the stage of cognitive development considered the key variable for predicting decision-making. Self-determination and previous exposure as influencers of cognitive development were considered to be of secondary importance. Decision-making abilities were explored in both contraceptive and non-contraceptive situations.

The hypotheses tested in this Sachs study were:

(I) Stage of cognitive development is positively correlated with, and the best single predictor of, contraceptive and non-contraceptive decision-making abilities in female adolescents.

(II) Self-determination is positively correlated with, and contributes significantly to, the prediction of contraceptive and non-contraceptive decision-making abilities in female adolescents.

(III) Previous exposure to contraceptive situations is positively correlated with, and contributes significantly to, the prediction of contraceptive decision-making abilities in female adolescents.

(IV) Relevant knowledge, as a necessary but insufficient factor in adolescent decision-making, will have a low positive correlation with, and contribute least to, the prediction of contraceptive decision-making abilities in female adolescents.

(V) Stage of cognitive development is a better predictor of contraceptive decision-making abilities in female adolescents than is chronological age.

A descriptive/correlational design was used by Sachs to test the hypotheses and data were collected using interviews and questionnaires. Data supported hypotheses (I) and (II), as expected, but hypothesis (III) was not supported. Hypothesis (VI) was moderately supported, contrary to the postulation, but when a secondary analysis was done, the research revealed that relevant knowledge, without the cognitive skills to manipulate the knowledge, is insufficient to explain much variance in contraceptive decision-making abilities. Hypothesis (V) was partially supported. While decision-making was negatively correlated with age, age did make a significant contribution in explaining contraceptive decision-making abilities. Adolescent decision-making has been studied from different perspectives, however, the single most significant factor in the prediction of contraceptive decision-making is the stage of cognitive development as identified by Sachs in her 1985 study.

Limitations of the study were: all the research respondents were black females, all from similar backgrounds, and all utilized family-planning clinics. Length of questionnaire was thought to be excessive where time is critical, such as in a clinical or classroom setting. Recommendations by Sachs for further research include using a shorter questionnaire, a heterogeneous population from multiple settings, and intervention strategies with longitudinal follow-up.

Adolescent Cognitive Development in Relationship to Decision-Making Regarding Contraceptive Use or Non-Use

The late 1960s and 1970s were proliferated with studies concerning demographic, situational, and psychological variables associated with adolescent non-use of contraceptives. This research was a direct result of the increased adolescent unplanned pregnancy rate. Government focus and financial support stimulated researchers from multiple disciplines to focus on identifying why adolescents do not contracept. Fifteen years ago, Kantner and Zelnik (1973) found that adolescents do not plan protection. The younger the adolescent, the less likely the adolescent is to plan to contracept, and the older the adolescent, the more likely he/she is to use contraception. The decision by older adolescents to use birth control supports the theory that adolescents at a higher level of cognitive development are cognitively better able to make decisions involving the future. Zelnik and

Kantner repeated these same findings in 1977 and 1979, as Zabin, Kantner and Zelnik did also in their 1979 research. Harney (1976) presumed that a person who controlled her destiny would not risk an unplanned pregnancy. Jones and Philliber (1982) concurred with Nadelson (1980) after their research of teens who risk and teens who plan, that younger adolescents lack cognitive consistency and may lack future orientation to be effective contraceptive users. Though multiple studies alluded to the fact that adolescent contraceptive non-use might be related to the adolescent's current stage of cognitive development, none, until recently, pursued this possibility through research. None of the early researchers even postulated why adolescents frequently do not have a cognitive future orientation or went on to relate this concept to the sexually active adolescent's contraceptive risk-taking behaviors.

In 1975, Cvetkovich, Grote, Bjorseth and Sarkissian discussed the psychology of adolescents' use of contraceptives. They describe adolescent contraceptive use as irrational. This notion is reinforced by sexually active adolescents who have had the benefit of sex education and access to contraceptives and still do not use contraception. In an effort to explain this phenomenon, the researchers discuss the cognitive and emotional development typical of the adolescent years, particularly the egocentric nature of intuitive adolescent thought. Given

the apparent pervasiveness of adolescent irrationality, little research has conceptualized contraceptive use in these terms. Cvetkovich, Grote, Bjorseth and Sarkissian go on to say that the most dominant model in past research has been "a one-to-one relationship between expressed attitudes and contraceptive behavior" (p. 259). They identify three problems with the past research: lack of longitudinal studies, lack of analysis of male adolescents regarding contraception, and the frequent use of convenience populations, usually from clinical settings.

Cvetkovich, Grote, Bjorseth and Sarkissian identify the major task of the adolescent years is the "mastery of thought" (p. 260). This theory is also supported by Elkind (1967), Flavell (1963), Looft (1972), and Piaget (1967). How the adolescent makes this transition is particularly important when studying the problem of adolescent sexual activity, and non-use of contraceptives. Adolescents are making decisions about contraception when they may not yet view themselves in terms of being sexual and when they are yet unprepared to analyze themselves. The use of contraception requires a certain amount of premeditation as well as objective thinking. Many adolescents, especially girls, are not ready to admit to their sexual desires and do not want to risk being viewed as "that kind of girl" (the imaginary audience, p. 31).

The article by Schinke, Gilchrist, and Small (1979) supports the cognitive approach as a means of primary

prevention aimed towards decreasing unplanned adolescent pregnancy. In 1980, Nadelson, Notman, and Gillon supported the developmental approach through their research on sexual knowledge and attitudes of adolescents in relationship to contraceptive use. They questioned 296 adolescents (average age 16.3 to 17.3 years), most of whom were pregnant, with regard to sexual activity, contraceptive practice, relationship of sex education to use of contraceptives, methods of coping, and family relations.

These findings suggest that responsible contraceptive planning may be at variance with the developmental stage of the adolescents; however, they do not specifically identify development in terms of cognition. The sample study recipients may be biased since the adolescents are already pregnant, as pregnancy may have had an effect on the adolescent's response. Limitations of this study are: the population appears not to be a random selection, the age of the respondents was limited to a single year, the respondents were considered to be in late adolescence, the statistics were offered in percentages, and most of the recipients were already pregnant.

Marcy, Brown and Danielson (1983) examined 122 unmarried, sexually active 13- to 18-year-old adolescents in a prepaid health plan in relation to their level of knowledge, and time and method of contraceptive counseling.

They found that contraceptors and non-contraceptors did not differ in level of knowledge but that adolescents counseled by a developmental method rather than by a conventional method practiced contraception more effectively. The concern with this study may be in the counseling approaches, since no definition was offered as to how the conventional counseling method differed from the developmental counseling method. The sample was also a convenience sample of all females.

Pesttrak and Martin (1985) reviewed the literature concerning ego development, moral development, and attainment of formal operations. These authors found support for their proposal that although young adolescents are biologically capable of coitus, they may not have reached the level of cognitive development to be able to develop genuine intimacy, understand the complexity of interpersonal aspects of a mature sexual relationship and properly practice birth control (p. 981).

Blum and Stark, in their article entitled "Cognitive Development in Adolescence" (1985), focused on the changes in cognition associated with adolescence: the emergence of formal operational thought, future time perspective, abstract reasoning, and social cognition. They defined what these cognitive changes mean for the adolescent and how the professional can apply the knowledge about these cognitive changes in their clinical assessment.

