Chapter Objectives

- To introduce the basic assumptions that underlie the organization and focus of the text.
- To introduce the psychosocial approach, including the interrelationships among the biological, psychological, and societal systems.
- To define the scientific process and review basic research principles for the study of human development.
- To consider the ethical guidelines that should be used in conducting research with human subjects.
- To note historical changes in life expectancy and examine the implications of these changes for the study of development over the life span.

Patrick Jonathan Carmichael was born the son of a freeman, who earned his way out of slavery in North Carolina before moving to Alabama and the Rump plantation. Carmichael attended Snowhill Institute, which was modeled after Booker T. Washington's Tuskegee Institute. It was here that the dream for his own school began. After graduating from high school, he taught for five years, then founded Purdue Hill Industrial High.

"The state put up just seventy-five dollars a year for expenses," Carmichael says. "Students paid tuition of twenty-five cents a year and paid in chickens or cans of syrup if they didn't have the money. You couldn't get a dime out of a state to build a Negro school back then. I'd write letters to people all over the country who I thought had a little charity about them to help us. I'd be the last man to put his light out because I'd be writing letters."

"He got twenty-five dollars a month," Carmichael's son adds. "He fed us kids by farming, getting up before dawn to work the fields, raise chickens and cattle and pigs. He had a big garden. All his earning went back into the school. At night he'd write those letters to wealthy people in Boston or New York, trying to get a little money for the school. He was persistent. A little at a time. People in the area built the school. It started out as a one-room school with one teacher and eleven students and grew to a twelve-room school with two hundred and fifty students and ten teachers."

. . . Patrick Jonathan Carmichael is now living with his son and daughter-in-law. He is 101 but has been with them for only the past few years. After retiring from his career in education in 1958, he lived alone on his farm until he broke his hip after going out to feed his cattle. He was 97.

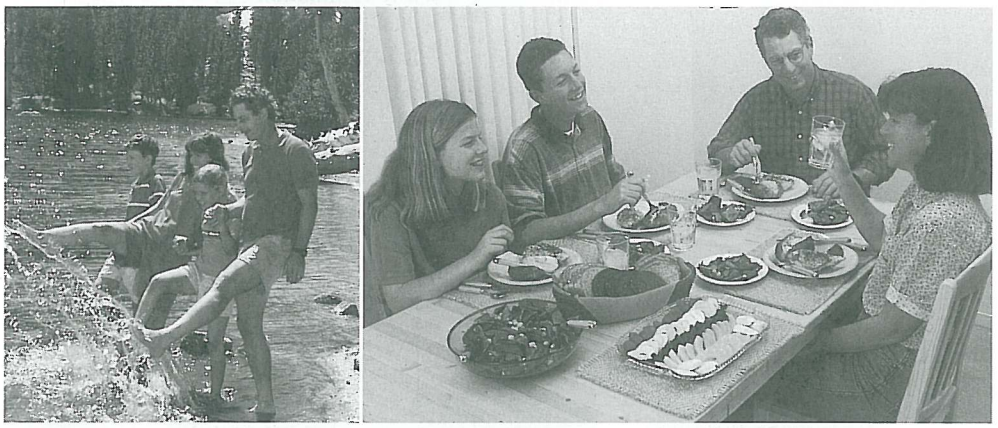
"I didn't get along with my father when I was younger," says his son. "He was such a hard-working, disciplined man. Now it's different. It's like we're getting another chance. I have to take care of him, do things for him like shave him. He needs me and we're developing more of a buddy relationship." (Heynan, 1990, p. 9. Patrick Jonathan Carmichael, born 1886, interviewed in 1987.)

Think for a moment about Patrick Jonathan Carmichael: his hopes, determination, sacrifices, family, accomplishments, disappointments, and the new challenges he must have faced as he retired from education, lived alone, and formed new, interdependent relationships with his son and daughter-in-law. Think of living 100 years—so many changes and so much to learn; so many losses and so many victories. What do we know of development through life? How can we conceptualize the dynamic development of individuals within the contexts of their societies, the period of history in which they grew up and entered adulthood, their families, their values and goals, and the obstacles they faced? How can we preserve the intriguing uniqueness of individual lives and still begin to detect patterns of change and growth? These are some of the challenges facing the broad discipline of human development.

The study of human development is puzzling and relatively unexplored. If we are to understand it, we must study how maturation and experience shape beliefs and expectations at each stage of development. Our goal is to gain a more accurate picture of how individuals make sense of their experiences, adapt to their environments, cope with challenges, and continue to develop from one period of life to the next. This process is as individual as each person's life story and is influenced heavily by such factors as gender, ethnicity, socioeconomic status, geography, sexual orientation, and physical abilities and disabilities. Yet common patterns of organization and meaning allow us to know and care for one another, and contribute to one another's well-being.

This chapter provides a brief introduction to four topics that are central to the study of the life span. First, we outline our assumptions about human de-

velopment that guide the orientation of the text. Second, we introduce the broad concept of a psychosocial approach to development. Third, we highlight basic principles of the scientific process from which much of our knowledge about development is derived. Finally, we introduce data about life expectancy in order to start you thinking in a concrete way about the course of your own life and the decisions you make that may directly impact your own life story. ❖



Each life story is one of continuity and change. The family is shown during two widely separated periods of time, consists of the same people, recognizable yet changed. Maturation and experience interact to produce a continually modified family group, but the sense of affection and closeness remains.

ASSUMPTIONS OF THE TEXT

Our perspective on development through life embraces the following four assumptions that are critical to the organization and focus of this book:

1. *Growth occurs at every period of life, from conception through very old age.* At each period, new capacities emerge, new roles are undertaken, new challenges must be faced, and, as a result, a new orientation toward self and society unfolds.
2. *Individual lives show continuity and change as they progress through time.* An awareness of the processes that contribute to both continuity and change is central to an understanding of human development.
3. *We need to understand the whole person, because we function in an integrated manner.* To achieve such an understanding we need to study the major developments in physical, social, emotional, and cognitive capacities and their interrelationships. We also need to study actions, the many forms of observable behavior.
4. *Every person's behavior must be analyzed in the context of relevant settings and personal relationships.* Human beings are highly skilled in adapting to their environment. The meaning of a given behavior pattern or change must be interpreted in light of the significant physical and social environments in which it occurs.

A PSYCHOSOCIAL APPROACH: THE INTERACTION OF THE BIOLOGICAL, PSYCHOLOGICAL, AND SOCIETAL SYSTEMS

Erik Erikson (1963, p. 37) wrote that human life as the individual experiences it is produced by the interaction and modification of three major systems: the biological system, the psychological system, and the societal system.

The Biological System

The **biological system** includes all those processes necessary for the physical functioning of the organism (Figure 1.1). Sensory capacities, motor responses, and the workings of the respiratory, endocrine, and circulatory systems are all biological processes. They develop and change as a consequence of genetically guided maturation, environmental resources such as nutrition and sunlight, exposure to environmental toxins, encounters with accidents and diseases, and life habits related to daily exercise, eating, sleeping, and the use of drugs.

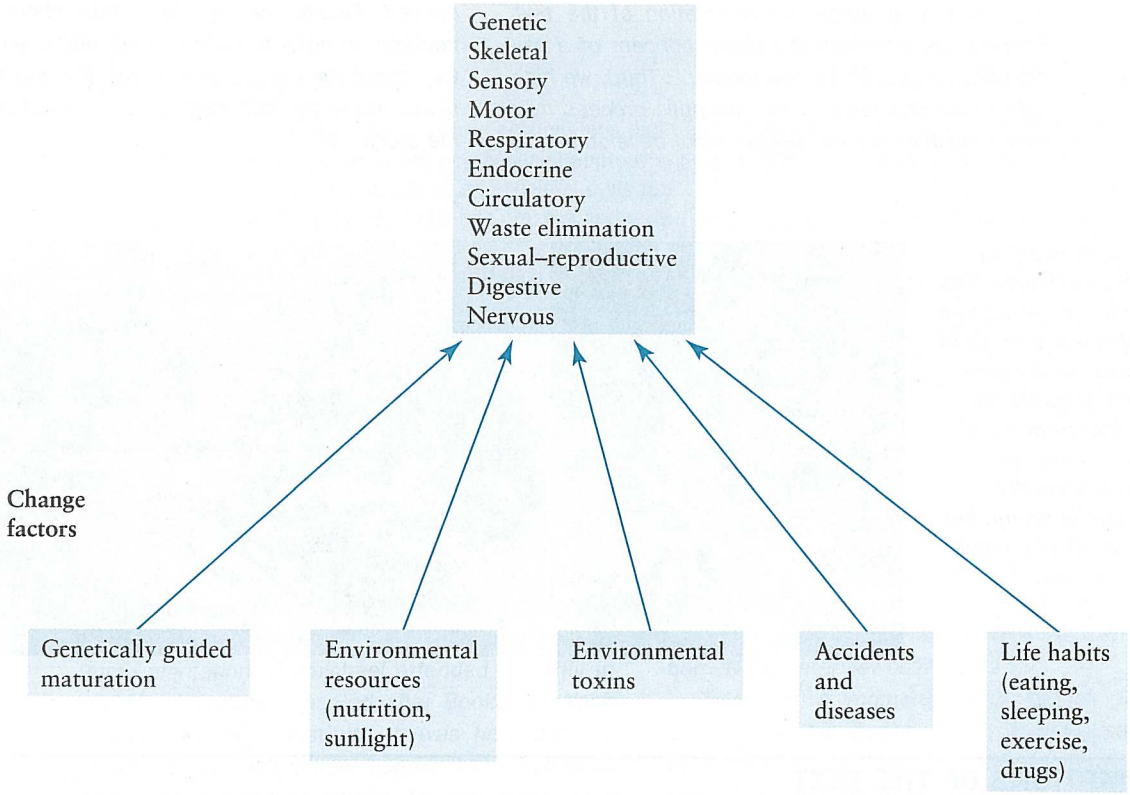


FIGURE 1.1
The biological system

The Psychological System

The **psychological system** includes those mental processes central to the person's ability to make meaning of experiences and take action (Figure 1.2). Emotion; memory and perception; problem solving, language, and symbolic abilities; and our orientation to the future—all require the use of psychological processes. The psychological system provides the resources for processing information and navigating reality. Like the biological processes, the psychological processes develop and change over one's life span. Change is guided in part by genetic information. The capacity for intellectual functioning and the direction of cognitive maturation are genetically guided. A number of genetically transmitted diseases result in intellectual impairment and a reduced capacity for learning. Change also results from the accumulation of experiences and from encounters with various educational settings. The psychological processes are further enhanced by numerous other life experiences, such as sports, camping, travel, reading, and talking with people. Finally, change can be self-directed. A person can decide to pursue a new interest, to learn another language, or to adopt a new set of ideas. Through self-insight or perhaps psychotherapy, one can begin to think about oneself and others in a new light.

The Societal System

The **societal system** includes those processes through which a person becomes integrated into society (Figure 1.3). Societal influences include social roles, rituals, cultural myths, social expectations, leadership styles, communication patterns, family organization, ethnic and subcultural influences, political and religious ideologies, patterns of economic prosperity or poverty and war or peace, and exposure to racism, sexism, and other forms of discrimination, intolerance, or intergroup hostility. The impact of the societal system on psychosocial development results largely from interpersonal relationships, often relationships with significant others.

Societal processes change over one's life span. One of the most striking instances of such change occurs when a person moves from one culture to another. In this case,

FIGURE 1.2
The psychological system

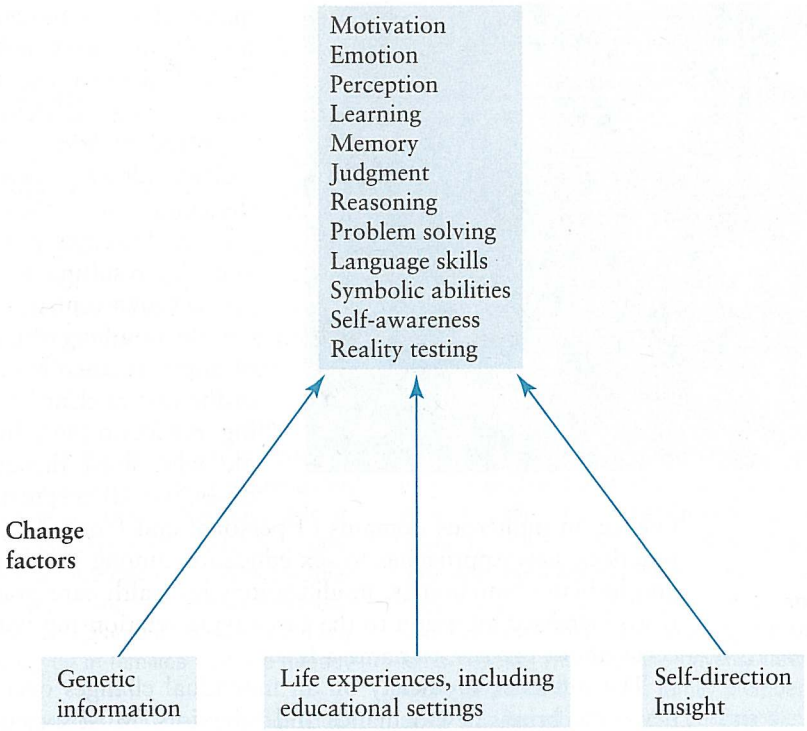
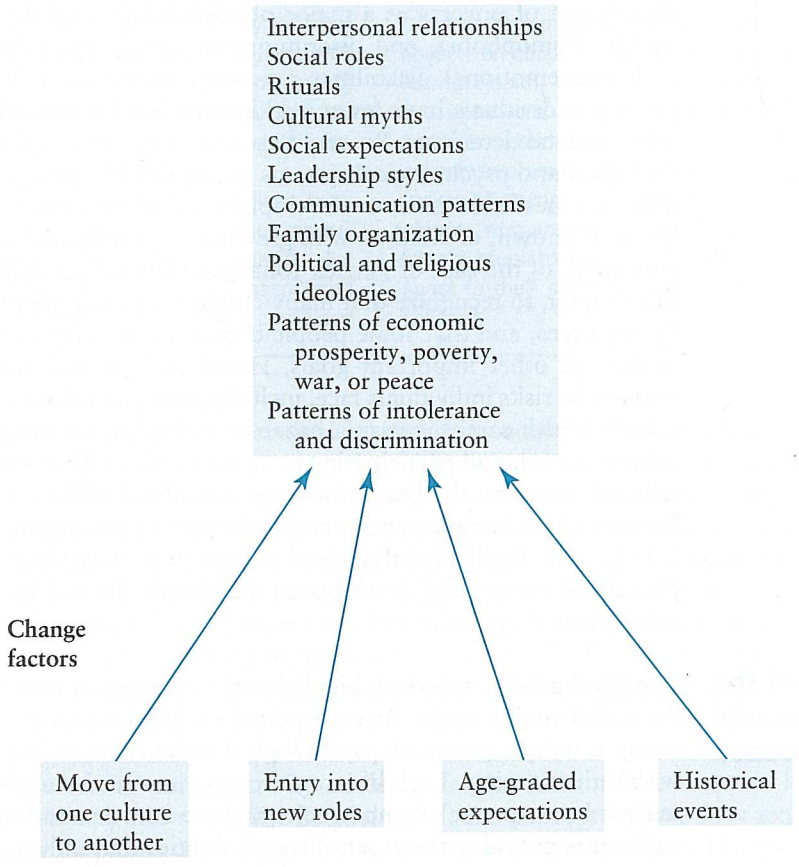
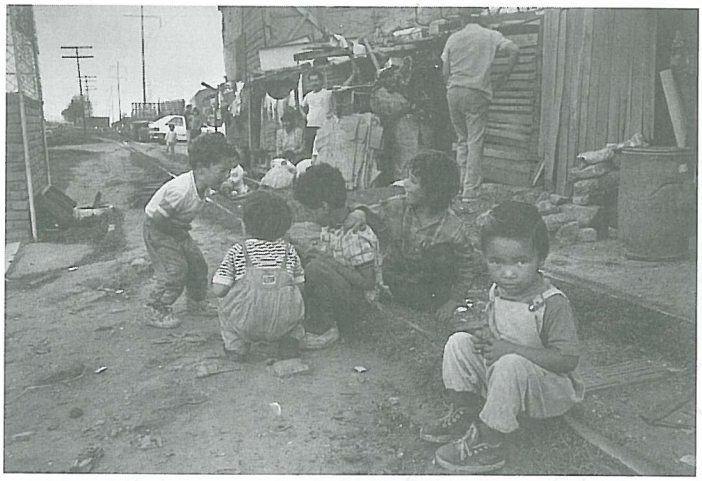


FIGURE 1.3
The societal system





Poverty represents a powerful characteristic of the societal system. Children growing up in poverty are exposed to stressors and risks that can severely restrict development. What factors might help reduce the negative impact of poverty?

many of one's fundamental assumptions about oneself and one's social relationships are modified. Historical events—conditions of war or peace, being the victor or the vanquished, living in prosperity or poverty—influence how people in a given culture perceive themselves. For example, the conditions of World War II—forced military service, decreases in the availability of resources and the resulting system of rationing, the increased involvement of women in the labor market, the bombing of European cities, the unveiling of unprecedented human atrocities, the explosion of the first nuclear bomb over Japan—had a lasting impact on the values and ideology of the people who lived through that period. In recent times, the AIDS epidemic has had a significant influence on numerous domains of personal and family life, including changing sexual practices, new approaches to sex education among youth, greater visibility of the gay and lesbian communities, modifications in health care practices and workplace practices, increased attention to the care-giving relationship within families, and new concerns about privacy, to name a few.

The influence of society on an individual changes over the life course. Entry into new roles brings new demands and behaviors. Most societies have expectations about competence and participation of members in settings and roles that change for each stage of life. These expectations may be in harmony or in conflict with the maturation of the biological and psychological processes.

The Psychosocial Impact of Poverty

In thinking about the impact of societal factors on development, we want to highlight the context of poverty as a major obstacle to optimal development. Racism, sexism, ageism, homophobia, and discrimination against individuals with physical, intellectual, and emotional disabilities are other examples. However, under conditions of poverty, individuals have fewer options and less opportunity to escape or avoid these other societal deterrents. Poverty has potentially powerful and pervasive effects on the biological and psychological systems across the life span. In and of itself, poverty does not place inevitable limits on development. There are many instances, both famous and less well-known, of children who grew up in poverty and achieved eminence. We need only think of the case of Patrick Jonathan Carmichael, introduced at the beginning of this chapter, to recognize that many children flourish under conditions of meager family resources, and that some people choose to live very modest material lives in order to achieve other important goals. However, it is well documented that poverty increases the risks individuals face, including risks associated with malnourishment, poor quality health care, living in a hazardous physical environment, living in a dangerous neighborhood, and participating in an ineffective school system. Poverty is linked with reduced access to the basic resources associated with survival (Duncan et al., 1994). Because of the complex and pervasive impact of poverty on development, we introduce it here as a fundamental societal theme (Box 1.1). Issues related to the impact of poverty on patterns of development and family life will be addressed in more detail in subsequent chapters.

Overview of the Psychosocial Approach

The **psychosocial approach** highlights the continuous interaction of the individual and the social environment. At each period of life, people spend much of their time mastering a unique group of psychological tasks that are essential for social adaptation within their society. Each life stage brings a normative crisis, which can be viewed as a tension between one's competencies and the new demands of society. The resolution of each crisis provides a new set of social abilities that influences the person's general orientation to the succeeding stages.

BOX 1.1 POVERTY

Conditions Leading to Poverty

In the first half of this century, most poverty was a result of nonemployment, unemployment, or work involving low or temporary wages (Hernandez, 1993). Since the 1960s, however, three major factors have contributed to the increase in the numbers of families living in poverty: the decline in well-paying, blue-collar jobs; large increases in single-mother households due to increases in births to adolescent mothers and increases in the divorce rate; and the decline in the value of federal benefits such as Aid to Families with Dependent Children (Huston, et al., 1994).

Poverty is transitory for some families, as when a wage earner becomes unemployed and then finds new work, but persistent over the life course for others. For unmarried women who become mothers in adolescence, poverty is often a result of interrupted education, the inability to work full time (usually because of time needed to care for their children), and the low-paying jobs that are available to those who have limited educational attainment. In addition, many of these women are growing up in families that are already poor.

Divorce places many women and their children into poverty. In many instances, the family was already encountering financial strain, which is known to be one of the primary factors associated with divorce. However, following divorce, 27% of divorced women and their children fall below the poverty line (Chase-Landsdale, 1993). The level of poverty experienced by newly divorced women is aggravated by the failure of many fathers to pay child support. Poverty for these families is often temporary, since many divorced women remarry or are able to find adequate employment after a year or two. However, the negative impact of poverty on children coupled with the stresses associated with experiencing parental divorce are likely to affect a child's adjustment (Demo & Ganong, 1994).

African-American, Hispanic, and Native American families are overrepresented among the poor, and their experiences of poverty are likely to be more long lasting. For individuals in these ethnic groups, the stresses associated with racism and cultural alienation are likely to be combined with the emotional distress associated with persistent poverty, producing even greater challenges for accomplishing the developmental tasks of each life stage (McLoyd, 1990; Duncan et al., 1994; Corcoran & Chaudry, 1997).