Sachs (1987) found that instruments which can be easily administered in clinical settings and are sensitive in screening the level of cognitive development are not readily available. The instruments that have been utilized in the past are difficult and time-consuming to administer, especially in the clinical setting. A standardized tool for use with adolescents was identified by Sachs which could be used to systematically screen for the adolescent's cognitive developmental level--the Leskow and Smock Permutation Task (1970). Sachs explained that the ability to consider future consequences of present actions is the key to effective health decision-making. For the young adolescent who is probably still at the concrete operational level of cognitive development, there is a potential for serious consequences in high risk situations such as unprotected sexual intercourse.

Sachs utilized the Leskow and Smock Permutation Task instrument on 86 females in her 1985 study. She found that when cognitive level was compared with problem-solving ability in general interpersonal and contraceptive situations, it was significantly correlated ($r = .24$, $P < .01$, $f = .31$, $p < .01$, respectively), supporting the construct validity of this measure.

Implications from Sach's study (1985) support the use of an adolescent cognitive developmental screening tool in the clinical setting to provide a basis for appropriate

adolescent health teaching and counseling. Nursing interventions aimed at the adolescent's stage of cognitive development would help the adolescent to improve and increase decision-making skills, and possibly prevent risk-taking behavior that could result in an unintended pregnancy for the adolescent.

Summary

The two most important contributions on adolescent cognitive development and contraceptive decision-making in the recent literature are the Sachs research, "Contraceptive Decision-Making in Urban, Black Female Adolescents: Its Relationship to Cognitive Development," and her most recent research, "Cognitive Screening for Adolescent Health Education" (1987), which will be discussed in more depth in Chapter IV.

Almost every other article and research study on adolescent pregnancy or adolescent contraceptive non-use introduces the study with facts and information on adolescent pregnancy and "adolescence" as a stage of growth, development, and change. Most often researchers focus on the adolescent's demographic, situational, environmental, and psychological behavior, or on physical variables, and little is noted about the adolescent's cognitive growth or development. The variables most frequently researched are concrete facts, using instruments readily available for

measurement. Cognitive development is an abstract, complex, concept, and extremely difficult to measure. Few instruments are available that have successfully measured the relationship of cognitive development to an adolescent variable such as contraceptive use or non-use.

The scarcity of researchers examining the relationship between the stage of adolescent cognitive development and decision-making in contraceptive use or non-use, and the inconsistent or inconclusive findings found in the existing literature, have demonstrated the need for an easily administered tool to screen the adolescent's stage of cognitive development in the clinic or school, when predicting adolescent contraceptive behavior and when planning cognitive-appropriate decision-making materials for educational and counseling interventions.

The goal of this study is to provide nurses in advanced practice, other health care providers, and educators with an adolescent cognitive stage developmental screening tool; and to increase the professional's level of understanding of adolescent cognitive development so that the professional may facilitate the adolescent's use of birth control. This goal will ultimately result in a reduction of unintended adolescent pregnancies. In Chapter IV the methodology employed in this study will be presented.

CHAPTER IV

METHODOLOGY

Overview

In this chapter, the study sample, study site, and a screening tool to identify the adolescent's stage of cognitive development are presented. The instrument is discussed in terms of the proposed methodology for testing the instrument, the relationship of the adolescent's stage of cognitive development to the adolescent's decision to make future-oriented decisions such as the use of birth control, the instrument's proposed use in an adolescent setting, data collection, data analysis, and proposed application of data results to health teaching are discussed.

Sample

The study sample selected will include adolescents between the ages of 15 and 19 years, who are using or not using birth control, or considering or not considering the use of birth control. Since younger adolescents are already considered to be at a different level of cognitive development than older adolescents, the younger adolescent (ages 12 to 14 years) will be excluded from this study.

Study Site

The first study site for the screening will be an Ingham County school. The grades preferred will be the 10th, 11th, and 12th because of the probability of sampling differing levels of cognitive development. The sample of adolescents will be randomly selected from a local Ingham County high school for the study. The function of this screening will be to address the feasibility, reliability, and validity of this cognitive development screening tool. The sample size will consist of 100 adolescents matching the previously described socio-demographics. Based on the results of the study, assuming the adolescent cognitive development screening tool proves successful, the screening tool will then be used in multiple settings with other adolescents making future-oriented decisions, especially those decisions relating to the use of birth control. The major study hypotheses will be: There is a relationship between the adolescent's stage of cognitive development and the adolescent's ability to make future-oriented decisions, such as the adolescent's decision to use birth control.

Protection of Human Subjects

A complete explanation of the study will be presented to the University Committee on Research Including Human Subjects. The guidelines and procedures of this committee will be strictly adhered to; no research will be conducted

until committee approval is given. Participants will be assured of the freedom to refuse or withdraw from the study. Confidentiality and anonymity will be strictly maintained. In the event that questions or concerns by the participants might arise in the future, participants will be given the name and business phone numbers of the researcher.

Operational Definitions

I. Sociodemographic questions will be minimal, and used to control extraneous variables. The sociodemographic characteristics will be operationalized through inquiring about the adolescent's age, ethnic background, and religion (Appendix A).

II. A. Adolescent stage of cognitive development is viewed as the mental processes of reasoning, remembering, perceiving, and believing. It is a continuous process that follows a fixed course from birth through adulthood. These mental processes allow the person to adapt to the environment and organize the experience. This is the independent variable of the study and will be operationalized by the Leskow and Smock Permutation Task Screening Tool (Appendix B).

B. The decision to make future-oriented decisions such as the use of birth control is the dependent variable. This dependent variable will be operationalized by questions regarding the adolescent's

use of birth control, non-use of birth control, considering or not considering use of birth control, if currently sexually active or not sexually active, or has ever been sexually active (Appendix A).

Examination of the Screening Instrument

The Leskow and Smock Permutation Task Instrument has been in existence for some time but has not been widely used in clinical research or nursing practice. The Leskow and Smock instrument (1970) is a combination task used to determine adolescent cognitive development. Combination tasks require that the individual generate all the possible combinations of a set of elements. Permutation refers to the rearrangements (transformations) of the linear ordering of a set of elements. As the adolescent's cognition develops, his thinking becomes more orderly and a system is developed. For example, adolescents at a concrete level of development have patterns of more random production of combinations, while adolescents with formal operational thinking generate systematically patterned combinations (Leskow & Smock, 1970).

In the Leskow and Smock Permutation Task the subject is asked to identify (a paper and pencil test) as many four-digit combinations (permutations) of the numbers 1, 2, 3, and 4 as possible. For example, the numbers 1, 2, 3 can be arranged in six transformations: 123, 132, 231, 213, 312, and 321. According to Inhelder and Piaget

(1958), this type of task has several advantages: numbers are logical-mathematical entities which can be used to show general cognitive developmental tasks (Flavell, 1977); systemic combinational operations appear early in the development of formal operational thinking, while permutations occur later (Leskow & Smock, 1970); the task can be used to measure across cultures; minimal reading is required; and it can be administered and scored in three to five minutes (Sachs, 1985).

In 1968, Leskow performed a cluster analysis of both the process and product of the permutation task and found the three tasks of operation of permutations, initial marks held constant, transformations relatively independent measures. In 1970, Leskow and Smock indicated that mean permutations increased slightly with age, but that mean initial marks held constant tripled between 12 and 18 years of age, while the mean number of transformations increased from 1.7 at age 12 to 6.1 at age 18 (pp. 418-419). These two studies supported construct validity of the permutation task and were in the direction predicted by cognitive theory.