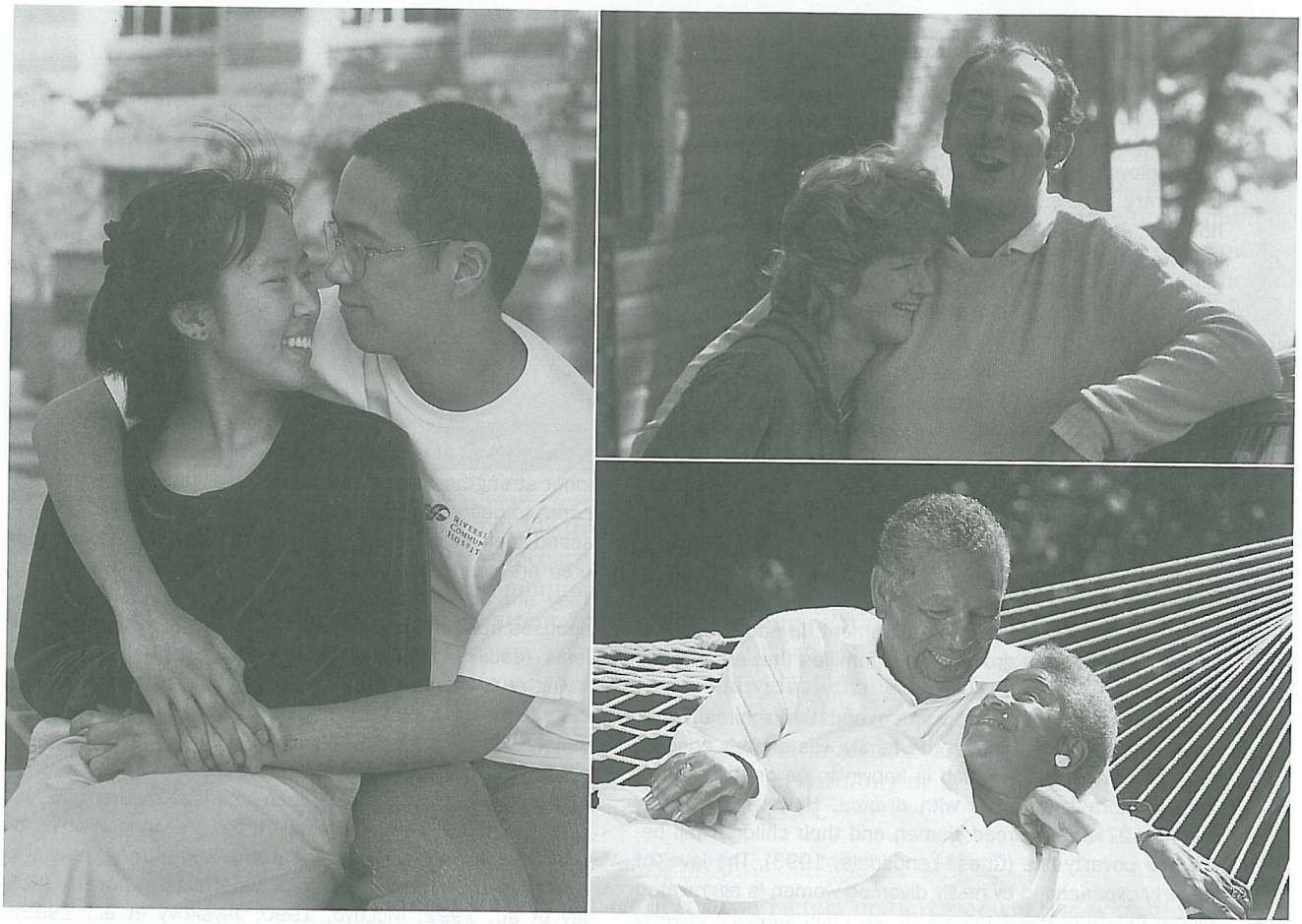
Factors that Mediate the Impact of Poverty

Like every other environmental factor, poverty has a differential impact on children and families. Although we are still a long way from fully understanding how some children escape its negative effects, we do know that many children who live in poverty continue to develop optimally. Some scholars have emphasized the notion of **resilience** as a characteristic of children. Resilient children appear to have inner strengths that permit them to get the resources they need, to define their situation in a positive way, and to transcend their lives' challenges (Garmezy, 1991). These children are characterized by an easy, sociable temperament. They are active, seeking out stimulation and evoking responses from others. They are bright and able to solve problems readily. They usually have at least one supportive, loving relationship with a family member and they have access to supportive contacts outside the family.

In addition to the resilience of children, there are other resources that help parents buffer the impact of poverty. Among low-income, single African-American mothers, for example, a higher level of education, the presence of an emotionally supportive social network, and strong religious beliefs all help reduce the negative effects of poverty (Kelley et al., 1992; McLoyd, 1990; Jayakovy et al., 1993). Other studies of factors that mediate the negative effects of poverty on children have identified aspects of the mother's mental health, especially low levels of depression and active behavioral coping as important additions to the resources mentioned above (Duncan et al., 1994). Persistent poverty in a small child's life is a strong predictor of a wide variety of physical and mental health problems. In contrast, parents who are able to see their poverty as transitory and to take steps to move out of poverty may also differ with respect to their supportiveness and responsiveness to their children.

Throughout life, personal relationships occupy our attention. Some of these relationships are more important than others, but their quality and diversity provide a basis for the study of one's psychosocial development. As we progress through the stages of life, most of us develop an increasing capacity to initiate new relationships and to innovate in our thoughts and actions so as to direct the course of our lives.

We strive to make sense of our experiences. The meaning we derive depends on our beliefs about ourselves, our relationships with others, and the world as our society defines it. This meaning changes over the course of life as a result of the maturation of the biological and psychological systems and as participation in the societal system changes. Think about the concept of love as an example. In infancy, love is almost entirely physical. It is the pervasive sense of comfort and security that we feel in the presence of our caregivers. By adolescence, the idea of love includes loyalty, emotional closeness, and sexuality. In adulthood, the concept of love may expand to include a new emphasis on companionship and open communication. The need to be loved and to give love remain important throughout life, but the self we bring to a loving rela-



The desire to experience a loving relationship remains strong throughout life. However, the self one brings to a loving relationship changes at each stage. How might experiences of love change from adolescence to early adulthood to later adulthood?

tionship, the context within which the relationship is established, and the signs we look for as evidence of love change with age.

Humans struggle to define themselves—to achieve a sense of identity—through a sense of connectedness with certain other people and groups and through feelings of distinctiveness from others. We establish categories that define whom we are connected to, whom we care about, and which of our own qualities we admire. We also establish categories that define those to whom we are not connected, those whom we do not care about, and those qualities of our own that we reject or deny. These categories provide us with an orientation toward certain kinds of people and away from others, toward certain life choices and away from others.

The psychosocial approach seeks to understand the internal experiences that are the products of interactions among the biological, psychological, and societal processes. Changes in one of the three systems—biological, psychological, or societal—generally bring about changes in the others. During the 20th century, remarkable progress has been made in bringing together observations, theories, and research to build a scientific knowledge base for the study of development across the life span. In the next section, we describe the fundamental elements of the scientific process that lead to the gradual building of a systematic understanding of development.

THE SCIENTIFIC PROCESS

The **scientific process** allows us to create a body of knowledge. Essentially it is a method for developing information that contains within it procedures for ensuring that the information will be correct. In this section, we describe the process through which scientific knowledge is achieved (Figure 1.4) and then discuss the fundamental components of research design, including selecting a sample, a method, and an approach to

data collection; evaluating the existing research; and conducting research according to ethical principles.

Scientific thinking usually begins when one attempts to reason systematically about a puzzling idea or observation. The observer tries to figure out how the observation may be explained and thinks about what leads to what and which things cause other things to happen. As a result, one develops a set of interrelated ideas to account for the observation. These ideas, often referred to as **assumptions, hypotheses,** and **predictions,** constitute a theory. The theory is not an end in itself, but a way to get going.

The next step of the scientific process is to test the theory through experimentation and observation. A good theory contains specific predictions about cause and effect. After the predictions are stated, one must figure out how to test whether they are accurate.

One must **operationalize** the concepts of a theory in order to test them. That is, one must translate an abstract concept into something that can be observed and measured. Consider the concept of personal attraction. One who decided to measure personal attraction, for example, could think about the various ways in which people show they are attracted to each other. One might observe that people who are mutually attracted tend to look into each other's eyes rather than off to the side. The amount of eye contact is a way of defining the concept of attraction so that it can be observed and measured. Eye contact thus becomes an **operational definition** of personal attraction.

Often the theory is not tested by the same person who develops it because this person may therefore have some personal investment in demonstrating that the theory is correct. The scientific process usually involves the ideas of more than one person. Sometimes people with different points of view engage in a debate as they try to refute positions they find flawed. At other times two or more people work on different phases of theory building, experimentation, and evaluation.

If a theory is fruitful, many researchers working in independent groups will devise ways of extending and clarifying it. Working in this way, as a community of scholars, helps to ensure that a theory will not be confirmed simply because of the theorist's per-

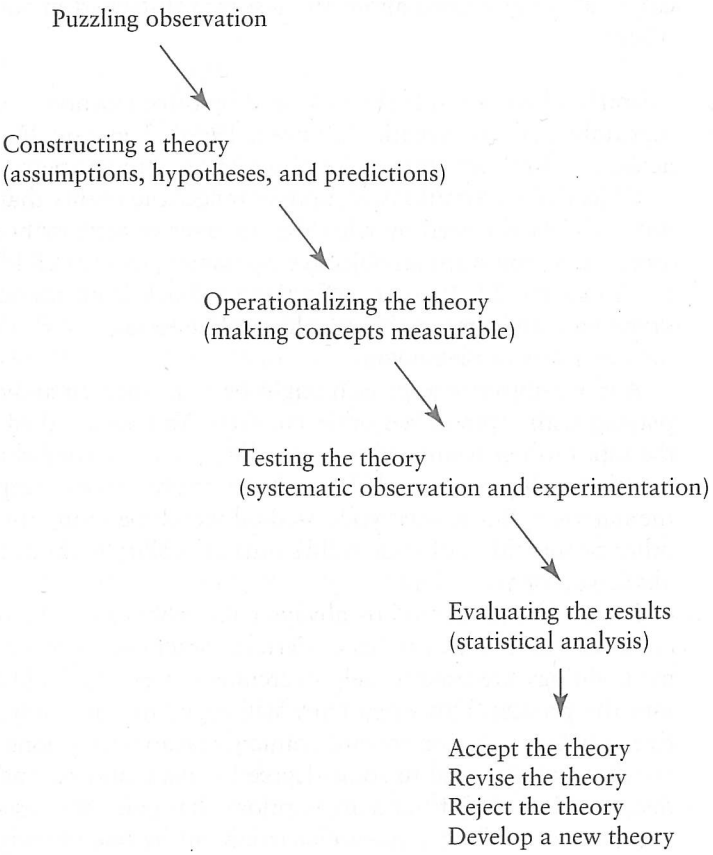


FIGURE 1.4
The scientific process

sonal biases. For example, Erik Erikson was not the person who tested his psychosocial theory. Researchers such as James Marcia, Ruthellen Josselson, Alan Waterman, and Jacob Orlofsky pursued some of Erikson's hypotheses about identity development and devised strategies for operationalizing Erikson's concepts, especially the psychosocial crisis of personal identity versus identity confusion. Their work clarified Erikson's concepts and supported many of his views about the relation of personal identity to subsequent development. You will read more about this in Chapter 10.

The final phase of the scientific process involves an evaluation of the observations. Statistical techniques help determine the likelihood that observations could have happened by chance or not. Observations that appear to be a result of chance do not confirm the theory. If the observations have a low probability of having occurred by chance, one says that they are **statistically significant.** If statistically significant results support the theory's predictions, one is likely to accept them as providing evidence for the theory. Nevertheless, scientists may continue to examine the propositions of the theory, involving new participants or new methods.

What if the results do not fit the theory's predictions? One approach is to reexamine the methods and design of the study. Perhaps the key concepts were not measured appropriately or the sample was biased in some way. When results of research are inconclusive or contrary to the predictions, scholars may try another research approach before revising the theory. But when several different studies fail to support the hypotheses, we tend to lose confidence in the entire structure of the theory. We may revise or discard the theory and begin to develop an alternative explanation for our observations.

In summary, the scientific process consists of creating a theory, testing it through research, and modifying, rejecting, or accepting it. To the extent that it is confirmed by the scientific process, a theory helps us interpret many observations about reality.

The sections that follow provide an overview of the basic principles of the research process as it is applied to the study of human development. In reviewing these principles, you will begin to grasp the challenge of trying to arrive at a systematic body of knowledge about the patterns of continuity and change in the human life course. At the same time you will encounter concepts that will improve your ability to ask critical, analytic questions about the research discussed in subsequent chapters and elsewhere.

Scientific Observation

Scientific observation is characterized by three essential qualities: it must be objective, repeatable, and systematic (Creswell, 1994). These qualities may or may not be characteristic of the way you make observations in your personal life.

Objective observations accurately reflect the events that are taking place. They are not unduly influenced by what the observer expects or hopes to see. Suppose, for example, that you want an objective assessment of your child's talent for playing the guitar. You are unlikely to get objective feedback from friends or relatives. Because they know you, and presumably would not like to insult you, they may be inclined to slant their answers to please you.

A more objective approach might be to include an audio tape of your child's guitar playing with tapes of ten other children. You would then ask another person to give the tapes to ten people who do not know you or your child and ask each of them to rate the quality of musical ability demonstrated on each tape. You may or may not like the outcome, but at least your method would be more objective. It would reveal what other people think of your child's musical ability without being biased by any feelings about you or your child.

Social science research is always vulnerable to the theoretical biases and value orientations of the researchers. Certain practices of research design, sampling, and methodology are used to help overcome biases and build a higher level of objectivity into the process. However, many will argue that it is impossible to be entirely objective. One's orientation toward framing research questions and interpreting the results are always influenced to some degree by one's cultural and historical contexts that influence values, beliefs, and assumptions that guide the research process. That is why it is so important for the research carried out by one investigator to be repeatable.

If research is **repeatable,** then others could carry out a similar investigation and observe the same results as the original investigator. In order for this to occur, the original investigator must carefully define all the procedures and equipment used in the study, describe all the essential characteristics of the participants (such as age, sex, and social class background), and describe the setting or situation where the observations were made. Since there are so many ways that one group of participants might differ from another, and so many different ways that observations can be made, repeatability is an important part of building a body of social science knowledge.

Usually a problem or process is investigated by an individual or research team, taking great care to make sure that observations are unbiased, orderly, carefully collected and recorded, and comprehensive. In order to insure that the results of a study are accurate, the original researchers encourage other investigators to repeat the study to see if the same results are observed.

A **systematic** approach ensures that research is done in a careful, orderly way. Scientists have a framework of essential questions that they strive to answer based on what is already known and what certain theories predict. They approach research by having clear objectives, carefully defining the purpose of the research and the specific methods they will use to reach those objectives. Although sometimes discoveries are made by accident, scientific research typically does not poke here and there at unrelated events.

Research Design

Research investigations are designed just as cars, bridges, and buildings are designed. In formal, scientific work, research design is often conducted in meetings where small groups of scholars try to think up the most appropriate, objective, and systematic approach for answering their questions. Scientists know that the information they gain from conducting research will be heavily influenced by the characteristics of the participants who are involved in their study, the kinds of data that are gathered, and the conditions under which the data are gathered. The principles of research design focus on the sample that is selected to participate in the study, the method that is used to gather information, the approach to studying change, and the statistical techniques that are used to analyze the data (Miller, 1991). In this chapter, we focus on the first three: sampling, methods, and designs for studying change.

Selecting a Sample

Sampling is the approach for choosing participants who will be included in the study. The nature of the questions that are being addressed usually has implications for the best way to identify the sample. If the study is about some universal principle of development, it should apply to individuals from a wide variety of family and social backgrounds. For example, studies of normal language development should include children from various ethnic, racial, social class, and cultural backgrounds. One cannot argue for universal principles if the research has shown the process or pattern to be true only for a homogeneous group of children.

Every sample is taken from a population. The **population** is the large group to which the findings of the research are intended to apply. There is no single, predetermined population; the relevant population depends on the purpose and scope of the research. The **sample** is a smaller subgroup of the larger population that will participate in the study. For example, the population of interest might be adolescents in the United States who graduate from high school but do not go on to college. In 1994, roughly 2 million adolescents aged 18 and 19 had graduated from high school but were not enrolled in any postsecondary school (U.S. Dept. of Education, 1995). No research study is going to include all of those adolescents. So a sample is drawn that is expected to be representative of the population. Under ideal conditions, the participants in any study of this population ought to have the same general characteristics (such as family income; race; gender; urban, suburban, or rural environment; and high school academic background) as the population from which the sample was selected. The sample and the population from which the sample is taken determine what generalizations may be made from the research findings. We must be careful not to assume that research findings based on one sample are generalizable for all ages, both sexes, all racial and ethnic groups, all social classes, or individuals from other cultures.

The generalizability of research depends heavily on the sampling process. Studies that focus on older adults often require interviewers who can meet face to face with participants in a variety of settings. What factors might limit the researcher's ability to sample older adults?

Four approaches to sampling are common in the research literature. Each one has somewhat different implications for the generalizability of the findings.

Random Samples

In a random sample, each person in a given population has an equal chance of being included. The researcher may ensure equal opportunity by putting each person's name on a slip of paper and then choosing some of the slips blindly, or by selecting names from a list at random by using numbers produced by a random number generator.

Stratified Samples

Participants are deliberately selected from a variety of levels (strata) or subgroups within the population. For example, the males and females in the sample might be selected to correspond to the proportion of males and females who attend a certain college or who are employed in a certain industry. Within each group, however, the participants are selected at random.

Matched Groups

The researcher selects two or more groups of subjects who are similar on many dimensions. In most studies using matched groups, participants in one group receive some type of treatment or participate in some type of experimental intervention that the participants in the other group do not receive. In this way, effects of the treatment can be observed since the participants are thought to be very similar in all other respects.

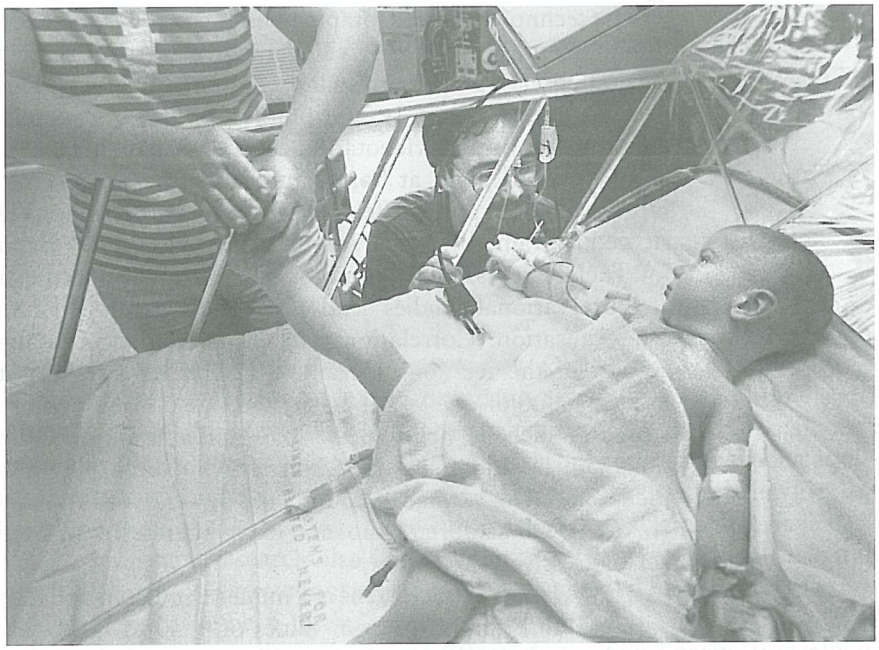
Volunteer Samples

Participants are solicited by advertisements, notes to teachers or parents asking for participants, or requests to professionals or groups of potential participants. Those who are included in the study are selected from among those who volunteer.

Strengths and Weaknesses of Approaches to Sampling

What are some of the strengths and weaknesses of these approaches to sampling? Random sampling and stratified sampling are most likely to ensure that a sample is representative of the population from which it is drawn. If each person in the population had an equal chance of being included in the study, then the outcome ought to be equally likely to apply to those who did not participate as to those who did. The method that places the greatest limits on generalization is volunteer sampling. One never knows what type of person will volunteer to participate in social science research. Can you think of how reliance on volunteers may produce special problems? For example, people who volunteer to participate in research may be especially in need of money, have more time on their hands, or be hoping to find some kind of help as a result of participating in the research.

Regardless of these difficulties, volunteer samples are widely used. Frequently the only way to study a certain question is to ask for volunteers. Some of the research findings discussed in the text are based upon **clinical studies.** This usually means that the participants have been involved in some type of treatment program or are on the waiting list to receive clinical treatment. These studies are especially important for understanding the causes of clinical conditions, the developmental paths or patterns these conditions exhibit, the impact of certain interventions, and the long-term consequences of these conditions. Without this voluntary participation, there would be no way to begin to document the effectiveness of treatment. At the same time, one must be cautious not to generalize findings from clinical studies to the population as a whole.



Clinical samples often focus on children or adults who are undergoing a special, experimental treatment or who have undergone some unusual trauma. Without their participation, we could not learn about the potential benefits of new forms of treatment or intervention.