Proposed Methodology

Administration of the Task: Directions for administration of the Leskow and Smock Permutation Task are found in Appendix B. The task is not time limited but when Sachs (1985) used it to measure the cognitive level

of 86 adolescent females in family planning clinics, the time required was an average of less than four minutes. The adolescents with formal operational thinking were able to complete the 24 combinations within three minutes. Adolescents lacking this level of cognitive development became frustrated and ceased trying in less than five minutes. This brief time period demonstrated that the combination task can be quickly and easily administered without adding to clinic time.

Scoring: There are three steps involved in the Leskow and Smock (1970) scoring system: (1) the total number of correct permutations; (2) the number of initial marks held constant (the ability to separate the effects of several variables holding as many constant as possible--a clear sign of formal operational thinking (Inhelder & Piaget, 1958); (3) the determination of the pattern used in developing the permutations. However, when Sachs (1985) used the scoring system in the clinical setting, the complexity of identifying the pattern of responses was too time consuming.

Leskow and Smock also treated the cognitive developmental level as a continuous variable and, although theoretically correct, the results were not useful to the clinician. In 1987, Sachs proposed that cognitive developmental levels be classified into concrete and formal operational thinking, so that health education could be focused on one discrete level of cognitive

development. The first two steps follow Leskow and Smock's scoring system (1970)--(1) the total number of correct permutations generated, (2) the determination of the number of initial marks held constant, (3) the pattern used to develop the permutations is complex and time consuming. Instead, Sachs (1987) proposed combination scores be classified as representative of differing levels of cognitive development. There are a maximum of 24 combinations and 32 initial digits held constant. If 12 to 24 combinations are present with 16 or more initial marks held constant, formal operational thinking is present. Less than 12 combinations with 15 or fewer initial marks held constant is representative of concrete thinking. This scoring is consistent with cognitive developmental theory that states holding one or more variables constant while manipulating the others is evidence of formal operational thinking. The inability to hold marks constant is consistent with concrete operational thinking. The construct validity of the revised scoring method was demonstrated by Sachs (1985) where cognitive level was correlated with problem-solving abilities in interpersonal and contraceptive situations and found to be significantly correlated.

Data Collection Procedure: Adolescents fitting the criteria for inclusion will be approached by the researcher about participating in this study. The purpose of the study will be explained with assurance of confidentiality

and anonymity. An estimation of the amount of time and effort to complete the sociodemographic questionnaire and task test will also be given. After this explanation, and if a willingness to participate in the study has been expressed, a signed consent form will be obtained. A copy of the questionnaire and task test will be given to the adolescent. After completing both, the adolescent will return it to the researcher in a sealed envelope. At the end of the study, a debriefing letter will be sent or given to each participant, depending on their confidentiality status.

Data Analysis: A simple linear regression analysis will then be carried out to better describe the relationship between independent variable A and dependent variable B. The stronger the correlation of these two variables, the more accurate the study hypothesis.

Proposed Applications of Data Results to Health Teaching

The screening of cognitive development provides an informed basis upon which nurses and educators can plan specific teaching interventions. Two variables identified by Piaget for adolescent maturation that can be influenced by external stimuli are active experience and social interaction. Following the results of the cognitive developmental screening, the nursing interventions utilized will center on the adolescent's level of cognitive development. The health care professional's teaching

or counseling format will incorporate experiences and social interactions tailored to the adolescent's identified level of cognitive development. Information offered by the FCNS and other health care professionals will then be congruent with the adolescent's measured level of cognitive development. For example, if the adolescent is tested as a concrete thinker, health information will be provided in very concrete terms. Exploring how the adolescent made decisions in other situations often provides the FCNS with realistic options for health-related decisions, such as the use of birth control. The adolescent then requires guidance through the decision-making steps, including identification and clarification of the possible consequences of each option. The use of role playing (cognitive rehearsal) and audiovisual aids may identify key concepts for the adolescent and complement the teaching effort.

The FCNS may utilize a specific example of a situation that the adolescent can readily identify and then the FCNS will help the adolescent assess the options, looking at the possible consequences of each option. All discussions with the adolescent who is in the concrete thinking stage will be related to the pronoun "you". This adolescent must view specific situations in terms of himself, not in abstract examples.

The FCNS guides the adolescent through the decision-making process: identification of the problem,

consideration of all the options and their consequences, selection of an action and plan how to follow it through, and then plan for evaluation of the results. Other situations, such as current health-related decisions, are related to the process, where the adolescent can successfully resolve the problem. Other teaching aids may include cartoons, posters, VCR tapes, movies, and illustrated brochures.

Adolescents in the formal thinking stage need less nursing direction to connect given information to personal health care decisions than do adolescents in the concrete thinking stage. The adolescent in the formal operations level of thinking can most often cite the problem and identify some of the options and consequences without much reinforcement. Role playing works best with the adolescent playing the role and identifying the key decisions/options/consequences. The FCNS in both situations helps the adolescent to evaluate all possible options and reinforces the use of the decision-making process.

Summary

In this chapter, the screening tool for measuring the adolescent's stage of cognitive development has been identified, its characteristics and proposed methodology for implementation have been discussed. A brief summary for health teaching is also presented. The conceptual

framework of Martha Rogers is presented in Chapter V to provide the nursing framework for intervention. An integration of Rogers' theory for nursing and Piaget's theory for cognitive development is also presented. The study recommendations and implications in nursing practice, education, and research, are covered in the final discussion and presentation for this project.

CHAPTER V

SUMMARY AND CONCLUSIONS

Introduction

In Chapter V, the final chapter of this project, a summary of the project is presented. The conceptual framework of Martha Rogers, The Theoretical Basis of Nursing (1970), is examined to establish a framework from which nursing can intervene as a primary advocate in behalf of the adolescent. An integration of Rogers' theory for nursing and Piaget's theory for cognitive development is presented. Finally, recommendations and implications of the study for nursing practice, education, and research are discussed.

In the latter half of the twentieth century, adolescent pregnancy has become one of the major public health and social problems of our time. The rate of pregnancies among adolescent girls continues to increase, and in 1983 the rate of child-bearing by unmarried adolescents was the highest ever observed for that group (National Center for Health Statistics, 1985). In 1980, the United States Department of Public Health Service issued a decade-long initiative of 226 health objectives for the nation. This initiative called for concerted effort addressing measures to improve health status and reduce risks to health.

Reduction of adolescent pregnancy is one of the nation's 1990 health care objectives but, unfortunately, based on The 1990 Health Objectives for the Nation: A Midcourse Review (U. S. Department of Health and Human Services, 1986), this objective will not be met.

Most adolescent pregnancies are unintentional. The cost to the country is extraordinary to humans, health, economics, and society. Based on 1983 figures in Ingham County (MI), one girl in 200 will have a baby before the age of 15. Approximately one in 13 girls aged 15 to 19 will become pregnant during the course of one year. Prenatal care and delivery for 504 births to adolescent mothers cost Ingham County \$1,512,000, and social service support in subsequent years is estimated at \$7,056,000. The combined costs amount to \$32.00 for each Ingham County resident. These figures account for an appreciable portion of money spent for local public purposes in 1983 (Gorwitz, 1985, p. 1, 4).

The problem of adolescent pregnancy is not a phenomenon isolated from the problems of society as a whole. It is a reflection of today's society, its needs and intense pressures. Its solution is highly dependent on how society responds.