Research Methods

A variety of methods has been used to study development. Each one has its strengths and weaknesses, allowing the investigator to focus on one set of behaviors at the expense of others. The choice of method must fit the problem under study. Six general categories of developmental research are described here: observation, case study, interviews, surveys, tests, and experimentation. These methods have all contributed to the discovery of knowledge, and as you read further in the text you will find examples of each method. Some techniques, especially observation, case study, and interview, are more commonly used in the exploratory phase of research when investigators are trying to uncover basic themes or dimensions of a problem. Other methods, especially observation using a predetermined coding scheme, experimentation, and surveys and tests, tend to be used in the hypothesis testing phase of the research process.

Observation

Direct **observation** of children in their home and school environments is one of the oldest methods for studying development (Kessen, 1965). Researchers have used mothers' diaries and observation logs to gather information about behavior in intimate settings that could not be known in any other way. Jean Piaget was guided by the observations of his own children in the formulation of his theory of cognition. Today, some researchers conduct observations in the homes, schools, and day-care centers where children typically spend their time. Others bring children and their families or friends into "homelike" laboratory settings where they can watch children's behaviors under somewhat more constant and controlled physical conditions (Kochanska, Kuczynski et al., 1989).

Naturalistic observation, in which behavior in a setting is carefully observed without any other kinds of manipulation, provides insight about how things occur in the real world. In some instances, researchers go into a setting to observe the full range of interactions and behavior patterns. Based on their field notes, they begin to develop hypotheses or tentative explanations about the meaning of the behaviors. Then, they may test these hypotheses through more focused observation or through more controlled experimentation.

In other instances, researchers use observation to examine a specific behavior or relationship. They may be looking for different forms of peer aggression, patterns of social cooperation, or conditions that promote cross-gender interactions. In these cases, the observers limit the scope of their observations to behaviors that are relevant to their concerns.

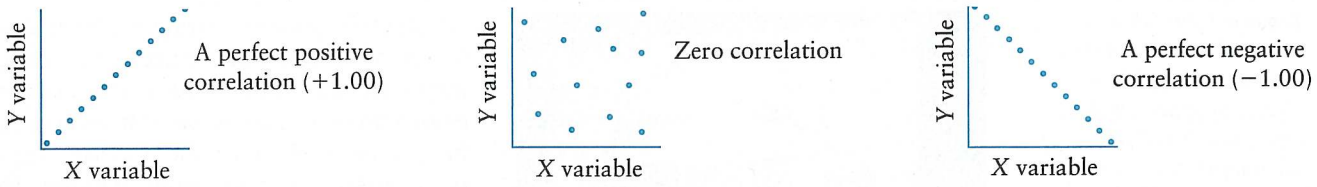
The technology of videotaping has expanded the use of observational techniques for developmental research. A videotaped record can be reviewed over and over again. Several observers can watch a tape, stop it, and discuss what they saw. The same events can be observed from several points of view. For example, researchers interested in children's play might videotape a child's free play in three or four different settings such as day care, a park, at home, and with friends. Several observers might review the tapes, each one rating different aspects of the behavior. Videotaped records can also be slowed to frame-by-frame viewing, allowing for very detailed microanalysis of behavior. Facial expressions and motor sequences have been examined using this approach.

Observational studies lend themselves to an examination of correlation rather than causation. **Correlation** refers to a statistical analysis of the strength and direction of the relationships among variables. It reflects the degree to which knowing the value of one variable, such as age, allows one to predict the level of another variable, such as helpfulness. In observational research, many correlational questions can be addressed. Do children who often play alone show more creativity in their play? Do younger children use fewer words to describe an object than older children? Do children who are most aggressive with their peers at day care also act aggressively at home?

The **correlation coefficient** is a numeric index of the strength of relationship between variables that can range from values of +1.0 to −1.0. Let us take, as an example, the correlation between popularity with peers and aggressiveness. If higher levels of aggressiveness are associated with higher popularity, the correlation is positive (toward +1.0). If higher levels of aggressiveness are associated with lower popularity, the correlation is negative (toward −1.0). If there is no systematic relationship between aggressiveness and popularity, the correlation is close to 0 (Figure 1.5). A correlation of .40 suggests that there is a positive relationship between aggressiveness and popularity, but that popularity cannot be predicted entirely or even predominantly by knowing about one's level of aggressiveness. Research that actually focuses on the relationship between popularity with peers and aggressiveness is discussed in the chapters on early and middle childhood.

A strong correlation between two variables only shows that there is an association between them. It does not provide information about causation. Knowing that aggression is negatively correlated with popularity does not necessarily mean that being aggressive causes children to be rejected by peers. It could be that some other factor, such as mistrust of others, accounts for both aggression and peer rejection.

In a naturalistic setting, observers can capture the flow of ongoing behavior and note the interactions among participants. Here, the observer watches as teacher and children engage in a reading lesson. Her presence does not appear to interfere with the children's interest and attention. What kinds of behaviors might be the focus of this observational study?



Note: Each point represents one person measured on both variables.

FIGURE 1.5
Patterns reflecting positive, zero, and negative correlations

Strengths and Limitations of the Observation Method. One strength of naturalistic observation is the ability to capture naturally occurring responses as they take place. Another strength is the ability to allow children's behaviors to guide the researcher's conceptualization. Rather than setting up a specific task or group of questions and having children respond, the observer examines the full range of relevant behaviors and builds an interpretation of the meaning of the events from the patterns that have been observed.

Observational research also has weaknesses. It is often difficult to establish agreement among observers about exactly what occurred. Think about the times that you and a friend have been in the same situation but have entirely different reactions to what is happening or describe it very differently to a third party. Typically two or more observers' codings of the same situation are compared to determine whether different observers rated the same event in the same way. This is called **interobserver reliability.** When interobserver reliability is high, one has confidence that all the observers are describing or coding the events in the same way. When interobserver reliability is low, the researchers must determine why and correct the differences in observation techniques. This may result in changing the category scheme so that it is easier to link each behavior with a category, or it may result in more training so the observers know more precisely how to code each behavior.

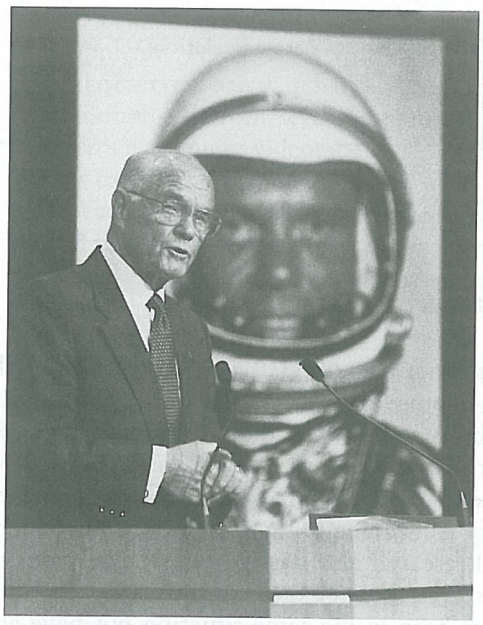
Another difficulty with the observational method results when so much activity is taking place that it is difficult to select specific behaviors or to code fast enough to keep up with the pace of activity in the setting. Finally, some research focuses on a particular kind of behavior or behavioral sequence such as helping behavior, peer rejection, or conflict. In naturalistic observation, one cannot be assured that the behavior of interest will take place during the observational period.

Case Study

A **case study** is an in-depth description of a single person, family, or social group. The purpose of a case study is to describe the behavior of only that person or group. Case studies are often carried out to illustrate a general principle by providing specific details, to examine a phenomenon that does not conform to theoretical predictions, or to stimulate theory development in an area that has not been investigated. Case studies have been used to examine the sequence of life events that have led up to a certain crisis or major turning point. They have been used to document the course of mental disorder or to illustrate the process of treatment (Runyan, 1982). Case studies can be based on a variety of sources of information including interviews, therapy sessions, prolonged observation, diaries or journals, letters, historical documents, and talks with people who know the subject of study.

Some case studies document the lives of great individuals. In *Gandhi's Truth (1969),* Erikson provided a psychosocial analysis of the life of Mahatma Gandhi. Erikson considered Gandhi's childhood, adolescence, and young adulthood as they contributed to his personality, his moral philosophy, and to the contradictions between his personal social relationships and his role as a powerful social leader.

Case studies can also focus on social groups, families, and organizations. One of Anna Freud's most famous cases described the attachments that developed among a group of orphans who had lived together in a concentration camp during World War II (Freud & Dann, 1951). The study focused on the strong feelings the children had for



Senator John Glenn has volunteered to participate in a case study of the effects of space on the aging process. Because of his unique background, long-term medical records are available that can be used to trace his physical health over a 50-year span.

one another and their strategies for maintaining their sense of connectedness once they were placed in a more normal social environment. The case illustrated a unique phenomenon, the intense emotional attachment of young children to each other, that had not been documented before.

Strengths and Limitations of the Case Study Method. Case studies have the advantage of illustrating the complexity and uniqueness of individual lives. Studies carried out with large samples often identify general principles. Case studies provide concrete examples of how these principles play themselves out in the lives of specific individuals. Some cases give the details of an experience that is rare and might not be captured in a large-scale study. Sometimes the case study brings a problem to the attention of researchers who then pursue it through other methods (Yin, 1994).

Case studies have been criticized as unscientific. In the first place, they are obviously not representative of large groups of individuals. One must be cautious about generalizing the conclusions drawn from a case study to other individuals or groups. Moreover, if the information that provides the basis of the case study is gathered in a biased or subjective way, then the results or conclusions of the study will be of little worth. Of course, this criticism applies to any type of research. Finally, critics argue that there is no reliability in case studies. If different people were writing a case study on the same individual, they might come up with very different views of the events and their significance.

These limitations suggest that one must have a very clear idea of the purpose and a systematic approach to gathering information in order to conduct case studies that would meet the standards of scientific observation. At the same time, vividly written, compelling case material has had a consistent impact in stimulating theory and research in the field of child development.

Interviews

Many case studies are based largely on face-to-face **interviews.** This method can also be used to gather data from large numbers of individuals and from people in clinical settings.

Interviews can be highly structured, almost like a verbal survey, or very open-ended, allowing the participant to respond freely to a series of general questions. The success of the interview method depends heavily on the skill of the interviewer (Holstein & Gubrium, 1995). Interviewers are trained to be nonjudgmental as they listen to a participant's responses. They try to create **rapport** with the participant by conveying a feeling of trustworthiness and acceptance. In unstructured interviews, the interviewer must make use of this rapport to encourage the participant to say more about a question and to share thoughts that may be private or personal. Matching the race and gender of the interviewer and the participant being interviewed have been found to help foster rapport and improve the quality of the data that is produced.

The interview method has traditionally been associated with clinical research, and it is becoming a major method in the study of cognition and language as well. Piaget's structured interview technique (Piaget, 1929) provides a model for the investigation of conceptual development (Box 1.2). The researcher who uses this technique asks a child a question (e.g., "Are clouds living or dead?"), and then follows up on the answer with questions about how the child arrived at his or her conclusion. In other studies, Piaget asked children to solve a problem, and then asked them to explain how they arrived at

BOX 1.2 Piaget's Interview Method

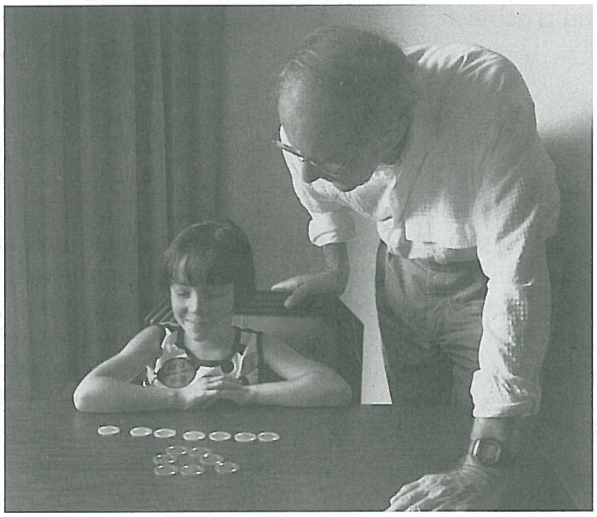
Piaget's use of the interview method to elicit a young child's cognitive reasoning can be seen in two excerpts from his works. In the first, Piaget (1929) was exploring a 5-year-old child's understanding of dreams:

> *Where does the dream come from?*—I think you sleep so well that you dream.—*Does it come from us or from outside?*—From outside.—*What do we dream with?*—I don't know.—*With the hands? . . . With nothing?*—Yes, with nothing.—*When you are in bed and you dream, where is the dream?*—In my bed, under the blanket. I don't really know. If it was in my stomach(!) the bones would be in the way and I shouldn't see it.—*Is the dream in your head?*—It is I that am in the dream: it isn't in my head(!) When you dream, you don't know you are in the bed. You know you are walking. You are in the dream. You are in bed, but you don't know you are (pp. 97–98).

Here Piaget (1963) was describing a 7-year-old child's understanding of class inclusion:

> You present the child with an open box that contains wooden beads. The child knows they are all wooden because he handles them, touching each and finding that it is made of wood. Most of these beads are brown, but a few are white. The problem we pose is simply this: Are there more brown beads or more wooden beads? Let us call A the brown beads, B the wooden beads: Then the problem is simply that of the inclusion of A in B. This is a very difficult problem before the age of 7 years. The child states that all the beads are wooden, and that most of them are brown and a few are white, but if you ask him if there are more brown beads or more wooden beads he immediately answers, "There are more brown ones because there are only two or three white ones."
>
> So you say, "Listen, this is not what I am asking. I don't want to know whether there are more brown beads or more white beads, I want to know whether there are more brown beads or more wooden beads." And, in order to make it easier, I take an empty box and place it next to the one with the beads and I ask, "If I were to put the wooden beads into that box would any remain in this one?" The child answers, "No, none would be left because they are all wooden." Then I say, "If I were to take the brown beads and put them into that box, would any be left in this one?" The child replies, "Of course, two or three white ones would remain." Apparently he has now understood the situation, the fact that all the beads are wooden and that some are not brown. So I ask him once more, "Are there more brown beads or more wooden beads?" Now it is evident that the child begins to understand the problem, sees that there is indeed a problem, that matters are not as simple as they seemed at first. As we watch him we observe that he is thinking very hard. Finally he concludes, "But there are still more brown beads; if you take the brown ones away, only two or three white beads remain."

In studies using a Piagetian-style interview, children explain how they reached an answer and why they think their answer is correct. This provides insight into the reasoning behind correct and incorrect responses.



In this Piagetian interview about conservation of number, a child is asked to explain how he arrived at his answers and why he believes that the answer is correct.

the solution. The child becomes an informant about his or her own conceptual capacities. This approach has been adapted in the study of moral development, interpersonal development, and positive, helping behavior.

Strengths and Limitations of the Interview Method. The interview method has the advantage of allowing individuals to contribute their own views on the topic being studied. They can tell the interviewer what is important to them, why they might choose one alternative over another, or what they think is wrong with the investigator's view of the situation. Participants may also, of course, present themselves in the way they want the interviewer to see them; when they do, they are said to be exhibiting a **self-presentation bias.**

Research suggests that young children's responses are especially vulnerable to influence by the interviewer. By smiling, nodding, frowning, or looking away, the interviewer can deliberately or inadvertently communicate approval or disapproval. There is a fine line between establishing rapport and influencing responses.

Surveys and Tests

Survey research is a means of collecting specific information from a large number of participants. If people are to respond directly to surveys, they must be able to read and write, unless the survey questions are read to them. The survey method is, therefore, most commonly used with participants in middle childhood, adolescence, and adulthood. However, survey information about infants and toddlers is often collected from parents, child-care workers, physicians, nurses, and others who are responsible for meeting the needs of young children. Thus, surveys have contributed a great deal to our knowledge about the way adults perceive the behaviors and needs of young children.

Survey methods can be used to collect information about attitudes (Do you believe teachers should be permitted to use corporal punishment with their students?), about current behaviors and practices (How many hours per day do you watch television?), about aspirations (What do you hope to do when you graduate from high school?), and about perceptions (How well does your mother/father or son/daughter understand your views?).

Survey questions are prepared in a standard form, and the responses are usually coded according to a prearranged set of categories. In well-designed surveys the questions are stated clearly and offer response choices that are not ambiguous or overlapping. In the most powerful surveys, the sample of subjects is carefully selected to be representative of the population under study. Surveys may be conducted by telephone, through the mail, in classrooms, at work, or in the participants' homes (Fowler, 1993).

Tests are often similar in form to surveys. They consist of groups of questions or problems the child is expected to answer. Usually tests are designed to measure a specific ability or characteristic. You are no doubt familiar with the kinds of tests typically given in school. You are presented with a group of items and asked to produce the correct answer or to select the correct answer from among several choices. Intelligence tests and achievement tests are of this nature. A researcher might give these tests along with some other measures in order to learn how intelligence relates to social life, emotions, or self-understanding.

Other tests are designed to measure a variety of psychological constructs, such as creativity, conformity, depression, and extroversion. Some tests are administered to assess whether a person has some form of mental illness, learning disorder, or developmental or physical disability.

Psychological tests must be reliable and valid to be useful. Tests are **reliable** when they provide approximately the same score or the same diagnosis each time a person takes the test. This is not to say that the test should not indicate change when change has occurred. But a person who takes a reliable test on two consecutive days should get approximately the same score on both days unless some deliberate training or intervention has been introduced between them. There ought to be a positive correlation (toward +1.0) between the two scores.

Tests are **valid** when they measure what they claim to measure. The people who design the tests have to define what it is they are trying to measure. They also have to provide evidence that their test really measures this construct (Messick, 1989). Consider the various tests that have been designed to measure intelligence in infants and very young children. The results of these tests are not very closely related to the results of tests of intelligence given in adolescence and adulthood (Bayley, 1970). In other words, correlations between intelligence tests given to infants and those given to the same subjects when they are older tend to be low (nearer to 0.0 than to −1.0 or +1.0). Perhaps the underlying components of intelligence differ in babies and in adolescents and adults. Or perhaps intelligence evolves in so many ways that the intelligence of the adult bears little relation to that of the infant. Or perhaps these infant tests are not really tests of broad, adaptive intelligence, but are measures of sensory processing and central nervous system coordination.

Strengths and Limitations of Surveys and Tests. Surveys and tests have certain advantages that make them widely used in developmental research. They allow us to compare the responses of large groups of respondents. Surveys and tests have been designed to ad-

dress a wide variety of topics. With a prearranged coding or scoring system, many tests can be administered and evaluated without difficulty.

This method also has limitations. Some surveys create attitudes where none existed before. For example, you might ask sixth-grade children questions about their satisfaction with their school curriculum. The students may answer a lot of questions on this topic, but they may not have given much thought to the issue before. Another problem is the gap between answers to survey questions or scores on tests and actual behavior. Adults may say they believe strongly in First Amendment rights, but they object when certain groups petition for the right to hold a rally in their town. Similarly, parents may say that they allow their children to participate in family decisions, but when it comes to real family decisions, they may not give their children much voice.

The use of tests to determine school admissions and placement has come under serious attack (Weinberg, 1989). Some tests have been criticized for putting unfair emphasis on knowledge derived from a white, middle-class, Eurocentric cultural perspective. Some tests have been criticized for putting at a disadvantage children whose first language is not English or for being insensitive to different learning styles and modes of synthesizing information.

Intelligence tests in particular have been criticized because they are used to decide children's educational placement, but they do not encompass the full array of psychological factors associated with social competence and adaptive behavior. Psychological tests continue to be used in research to explore the relationship among developmental domains. However, their use in settings such as schools and treatment facilities is becoming increasingly controversial for the many reasons mentioned above.

Experimentation

Experimentation is a method best suited for examining causal relationships. In an experiment, some variable or group of variables is systematically manipulated to examine the effect on an outcome. For example, one might study the effect of different types of instructions on student performance, or different learning environments on a student's ability to recall information. The variable that is manipulated by the experimenter is called the **independent variable.** The variable defined by the participant's responses or reactions is the **dependent variable** (Davis, 1995). The research is carried out to determine whether the independent variable or some combination of independent variables can produce a change in the dependent variable.

In some experiments, one group of participants has a certain set of experiences or receives information (usually referred to as a **treatment**) that is not provided to another group. The group that experiences the experimenter's manipulation is called the **experimental group.** The group that does not experience the treatment or manipulation is called the **control group.** Differences in behavior between the two groups are then attributed to the treatment. For example, in a study of academic performance in human development courses, students enrolled in a course would be randomly assigned to the experimental group, in which they are linked as a study group through e-mail so they can contact one another, discuss questions from the course, and share their ideas. The other students, who are in the control group, do not receive this Internet support. Differences in course grades between the experimental and the control groups would be attributed to the Internet intervention.

In other experiments, the behavior of a single group of participants is compared before and after the treatment or across several treatments. Once again, systematic differences in behavior before and after the treatment are attributed to the experimental manipulation. In this case each participant serves as his or her own control.

Control is the key to successful experimentation. The experimenter must exercise control in selecting the children or families who participate in a study. The participants must be able to bring equivalent competencies to the situation. If this condition is not met, one cannot assume that differences in behavior between groups are due to the treatment.

Experimenters control the way a task is presented to the participants so that such factors as the ability to understand the instructions, the order of events, and the degree

The experimental method has been used widely to learn more about infants' visual and auditory abilities and their capacity to remember stimuli from one presentation to the next. As a parent, what would you want to know before deciding to give permission for your child to participate in experimental research?

of comfort and familiarity with the setting do not interfere with the participants' behavior. Control ensures that changes in behaviors do in fact result from the experimental manipulation.