Adolescents delay six to twelve months before using birth control--why? Whose problem is it--society's, the family's, or the adolescent's? Adults have been in conflict over their feelings about their sexuality since

the beginning of civilization. How can we expect today's adolescents to have answers to questions that we, as adults, have not yet been able to answer?

Every vital statistics report offers figures relating to adolescent pregnancy in terms of the female. In time-honored fashion, our society virtually ignores the male involvement, even to the degree of condoning it. If one million adolescent girls become pregnant every year, that means one million adolescent boys are fathers. Yet we concentrate our prohibitive energy on the adolescent girl--why?

Sexual activity among adolescents continues to climb, and though adolescent use of birth control is also increasing, the adolescent's delay in initiating birth control continues to exist. Clinical research literature and clinical experience continue to substantiate this adolescent risk-taking behavior. Consequently this researcher initiated this project to study adolescent cognitive development and develop an adolescent cognitive developmental stage screening tool aimed at early intervention at the preventive level. The overall goal of this project is to reduce unplanned adolescent pregnancy.

First, review of the literature was undertaken to give the researcher a basis on which to pose the study. It was found that while there is much research in the area of concern, few writers related the problem to the adolescent's stage of cognitive development. It seems every

other social, psychological, educational, and behavioral perspective, including access, availability, and economic parameters, has been studied. Some of the studies offer conclusive results, but none offer significant outcomes except the Sachs investigations (1985, 1986, 1987) of the adolescent's stage of cognitive development in relationship to the use or non-use of birth control.

In Chapter I the problem of adolescent pregnancy, the goal statement and purpose of the study and its relevance to nursing practice, definition of concepts, limitations and underlying assumptions of the project are presented. In Chapter II, a conceptual framework for adolescent cognitive development (Piaget's theory on cognitive development), definition of the major study concepts, and the rationale for use of a screening tool for cognitive development are addressed. Review of the pertinent adolescent literature is presented in Chapter III, and the proposed methodology for testing the cognitive screening tool, the relationship of the adolescent's stage of cognitive development to the adolescent's decision to make future-oriented decisions such as the use of birth control, and the instrument's proposed use in an adolescent setting are described in Chapter IV.

Martha Rogers' The Theoretical Basis of Nursing

The opening statement in Rogers' book (1970) is: "People are at the center of nursing's purpose" (p. vii). Nursing science is directed towards describing the life

process of man and explaining and predicting the nature and direction of his life process development. A conceptual model of man provides nursing with a way of perceiving the life process, and establishes a foundation from which nursing may develop relevant research and utilize the findings towards comprehensive maintenance, promotion, prevention, caring, and rehabilitation of those who require the professional skills of a nurse (p. vii).

"The descriptive, explanatory, and predictive principles that direct professional nursing practice are rooted in a fundamental concept of the wholeness of life. Man is a unified phenomenon, subject to natural laws and characterized by a complex electro-dynamic field" (Rogers, 1970, p. 34).

Man is more than and different from the sum of his parts (Rogers, 1970).

The scientific value of nursing is but a means to explain man. Nursing's central concern is with man in his wholeness. The characteristics and attributes of man identifiably are those of the whole. Properties of man's parts are significantly different than those of the whole. Man cannot be explained by laws that govern segments of his being. True understanding of man comes only with perception of his unitary nature. Historically, the physical, biological, psychological, social, cultural, and spiritual attributes of man have in their separateness been studied by scientists, leading to multiple concepts and theories about man.

In 1935, H. S. Burr and F.S.C. Northrop published their historical statement of "The Electro-Dynamic Theory of Life":

"The pattern or organization of any biological system is established by a complex electro-dynamic field, which is in part determined by its atomic physico-chemical components and which in part determines the behavior and orientation of those components. This field is electrical in the physical sense and by its properties it relates the entities of the biological system in a characteristic pattern and is itself in part a result of the existence of those entities. It determines and is determined by the components. More than establishing pattern, it must maintain pattern in the midst of a physico-chemical flux. Therefore, it must regulate and control living things, it must be the mechanism the outcome of whose activity is 'wholeness', organization and continuity" (Rogers, 1970, p. 32).

"Living things are characterized by pattern and wholeness and subject to natural laws. Only as man's wholeness is perceived does the study of man begin to yield meaningful concepts and theories" (Rogers, 1970, p. 32, 44).

Once man's oneness is identified, it becomes possible to identify man's distinctive attributes. Rogers believes an energy field underscores man's totality, and provides the conceptual boundaries which identify his oneness. Structure and function of living systems are viewed as field (energy) phenomena and reflect the dynamics of life. A field is larger than its components, has its own integrity, and acts as a whole. The characteristics of man identify his wholeness; as man's distinctive properties diminish, man becomes visible as a whole, more than and different from the sum of his parts (Rogers, 1970).

Rogers bases her theory on a set of five basic assumptions, made up of man's attributes upon which nursing science develops. The first assumption, just discussed, was

"man is a unified whole possessing his own integrity and manifesting characteristics that are more than and different from the sum of his parts" (p. 47).

Rogers' theory of the life processes of man is based on systems theory. She defines man and his environment as open systems engaging in continuous interaction. Man as an open system is involved in a constant interchange of materials and energy from his environment. Man consciously rearranges and influences his environment. Yet the environment is also an active participant in the process of change so that while man strives for a specific change, the interplay of the environment may cause a change that is not expected. "A change in any part creates change in the whole" (Rogers, 1970, p. 51). When predictions are based on data that do not take the unity of man and his environment into account, the outcomes for man and society may vary widely from the anticipated results.

"Man and environment transactions are characterized by repatterning of man, and the environment" (p. 53).

Rogers' second assumption, on which nursing science builds, is:

"Man and environment are continuously exchanging matter and energy with one another" (p. 54).

"The perception of time passing is an integral part of man's life" -- "time is unidirectional" -- nothing that was, will ever be again (p. 55).

Life is bound by three dimensions, through time and by a space-time continuum. Man's development evolves through time, yet at any given point in time he is an expression of the totality of events occurring at that moment. "Change is unidirectional but not predetermined" (p. 58) -- the future cannot be told.

Therefore, Rogers' third assumption, upon which she bases nursing science, is:

"The life process evolves irreversibly and unidirectionally along the space-time continuum" (p. 59).

Energy fields are postulated to constitute the fundamental unit of both the living and the non-living. Two energy fields are identified, the human field and the environmental field. Man and environment do not have energy fields, they are the energy fields. Their energy fields are continuously open--flowing through each other.

Man's energy field imposes pattern and organization on his parts. It is this organization, this patterning, that identifies man and reflects his wholeness. Life is irreversible and prohibits repetition of patterning. Patterning consists of the structure and function which are dynamic processes within the wholeness of man. Patterning and organization unify man--"observable properties of all there is" (p. 62). Without patterning, life would be chaotic. Lawful development in nature offers meaningful predictions and rhythmic relationships.

Rogers (p. 62) further defines the unidirectionality of life as proceeding along a rhythmic spiral, graphically likened to a child's "slinky". As a new curve in the spiral occurs, a cyclical continuity is revealed, or a similarity; life events do not repeat themselves. The spiral of life, while seemingly repetitious, is an orderly process increasing in heterogeneity, differentiation, diversity, and greater complexity of pattern and organization. Distortions of the spiral represent deviations from nature's regularities.