Many studies in human development are **quasiexperimental.** This means that the treatment was not controlled by the experimenter but was a result of some pattern of life events (Wilson, 1995). Suppose we are interested in the impact of unemployment on conflict between married couples. We cannot (nor do we want to) cause some adults to lose their jobs while others remain employed. We can, however, compare couples of about the same age and social class who have experienced unemployment with those who have not.

In these studies, assignment to a "treatment" occurs as a result of real-world events. One would select participants for the study who are as much alike as possible in other respects except for their encounters with unemployment. It is the task of the scientist to compare some of the consequences of this treatment—the experience of unemployment—and to deal with the limitations that are imposed on the results by the way the individuals arrived in one treatment group or the other to begin with.

Strengths and Limitations of the Experimental Method. The experimental method has the advantage of providing conclusions about causal relationships. If we can show that the participants' behavior changes only when something about the experimental situation changes, we can conclude that the manipulation has caused the changes in behavior. This is a very powerful statement, particularly as we search for explanations for how conditions that occur early in development might influence later outcomes.

Experiments also have limitations. We cannot be certain about how applicable a controlled laboratory situation is to the real world. Would the behaviors that are observed in the laboratory also be observed at home, at school, or at work? For example, through studies of attachment (which is discussed in Chapter 5) we have learned that infants and young children do not behave the same way in the presence of their mothers as they do when their mothers are absent. Thus, experimental research conducted with children that does not allow mothers to be present may produce behavior that differs in quantity, quality, and sequence from the behavior that would be observed under more normal conditions, when the mothers are present.

Experimental studies tend to suggest that event *A* causes response *B*. In many domains of development, however, a multifaceted, reciprocal process promotes

change. Just think a moment about the development of friendship. A friendship depends on so many domains and the fit or lack of fit along each domain for the two people. Friendships may be influenced by physical appearance, abilities, temperaments, intelligence, family background, whether others support the friendship or ridicule it, and so on. Friendships are sustained and promoted by continuous feedback and interaction among the friends rather than by one or two factors that could be said to promote or inhibit friendship. We want to avoid imposing a unidirectional, causal explanation on behaviors that are more accurately described using an interactional model.

Advantages and disadvantages of the five research methods are summarized in Table 1.1.

Designs for Studying Development

The primary concern of developmental research is to describe and account for patterns of continuity and change. Four major research approaches have been created for examining development: retrospective studies, cross-sectional studies, longitudinal studies, and cohort sequential studies.

Retrospective Studies

A researcher engaged in a **retrospective study** asks the participants to report on experiences from an earlier time in their lives. Many early studies of child-rearing used parents' recollections of their parenting techniques to evaluate their patterns of child care. Researchers who studied the effects of stress during pregnancy often asked women to recall their emotional state before, during, and after their child was born. Investigators of personality development use retrospective data by asking adolescent or adult subjects to recall important events of their childhood.

This approach produces a record of what a person has retained of past events. We cannot be certain that these events really occurred as they are remembered. For that matter, we cannot be certain that they occurred at all. Piaget (1951) described a vivid memory from his second year of life:

> I was sitting in my pram, which my nurse was pushing in the Champs Elysées, when a man tried to kidnap me. I was held in by the strap fastened around me while my nurse bravely tried to stand between me and the thief. She received various scratches, and I can still see vaguely those on her face. (p. 188)

Thirteen years later, when Piaget was 15, the nurse joined a religious order. She wrote to his parents and returned a watch they had given her for protecting Jean from the

TABLE 1.1 Advantages and Disadvantages of Methods of Developmental Research

Method	Definition	Advantages	Disadvantages
Observation	Systematic description of behavior	Documents the variety of ongoing behavior; captures what happens naturally, without experimental intervention	Time-consuming; requires careful training of observers; observer may interfere with what would normally occur
Case studies	In-depth description of a single person, family, or group	Focuses on complexity and unique experiences of individual; permits analysis of unusual cases	Lacks generalizability; conclusions may refelect bias of investigator; hard to replicate
Interviews	Face-to-face interaction in which each person can give a full account of his or her views	Provides complex first-person account	Vulnerable to investigator bias
Surveys and tests	Standard questions administered to large groups	Permits data collection from large samples; requires little training; very flexible	Wording and way of presenting questions may influence responses; response may not be closely related to behavior; tests may not be appropriate for use in schools or clinical settings
Experimentation	Analysis of cause-effect relations by manipulation of some conditions while others are held constant	Permits testing of causal hypotheses; permits control and isolation of specific variables	Laboratory findings may not be applicable to other settings; focuses on a unidirectional model of causality

kidnapper. She confessed that she had made up the story even to the point of scratching her own face. Piaget believed he had created the visual memory from the story his parents had told him about the incident.

The passage of time may change the significance of certain past events in a person's memory. As we gain new levels of cognitive complexity or change our attitudes, we reorganize our memories of the past so as to bring them into line with our current level of understanding (Kotre, 1995). Sometimes, people claim to have recovered memories of past events that have been long forgotten or "repressed." It is extremely difficult to determine the accuracy of these memories (Loftus, 1993). They may be entangled with current experiences or with ideas taken from books, movies, or conversations with others. They may be altered by the suggestion that something happened that actually did not, or by the suggestion that something did not happen that actually did. Because memory is so easily modified by suggestion, its usefulness in uncovering systematic data about the past is limited. However, retrospective data are of value for understanding how people make sense of their past, and what role they perceive past experiences to have had in their present way of thinking. Studies that use the technique of **life review** provide insight into the way adults organize and structure key periods and events from their life history (McAdams et al., 1997).

Cross-Sectional Studies

Studies that compare people of different ages or of different social backgrounds or from different school or community settings are called **cross-sectional studies.** Such studies are quite commonly used in research on child development. Investigators may compare children of different levels of biological maturity or of different chronological ages to learn how a particular developmental domain changes with age.

One such study explored differences in how children aged 7, 9, and 12 were able to reason about problems to which there was more than one solution (Horobin & Acredolo, 1989). Even though the younger children were aware that there were multiple solutions, they were more likely than the older children to settle on one solution and insist that it was correct.

The limitation of the cross-sectional method is that it blurs the pattern of individual development. With respect to the study on reasoning, the cross-sectional approach tells us that most 12-year-olds are more flexible in their reasoning than most 7-year-olds. It does not tell us how the children who were the most flexible at age 7 would have performed at age 12 in comparison with those who were the least flexible.

Longitudinal Studies

A **longitudinal study** involves repeated observations of the same subjects at different times. The time between observations may be brief, as from immediately after birth to two or three days after birth. Or observations may be repeated over the entire life course, as in Leo Terman's longitudinal study of gifted children (Holahan et al., 1995; Sears & Barbee, 1978; Terman et al., 1947, 1959).

Longitudinal studies have the advantage of allowing us to consider the course of development of a particular group of individuals. We can discover how certain characteristics of children in infancy or toddlerhood relate to those same characteristics when the individuals reach adolescence or adulthood. We can also learn whether certain qualities of childhood, such as intelligence or outgoingness, are related to overall social adjustment or life satisfaction in later years. Longitudinal studies permit us to trace individual patterns within a group over time, rather than comparing typical patterns across age groups (Schaie, 1994).

Longitudinal studies may be very difficult to complete, especially if they are intended to cover a significant age period, such as the years from childhood into adulthood. Over this span of time, participants may drop out of the study, the investigators may lose funding or interest in the project, and the methods may become outdated. Questions that once seemed important may no longer be seen as vital. One of the greatest limitations of these studies is that they focus on only one generation of sub-

jects. Historical and social factors that may influence the course of this group's development will be inextricably intertwined in the observations. One cannot tell if all people growing up at all times in history would exhibit the pattern of changes that characterize this particular group.

Cohort Sequential Studies

A **cohort sequential design** combines the cross-sectional and the longitudinal approaches into one method of study (Schaie, 1965, 1992). Groups of participants, called **cohorts,** are selected because they are a certain number of years apart in age. For example, we might begin with a group of adolescents who are 11, 14, and 17. Every three years, this group would be interviewed until the 11-year-olds have turned 17. In addition, every three years, a new group of 11-year-olds would be added to the study. This combination of a longitudinal and a cross-sectional design is a powerful developmental research method. It produces immediate cross-sectional data, longitudinal data after three and six years, and a comparison of children who were the same age (11, 14, or 17) at three different times. This third comparison permits us to identify social and historical factors that may influence age-related differences. The elements of a cohort sequential design are seen in Figure 1.6.

Evaluating Existing Research

In addition to collecting new data, social scientists give considerable scholarly effort to reviewing and evaluating the existing research. Statistical techniques allow us to compare the findings of a variety of studies in order to identify patterns of results. As a student, you may be asked to review research findings on a topic of interest to you. Most researchers use this method to keep well informed on the research being reported in their subject area. They analyze the work of others to generate new questions and to formulate well-founded conclusions about issues in their specialization. The study, analysis, and evaluation of current research literature constitute special skills in their own right.

Ethics

In conducting research with living beings, and especially with children, social scientists continually confront ethical questions. **Ethics** refers to principles of conduct that are founded on a society's moral code. As part of their professional socialization, researchers are obligated to maintain humane, morally acceptable treatment of all living subjects (American Psychological Association, 1992).