Man undergoes continuous change, maintaining himself with a "self-regulating ability" (p. 63). The self-regulating ability of man is not equilibrium and stability, but rather increasing complexity of organization. Self-regulation maintains tensions and increases man's diversity, in an orderly, innovative manner. Through self-regulation, man seeks his potential in life. This process of self-regulation is a conscious and unconscious expression of wholeness.

The fourth assumption nursing science builds on is:

"Pattern and organization identify man and reflect his innovative wholeness" (p. 65).

"Man is a sentient being" (p. 68); he experiences feelings as a unified entity--a part of his wholeness. He feels joy and sorrow, ecstasy and depression, affection and zeal. These feelings are positive integrating forces, as are language and thought. Man orders thought through concept

formation. Man knowingly makes decisions, he is an active participant in patterning his field and organizing the environment to his liking. His decision may even be detrimental to his well-being. His failure to actively make a choice becomes a decision in his interaction with the environment (Rogers, 1970).

The fifth assumption upon which Rogers feels nursing science is built is:

"Man is characterized by the capacity for abstraction and imagery, language and thought, sensation and emotion" (p. 73).

What does this mean for nursing? What design is formulated for nursing's abstract system? Central to the purpose of nursing is man, and the theoretical system of nursing is built upon the Rogers assumptions just described. The scientific body of nursing knowledge is relatively new, and out of this new scientific body has grown a conceptual framework that defines the principles necessary to predict and guide nursing practice. The health of man, and his sickness, are expressions of the process of life and are seen as part of the totality of man, not as separate entities to be studied independently. As nursing understands the characteristics of life process in man as a whole, life's multiple manifestations, in sickness or health, will be explainable and predictable. Nursing's aim is to assist man to achieve his maximum health potential.

Life process is homeodynamics or "like"--static-like movements. The energy field is the fundamental unit of the living system and portrays the dynamic nature of life. The energy field defines three nursing science principles, as follows.

Principles of Homeodynamics

1. Resonancy states that human and environmental fields are identified by wave patterns and organization, manifested by changing from lower-frequency to higher-frequency wave patterns.
2. Helicy states that the nature and direction of human and environmental change is continuous, innovative, probabilistic, increased in diversity, and non-repeating rhythmicities.
3. Complementarity emphasizes the continuous mutual process between human and environmental fields. Human and environmental fields change together (Rogers, 1981, p. 23).

These principles make possible connections between events and permit technological application. Future occurrences are subject then to prediction; and interventions toward making changes become feasible. The principles offer a way to describe, explain, and predict multiple events that have a direct impact on the professional practice of nursing. However, Rogers' theory for nursing remains abstract; it cannot be conceptually

conceived in concrete forms of figures, diagrams, or illustrations other than her use of the spiral which is used only to denote the orderly process of life that moves unidirectionally and without repetition. Nor does this researcher believe Rogers intended more than analysis and a concise, systematic view of man and his environment-- "the unitary man" (Rogers, 1970). Unitary man has been described as an irreducible whole, not to be reduced into parts. Rogers offers man in an organized, abstract, flexible, open-ended conceptual system from which nursing can then derive specific principles and hypothetical generalizations to describe, explain, and predict. The art and science of nursing is to make imaginative and creative use of this knowledge in the form of research and human service.

An Integration of Rogers' Theory for Nursing and Piaget's Theory on Cognitive Development

What do Rogers' theory for nursing and Piaget's theory of cognitive development mean in the care of the adolescent for nurses in advanced practice? First, the nurse's practice must be based on the five assumptions of man that Rogers defines, as described earlier in this chapter. The nurse, when working with the adolescent who is making an important decision about the future (such as the use of birth control), must view the adolescent as a unified whole and in his entirety, looking at the adolescent and his environment. Only then will the

maximum potential of the adolescent's cognitive decision-making be reached. Second, Piaget's theory of cognitive development offers an explanation for what Rogers refers to as the increasing complexity of life. Piaget's theory also maintains a unidirectional path and increases in complexity as the infant, child, and adolescent pass through various levels, which Piaget characterizes by defining expected benchmarks of thought and behavior.

Rogers defines cognition as coming into awareness, which represents new levels of complexity with correlates in the ongoing development of cognition and feelings. She also states,

"the capacity to experience one's self and the world and to make sense out of one's experiences is an emergent along life's longitudinal axis" (1970, p. 93).

This quotation is similar to Piaget's definition of the stage of formal operations describing the older adolescent.

Piaget and Rogers are also similar in that Piaget does not base cognitive development on chronological age but on the cognitive processes that occur at approximate age intervals. Rogers (1981) concurs:

"chronological age is invalid as a basis for differentiating development and behaviors" (p. 3).

Rogers (1970) sees the developmental process of the individual as an unending flow of wave patterns in the life process, not dependent on nor specific to chronological age, as the human field is continually adding new dimensions of growing complexity. Figure 1 offers an example

of this increasing complexity that occurs as Piaget's stages of cognitive development also advance in complexity. Life process is an unending flow of wave patterns and the developmental process in growth is a grand example of the continuous flow of wave patterns.

The four critical factors that Piaget identified as necessary for cognitive development are maturation, equilibration, social interaction, and active experience. The interaction of these variables, which may differ from individual to individual, is essential for the adolescent's cognitive development. These factors define the stage of the adolescent's cognitive development and impact the cognitive process of decisions about birth control (Figure 2).

If the nurse in advanced practice expects to be able to intervene with the adolescent she must recognize herself as an environmental component which needs to be in synchronous harmony with the adolescent. The two critical factors that may be directly impacted by the FCNS interventions are social experience and active experience through appropriate external stimuli such as planning, reaching, teaching, and directing the adolescent.

The adolescent and the environment continuously shape one another, while the principles of homeodynamics provide guidance for the nurse. Resonancy postulates that change in pattern and organization of the human field and the environmental field is propagated by waves, sometimes

harmonic, sometimes cacophonous, sometimes dissonant, rising, falling, slow, fast, ever-changing in dynamic patterns (Rogers, 1970). These patterns characterize the universe and encompass man. The developmental process of man is an example of the unending flow of wave patterns. Helicy represents life moving in one direction evolving in sequential stages. The growth of life is goal-directed, increasing in complexity in the developmental process (Rogers, 1970; Piaget, 1967). Complementarity represents the complementary interaction of man and environment. Man and environment evolve together and change together. Examples of this phenomenon include the facts that man's longevity has increased, and that his environment has changed to accommodate longer life. Unplanned adolescent pregnancy has increased and so has the environment changed in some way, which supports this adolescent behavioral consequence. If unplanned adolescent pregnancy is to decrease, so must the environment be somehow altered to complement the change in the adolescent.

Utilizing Piaget's theory of cognitive development to identify the adolescent's stage of cognitive development is but the first step towards finding a solution to make a change in the adolescent's environment. Environmental techniques and procedures can be tailored, adjusted, and patterned to fit the adolescent's stage of cognitive development.

The expert role characteristics of the expanded-role nurse (assessor, client advocate, clinician, collaborator, consultant, coordinator, and evaluator) are instrumental in meeting this challenge. The nurse in advanced practice must also be creative and scientific as an expert inquirer and researcher if she, as an environmental component, is to complement this process as a leader, planner, counselor, and agent of change. School systems, churches, parents, and other social systems have difficulty making change because changes are irreversible and nonrepeatable. Yet change is the necessary evidence involved in the growing complexity of the patterning and organization of today's society.

Rogers states,

"Man knowingly makes choices through awareness of himself and his environment, he is an active participant in determining the patterning of his field and in recognizing the environment in accord with his desires. His choices are not necessarily wise ones. Some choices may even be detrimental to his well-being. Failure to make a choice is of itself a decision that is incorporated into the man-environment interaction process" (Rogers, 1970, p. 71).

Figure 2, which illustrates Piaget's theory of cognitive development in relationship to the adolescent's decision-making regarding the use or non-use of birth control, is an excellent example of Rogers' theory on decision-making. Man-environment interaction process is a process of achieving a balance between man and environment. Mental activity such as decision-making is an act of adaptation to, and organization of, the environment. How that adolescent makes that decision is based on his stage of

cognitive development. The adolescent "being" is seen in totality, influenced by maturation, his process of assimilation and accommodation, adeptness at social interaction, and his active experience with the environment (Figure 2).

Nursing's aim is to assist people, including the adolescent, to achieve the maximum health potential. The identification of relationships between subject theory, nursing theory, and nursing process provides an ordering of knowledges for developing generalizations, unifying principles, and defining strategies for problem solving, promoting ideal, comprehensive health care for all people.

The science of nursing provides a body of abstract knowledge derived from scientific inquiry and research that can be translated and applied in nursing practice and instructional programs. Nurses in practice and students must have the opportunity to test the validity and reliability of theory in real situations. Thus the process of nursing is set into motion. This body of knowledge determines the safety and scope of nursing practice.

Professional practice is imaginative and creative, based on the practitioner's intellectual knowledge and skill. Remembering Rogers' opening statement (1970, p. 81), "Nursing exists to serve people," nursing's most important responsibility is in direct service to society. Collaboration is a key activity for nursing if the maintenance and promotion of health services it renders are to

be comprehensive and safe. Participation in coordination of multi-disciplines, knowledges, and skills is an essential function of the professional practitioner in nursing--the clinical nurse specialist (CNS).

The total pattern of man's striving for maximum health potential offers data for nursing diagnosis. Evaluation of the data and determination of long- and short-range outcomes, initiation of intervention strategies with re-evaluation and revision of interventional measures are all a part of the nursing process. Selecting the best tools and procedures for a given situation and artistry in utilization are also extremely important dimensions of nursing practice. Rogers' theory offers a conceptual framework to meet this responsibility. Nursing intervention should be aimed at repatterning man and environment. The clinical nurse specialist offers the leadership in envisioning, initiating, and implementing health services relevant to the future health of mankind. It is Rogers' belief that:

"the resolution of health problems and the setting of goals directed towards achieving healthy people require a new concept of the unity of man and a recognition of man's capacity to feel and to reason., Man possesses major resources within himself People must be informed and active participants in the search for health. Intervention should be directed towards assisting individuals to mobilize their resources, consciously and unconsciously, so that the man-environment relationship may be strengthened and the integrity of the individual heightened" (Rogers, 1970, p. 134).

The science of unitary man allows the identification of nursing's uniqueness and heightens nursing's potential for fulfillment of its social responsibility in human service (Rogers, 1981).

Study Recommendations and Implications for
Nursing Practice, Education, and Research

Nursing Practice: The phenomenon of adolescent pregnancy and its prevention is a very complex problem. When working with the adolescent, the goal of the nurse in primary care expanded practice--family clinical nurse specialist (FCNS)--is to help adolescents achieve their maximum health potential, make informed decisions that will best serve their health needs and meet their future goals. One way this optimum adolescent health goal can be accomplished is for the FCNS, as the assessor, to identify the adolescent's stage of cognitive development by using the cognitive developmental screening tool. Once the adolescent's stage of cognitive development is identified, the FCNS can use this criterion along with her knowledge of adolescent cognitive development and expert clinical skills to incorporate this intrinsic information into developing a comprehensive nursing and educational care plan for the adolescent.

The FCNS's challenge is to employ the research-identified strategies based on the adolescent's stage of cognitive development in order to bring about maximum communication and intervention results with the adolescent.

The FCNS as a leader and coordinator plays a key role in initiating, coordinating, and leading the adolescent toward achievement of appropriate decision-making regarding the use or non-use of birth control. The FCNS in primary care provides accessible, continuous, coordinated, comprehensive, and affordable care to the adolescent. The FCNS's advanced knowledge of family, human development, and primary care provides the data base necessary to identify factors important for intervening with the adolescent. Often the FCNS as the main provider has a continuous, on-going educative and counseling relationship with the adolescent, an essential strategy towards facilitating the adolescent's compliance.

Adolescents at risk for poor decision-making are difficult to identify by an average interview. The cognitive developmental stage screening tool that has been identified, based on the literature, offers a convenient, quick, and easy means to identify and evaluate the adolescent's stage of cognitive development. Once the stage of cognitive development has been identified by the screening tool, counseling/teaching strategies to best impact the adolescent's stage of cognition may be employed to help the adolescent make well-informed decisions about life's activities/goals. For example, the adolescent's need for a pregnancy test most often indicates the adolescent is involved in sexual intercourse without using birth control. If the result of the test is negative, the FCNS

can use her knowledge of the adolescent's stage of cognitive development in helping the adolescent to identify the possible consequences of risking sexual intercourse without contraception.

Adolescents who "take chances" are most frequently those who are in the concrete stage of cognitive development. They react to present situations (the here and now) only, and most often are too idealistic. This adolescent needs counseling to help him/her link the cause and effect of their actions to the possible consequences, such as an unplanned pregnancy. These adolescents are not able to link action to reality without external influence such as interaction with an FCNS. Such interaction with the adolescent is a priority for the FCNS in a primary health care setting.

The environment must be altered to meet the change in the adolescent as a result of his or her decision. This process can only be effectively accomplished through the FCNS's coordination of collaboration and consultation with multiple professional disciplines as well as with lay groups. Consultation and collaboration with social workers, counselors, teachers, other health care providers, clergy, and parents, only if appropriate (meaning confidentiality), offer the most effective means to finding the most comprehensive approach.

Political awareness by the FCNS is essential in supporting policies affecting the adolescent and acting as the

adolescent's advocate and change agent in the specialty of adolescent health care. This awareness means taking an active leadership role in local and state policy formation, community work, calling the House and Senate for updates on current health care bills being heard, reading extensively, and being an advocate for the adolescent by being a well-informed speaker, representative, and liaison for the adolescent. The adolescents as a group can identify their own wishes and goals. The FCNS can promote adolescent representation by organizing and informing those adolescents willing to take an active role. A well-informed, outspoken adolescent group can provide a formidable power base when a showing of consensus is needed, or policy-makers wish adolescent opinion input.

During adolescence, the adolescent often trades the family orientation for peer group orientation in an attempt to discover his own identity. The FCNS who is adept at family theory acknowledges the importance of peers as the major referent group. She respects the adolescent for having his own feelings and opinions and maintains strict confidentiality at all times. Only when the adolescent's well-being is at stake may this confidentiality be breached. Trusting the adolescent, and being trustworthy, are key components when working with adolescents.

The health needs and practices of today's youth have immediate and long-range consequences for the adolescent, his family, and society in general. Assuring optimum

health for the adolescent is an imperative and very few communities have resources oriented to providing primary care to adolescents. Adolescents frequently face fragmented service, minimal confidentiality, difficulties with access and high cost, and lack of care, continuity, and service comprehensiveness. Ingham County Health Department's Willow Plaza Services in Lansing, Michigan, offers the only comprehensive, all-adolescent, primary health care service in the State. The adolescent on site may receive counseling, finish school, find a job, receive monetary help, child care, clothes, food, transportation, and comprehensive health care, including treatment for sexually transmitted diseases and referral for prenatal care. Referral resources are extensive and complete. The multidisciplinary staff, including one FCNS, are all trained in adolescent health care, and are dedicated individuals who provide the adolescent with confidential, comprehensive and individualized treatment, care, and counseling.

The cognitive developmental stage screening tool could easily be adapted for use within this clinic's intake procedure. The general policy would include using the screening tool on every adolescent admitted to the clinic for an initial appointment except those adolescents already on birth control or pregnant. The adolescents presenting for pregnancy testing would definitely be targeted for screening. School systems, especially, are seen

as primary sites for use of the adolescent cognitive developmental screening tool, possibly being introduced as a requirement for the sex education classes.

In order for adolescents to delay pregnancy, they must have both the capacity and the motivation to do so. To have the capacity, they need knowledge of both reproduction and birth control with access to services. Motivation implies the knowledge of the consequences of early parenthood and the reality of these consequences. The primary theme of this project focuses on the essential need to identify the adolescents' stage of cognitive development so that educational/learning/teaching strategies appropriate to their level of cognitive development can be utilized to achieve the adolescents' acknowledgment of the consequences, and reality of unplanned early parenthood.

Adolescent health care strategies need to be identified, developed, and aimed at three specific levels of care--prevention, intervention, and treatment. These strategies must be employed at the state and local level and in educational systems and health care systems, and must be implemented by all professionals, as well as the lay public, to meet the needs of adolescents' primary health care. Some strategies identified at each of the three levels of care include:

Prevention:

1. Have comprehensive reproductive health education K-12 in every school and most churches.

2. Advertise family planning services aimed at adolescents.
3. Institute programs for males, ideally associated with male service organizations.
4. Increase public awareness of interrelatedness of poverty, low achievement, low self-esteem, and early child-bearing; and legislators' understanding of ramifications of adolescent pregnancy.
5. Develop new strategies to reach high risk adolescents who are not in school or who cannot identify with current messages, by advertising at the adolescent's level of cognitive development.
6. Bring together a broad-based community group to develop a community-based plan on adolescent pregnancy and monitor its implementation. Lansing, Michigan, currently has such a group, funded by the State.
7. Offer sexuality programs based on adolescent cognitive development for parental awareness.
8. Have adolescent programs taught by peer groups on values clarification, postponing sexual involvement--how to say no, life-planning programs, self-esteem, and decision-making. (Cognitive development screening tool would be used for these programs especially.) Willow Plaza Services currently has a very active year-round Peer Education Group that works with adolescent groups.

9. Educate professionals and public on adolescent cognitive development.
10. Offer teaching seminars for professionals to learn how to employ the adolescent cognitive developmental stage screening tool in their setting.

Intervention:

1. Make accessible multiple adolescent health service settings a state-wide goal.
2. Make available and accessible professionals who have accurate knowledge of community resources for consultation.
3. Offer free pregnancy testing in conjunction with appropriate counseling based on the adolescent's cognitive developmental stage.
4. Develop creative marketing based on the adolescent's cognitive development to make resources known to adolescents. Use advertising showing cause-and-effect relationships.
5. Initiate follow-up on referrals to help identify those who have not accessed the system.
6. Offer multiple services for adolescents at one location.
7. Develop a plan for better coordination of community services for adolescents.
8. Continue to educate professionals and public on the needs of the adolescent and adolescent cognitive development.

9. Offer consultation for setting up and using the adolescent cognitive developmental stage screening tool in the professional's work setting.

Treatment:

1. Identify the adolescent's stage of cognitive development through use of the cognitive developmental stage screening tool in schools and primary care settings.
2. Offer primary care services based on adolescent levels of physical/cognitive development (nursing and medicine).
3. Offer continuous comprehensive services, health care, employment, continuing education, short- and long-term counseling, economic support, extensive referral networking including emergency shelter.
4. Offer clinic care at times when adolescents do not have to miss school (access and availability).
5. Do active outreach and case-finding to locate the high-risk, at-risk adolescents.
6. Establish an adolescent consultation/collaboration network.
7. Assure adolescents of reduced cost or no cost for care (if health department), reduced costs in private offices, and confidentiality.
8. Give the adolescent names, telephone numbers, and times he/she can call for help or for answers to questions.

9. Let the adolescent know the FCNS is a trustworthy advocate for him/her, someone who cares.

To alleviate or prevent many of the health problems of adolescence, the concern and action of the family and health care provider, as well as of the schools, public, and local, state, and federal health care agencies, are important. Only with cooperation of all persons/agencies can adequate and cognitive-stage-appropriate birth control services be made available.

Adolescent pregnancy programs, drug education programs for the adolescent and the family, and adolescent parenting education programs all must be expanded. It is equally necessary that adolescent abuse be prevented, at-risk adolescents be identified, accident prevention information be increasingly circulated, and nutritional supplementation and comprehensive health care for the adolescent be developed, expanded, and implemented. Because our world of tomorrow depends on today's youth, adolescent needs deserve to be high in priority for professionals, communities, and society. Major Andrew Nelson of the Salvation Army (1983) said that "the adolescent mirrors his total society in rare simplicity." The FCNS is obligated to facilitate and promote the health and development of the adolescent through use of her knowledge, skill, and commitment to serving people.

Nursing Education: The aim of this project is to increase the understanding of adolescent cognitive development, its role in the adolescent's decision-making process, and identification of strategies that would best intervene, with the FCNS using this knowledge to plan and to develop the adolescent's care plan. Few nursing programs or medical schools focus on the adolescent. In fact, the adolescent is the most frequently ignored person in the entire health care system. Few programs offer advanced training and education regarding adolescence, and yet, enigmatically, we wonder, "Why is unplanned adolescent pregnancy still a national health concern?"

Nursing and medical educational programs must address not only the physical and psychological components of adolescent development, but emphasize adolescent cognitive development as well, at the undergraduate level, the graduate level, and in continuing education programs. A practicum in which the learner (FCNS) can be guided by an individual skilled in adolescent health care is recommended for every level of nursing education, but especially for the nurse in advanced practice. Normal adolescent functioning, as well as deviations, can then be observed; interviewing, screening cognitive development, and counseling techniques can be practiced; skills in such areas as the gynecologic examinations, physical examinations, and minor acute situations need to be increased so experience in dealing with problems common to the adolescent may be gained.

Nursing process is an integral aspect of nursing education and needs to be addressed. This researcher addresses the identification and examination of a tool for screening the adolescent's stage of cognitive development, by employing assessment of the adolescent's cognitive development, with presentation of a plan for intervention and proposed interventions. The evaluation process, while an extremely important part of research, was not addressed in this study because the research was not operationalized.

Nurses and all others--including physicians--involved in teaching, counseling, and directing adolescents need to be aware of the importance of screening the adolescent's stage of cognitive development and incorporating this knowledge into the development of the nurse/physician management plan. The nurse in advanced practice is frequently involved in management because of marketing skills, leadership qualities, and excellent clinical judgment. The FCNS must also be skilled in different educative strategies, techniques, group versus individual, counseling versus teaching, and must know when anticipatory guidance is most appropriate.

Clinical experience with the adolescent is a primary priority for the FCNS during involvement with the graduate program. Working with the adolescent, applying knowledge and the principles derived from this experience, and developing an understanding of the adolescent will establish for the FCNS a practice grounded in theory and the expertise

to care for this segment of our population when his/her education is completed.

Nursing Research: Adolescent pregnancy has been studied by many different disciplines and from many perspectives for more than 20 years, in such areas as perceptions, access, barriers to psychological and educational issues, knowledge, and affordability. In 1980, unplanned adolescent pregnancy was named as a 1990 national health objective, yet today adolescent pregnancy remains statistically high and a national health concern. Funding for adolescent programs and continued research is the government's intervention towards resolving this national health concern.

However, research examining adolescent cognitive development in relationship to decision-making regarding the use or non-use of birth control is limited to several studies. Thus it is highly recommended that the tool identified in this study to screen the adolescent's stage of cognitive development be administered through a future research project to address the following research questions:

1. What effect does the stage of cognitive development have on the adolescent's decision-making ability?
2. What effect does the stage of cognitive development have when the adolescent is making decisions about the use or non-use of birth control?

3. What effect does the stage of cognitive development have on the adolescent's decision-making about future-oriented decisions?
4. What effect does the stage of cognitive development have when considering multiple alternatives?

Results from such research would be valuable in refining and improving the instrument as well as the study design.

Recommendations for future research would be to use the screening instrument in multiple settings. The screening of the adolescent's stage of cognitive development would allow educational and counseling programs aimed at pregnancy prevention to be tailored to the student's cognitive level, resulting in effective preventive outcomes. The goal for using the screening tool is to identify the adolescent's stage of cognitive development before he/she is confronted with making the decision about the use or non-use of birth control so that the situation can be adequately assessed and the appropriate decision made regarding the sexual experience.

A longitudinal comparative study is also recommended to evaluate the outcomes of the teaching/counseling strategies employed based on the adolescent's stage of cognitive development. Did the adolescent initiate the use of birth control at the onset of sexual intercourse or after appropriate counseling? Was he/she compliant and/or consistent with the use of a birth control method?

In addition to nursing research, this project has implications for future research for other disciplines. Any discipline that works in some way with adolescents where a teaching/learning component is present may well benefit by screening the adolescent for his stage of cognitive development and planning the learning component, based on strategies identified as most appropriate for the stage identified.

Summary

In summary, then, this researcher has provided a conceptual framework for adolescent cognitive development, review of the literature, identification and examination of a screening tool designed specifically to screen the adolescent's stage of cognitive development with proposed methodology. Data collection is needed to fully determine the usefulness of the tool when an adolescent is making a decision regarding the use or non-use of birth control, but a foundation has been established on which to complete the research. In this chapter, the conceptual framework for nursing of the adolescent, an integration of cognitive theories and the nursing theory, and, finally, recommendations and implications for the study in nursing practice, education, and research have been described.

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APPENDICES

APPENDIX A
QUESTIONNAIRE (Part I)
Background Information

APPENDIX A
QUESTIONNAIRE (Part I)

Background Information

The following questions describe general things about you. Please answer all the questions to the best of your ability. Remember all information will remain confidential.

1. When were you born? _____/_____/_____
 month day year

2. What is your childhood religious background?
(Check any that apply.)
_____ no religious upbringing
_____ Catholic
_____ Protestant
_____ Jewish
_____ other (write in) _____

3. What is your ethnic background? (Check one.)
_____ Asian American _____ Native American
_____ Black _____ White
_____ Mexican American _____
 other (write in) _____

4. Have you ever had the following diseases?
(Check any that apply.)
_____ heart disease _____ kidney disease
_____ cancer _____ respiratory disease
_____ epilepsy _____ emotional disturbance
_____ allergies _____ substance abuse
_____ diabetes (sugar) _____ (drugs or alcohol)
_____ none of the above
_____ any other not listed
 (write in) _____

5. What is your current marital status?
(Check all that apply.)
- | | |
|--|------------------------------------|
| <input type="checkbox"/> never married (single) | <input type="checkbox"/> separated |
| <input type="checkbox"/> now married | <input type="checkbox"/> divorced |
| <input type="checkbox"/> cohabit (living with partner) | <input type="checkbox"/> widowed |
6. Have you ever been sexually active (had intercourse)?
(check one) ☐ yes ☐ no
7. Are you currently sexually active (having intercourse)?
(check one) ☐ yes ☐ no
- *8. Have you ever considered using birth control?
(check one) ☐ yes ☐ no
- *9. Do you want to start using birth control?
(check one) ☐ yes ☐ no
- If no, does your partner want to use birth control?
(check one) ☐ yes ☐ no
- *10. Have you ever used any form of birth control?
(check one) ☐ yes ☐ no
- If yes, for how long?
(write in) days, months, years
- *11. Are you currently using birth control?
(check one) ☐ yes ☐ no
- If yes, what kind? (check all that apply)
- | | |
|-------------------------------------|---|
| <input type="checkbox"/> condom | <input type="checkbox"/> foam |
| <input type="checkbox"/> withdrawal | <input type="checkbox"/> sponges |
| <input type="checkbox"/> diaphragm | <input type="checkbox"/> birth control pill |
- If no, is your partner using birth control?
(check one) ☐ yes ☐ no

*Indicates dependent variable.

APPENDIX B

QUESTIONNAIRE (Part II)

The Permutation Task

APPENDIX B

QUESTIONNAIRE (Part II)

The Permutation Task

The instrument is a paper-and-pencil four-digit combination task to screen the cognitive developmental level of adolescents. Use the numbers 1, 2, 3, and 4.

Administration directions:

"Suppose you had four numbers to make up license plates, each with four digits. There are many different plates you can make with these numbers. See how many ways you can arrange them. Remember, follow a plan and let me know when you can't think of more" (Leskow & Smock, 1970, p. 416).

Although there is no time limit placed on the respondent, experience administering the task in a clinical setting demonstrated that participants limited themselves to approximately four minutes. They either completed all 24 combinations in that time, or became frustrated and ceased trying.

Scoring:

1. Count the number of correct combinations. Do not count repetitious combinations or those which did not use four different digits, i.e., 1, 3, 2, 1. (The 24 combinations are listed on the next page.)
2. Count the number of initial digits held constant in each new combination. Be sure to count digits in the first and second positions when appropriate. In the combinations listed on next page, initial digits held constant are underlined. There are 32 possible initial marks which can be held constant.

3. Determine the number of correct combinations which were generated systematically using the following categorizations:

Formal operational thinking: 12-24 correct combinations with 16-32 initial marks held constant, indicating systematic development of permutations.

Concrete operational thinking: Fewer than 12 correct combinations with 15 or fewer initial marks held constant, indicating a random development of permutations.

The most systematic responses are listed below.

Initial marks held constant are underlined.

1234	2341	3412	4123
<u>1</u> 243	<u>2</u> 314	<u>3</u> 421	<u>4</u> 132
<u>1</u> 324	<u>2</u> 431	<u>3</u> 241	<u>4</u> 231
<u>1</u> 342	<u>2</u> 413	<u>3</u> 214	<u>4</u> 213
<u>1</u> 423	<u>2</u> 134	<u>3</u> 142	<u>4</u> 312
<u>1</u> 432	<u>2</u> 143	<u>3</u> 124	<u>4</u> 321

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