The ethical guidelines for research with human subjects encompass a variety of considerations. Because we are concerned about subjects' right to privacy, the identities of individual subjects must be kept confidential. The subjects must not be coerced into participating in a research project, and a refusal to participate should have no negative consequences. If children in a classroom, for example, decide that they do not want to participate in a research project, or if their parents do not give permission for them to

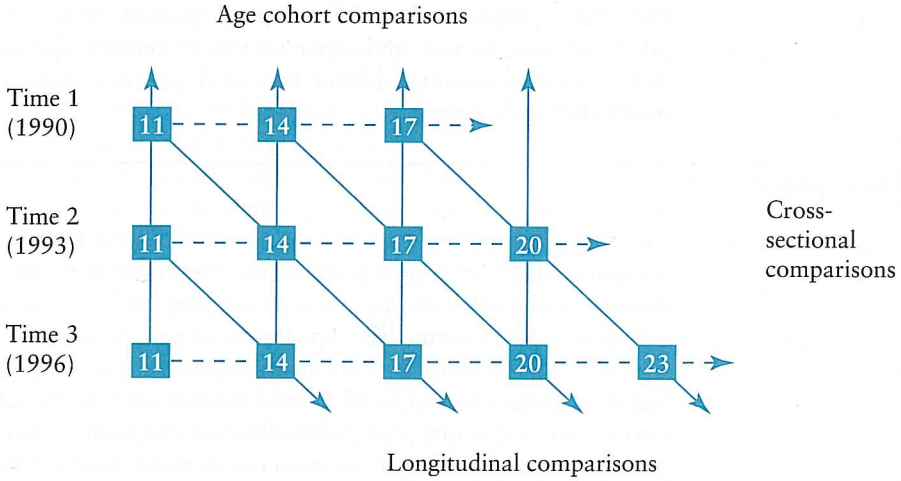
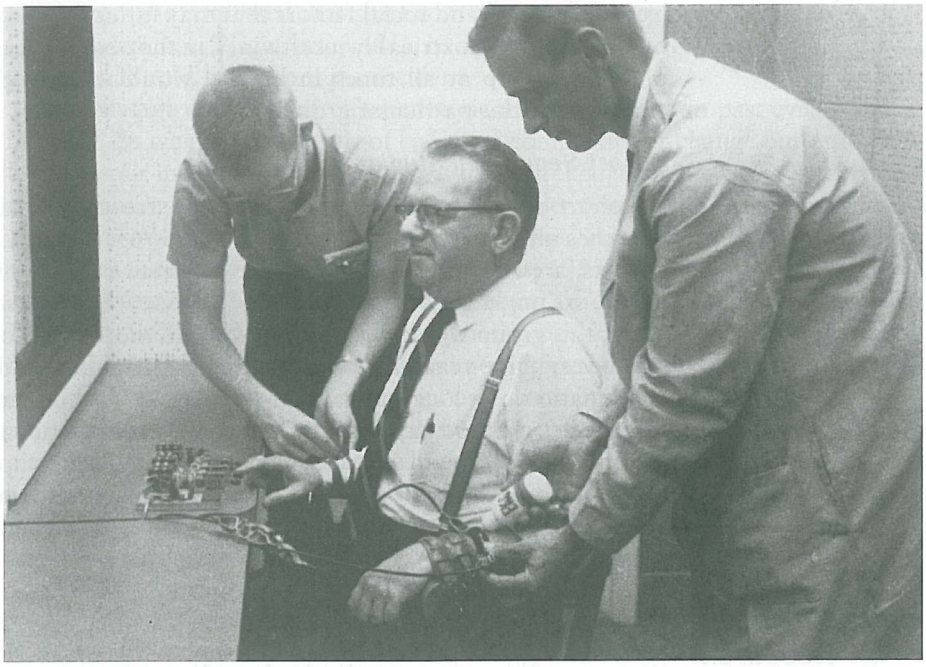


FIGURE 1.6
The cohort sequential design



In the famous Milgram experiment, participants were deceived into believing that they were causing physical harm to another person. One aspect of the deception was to involve research participants in connecting electrodes to the "learner." The distress they experienced in the experimental procedure led to important revisions in the code of ethical conduct in social science research.

participate, they should not be shamed, given an undesirable alternate assignment, or given a lower grade.

Researchers must protect subjects from unnecessary painful physical and emotional experiences, including shame, failure, and social rejection. Researchers must weigh the benefits of the new information they may discover in a particular study against the potential risks or harm to the subjects. Two questions must guide the researcher's decisions:

1. How would you feel if you, or one of your family members, were a subject in this study?
2. Can the problem be studied in ways that do not involve pain, deception, or emotional or physical stress?

The American Psychological Association has published a guide for researchers titled *Ethical Principles in the Conduct of Research with Human Participants* (1982). This guide requires that human subjects be told about all aspects of the research that may influence their decision to participate. They must be free to withdraw from the study at any time. They are entitled to a full explanation of the study once it has been completed. When the subjects are children, their parents must be given this information and must approve their children's participation. Most schools, day-care centers, hospitals, nursing homes, and other treatment centers also have their own review procedures for determining whether they will permit research to be carried out with the people in their programs.

THE LIFE SPAN

The task of mapping one's future depends on how long one expects to live. Naturally, we can make only rough predictions. We know that our lives may be cut short by a disaster, an accident, or an illness. However, our best guess about how long we will live is based on the average **life expectancy** of others in our group.

Table 1.2 presents data on the average **life span** of people in the United States during eight time periods. Look first at the top row of the table, labeled "At birth." The average life expectancy of people born at the turn of the 19th century was about 49 years. For people born at the time of the stock market crash and the beginning of the

TABLE 1.2 Average Remaining Lifetime at Various Ages, 1900-1994

Age	1994	1989	1978	1968	1954	1939-1941	1929-1931	1900-1902
At birth	75.7	75.3	73.3	70.2	69.6	63.6	59.3	49.2
65 years	17.4	17.2	16.3	14.6	14.4	12.8	12.3	11.9
75 years	11.0	10.9	10.4	9.1	9.0	7.6	7.3	7.1
80 years	8.3	8.3	8.1	6.8	6.9	5.7	5.4	5.3

SOURCE: U.S. Bureau of the Census, 1984, 1992, 1997.

Great Depression, the average life expectancy was about 59 years. The average life expectancy of people born at the beginning of World War II was around 64. The average life expectancy of people born in 1978 was approximately 73 years and rose to 75 years for those born in 1989. As of 1994, this figure was 75.7 (U.S. Bureau of the Census, 1997). As we look across these generations, it is quite clear that the length of life has been increasing for more and more people.

The next few lines in Table 1.2 show something else. People who had reached advanced ages (65, 75, and 80) in each of the time periods (1900–1902, 1929–1931, 1939–1941, 1954, 1968, 1978, 1989, and 1994) had a longer life expectancy than people who were born in those time periods. Thus, someone who was 65 at the turn of the century (born in 1835) was expected to live to be 76.9; someone who was 75 at that time (born in 1825) was expected to live to be 82.1; and someone who was 80 years old during that period (born in 1820) was expected to live to be 85.3. These figures suggest that hazards during the early and middle years of life shorten the average life expectancy at birth. Infant mortality was a major factor in limiting life expectancy at the turn of the century. In addition, many women died in childbirth, and respiratory diseases and heart disease were serious threats to life during the middle adult years. If one survived these common killers, one's chance for a long later life increased.

Using these kinds of statistics to estimate the life span, we are able to compute projections of changes in its length. The average person born in 1994 can expect to live 26.5 years longer than one who was born in 1900. At the later end of the life span, however, we find much less dramatic increases in life expectancy today as compared to 1900. On the average, people who were 65 in 1994 (born in 1929) can expect to live to be about 82.4; people who were 75 in 1994 (born in 1919) can expect to live to be 86; and people who were 80 in 1994 (born in 1914) can expect to live to be 88.3.

The Social Security Administration makes *projections* of life expectations that are quite reliable. These data, showing the life expectations of men and women separately, are seen in Table 1.3. Overall, men do not live as long as women. They die younger around the world as well as in various regions of the United States. The gap in life expectancy for U.S. males and females has been declining from 1980 to the present, and is expected to continue to decline at least through 2010, but is expected to increase again by the year 2050. What might account for this widening of the gender difference in the middle of the next century?

In the Appendix, you will find data on national patterns of life expectancy by race and sex as well as regional patterns within the United States and international comparisons. Here you will note significant racial differences in life expectancy, differences that show an advantage for whites in the early years of life, but an advantage for blacks in the later years after 65. The observation of racial differences in life expectancy at advanced ages has not been fully explained. One speculation is that African-Americans who survive the stresses and hardships of childhood, adolescence, and adult life may be especially hardy and resistant to the effects of biological aging in later life. These data provide very concrete evidence of the impact of the societal system on the biological system. Medical advances, knowledge about

TABLE 1.3 Projections of Life Expectation at Birth for 1980, 1990, 2000, 2005, and 2010 by Sex

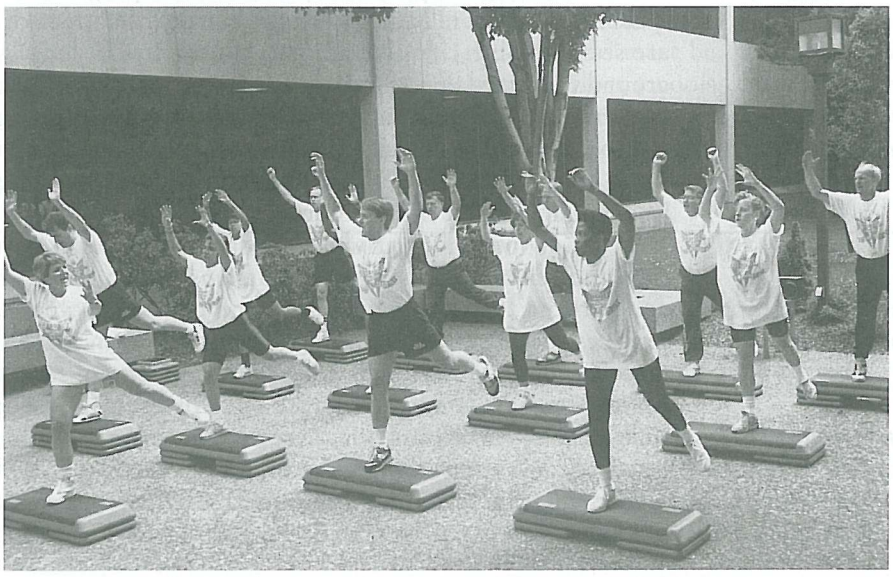
Sex	1980	1990	2000	2005	2010
Male	70.0	72.1	73.0	73.5	74.1
Female	77.4	79.0	79.7	80.2	80.6
Difference	7.4	6.9	6.7	6.7	6.5

SOURCE: U.S. Bureau of the Census, 1991, 1997.

the impact of lifestyle choices, access to health care services, and success in coping with life stresses or protection from life stresses can all contribute to a longer and healthier adulthood.

According to government projections presented in Table 1.3, the life span of both men and women is expected to increase from now until the year 2010. The question arises whether this increase can continue or whether there is an upper limit to the length of the life span. There are theories supporting both sides. Bernice Neugarten (1981), a noted human development scholar, argued that, if the rates of advance in such fields as medicine and nutrition proceed for the next 40 years at the rate at which they have progressed for the last 60, by 2020 many people may be living to be 120 years old. Others suggest that the primary killers of infants, adults, and aging persons have already been brought under control and that there is little room left for expansion in the human life span, which they view as genetically limited. They have argued that the best we can hope for is a healthier, rather than a longer, period of life (Olshansky et al., 1990).

When you try to estimate your own life expectancy, you must consider projections for people in your country, region, and state, and in your age, educational, racial, and sex groups. In addition, research with identical twins suggests that some component of longevity is genetically guided. People with long-lived ancestors are likely to be long-lived themselves. Individual lifestyle factors are also associated with longevity. In an article entitled "How to Live to 100," *Newsweek* magazine prepared a grid that allows one to calculate one's projected age based on health, lifestyle, family, and ancestry (Cowley, 1997) (Table 1.4). These factors mirror longitudinal studies of adults born between 1895 and 1919 who were studied in 1965 and again in 1984 (Guralnick & Kaplan, 1989). A variety of demographic, health, and lifestyle factors were associated with a high level of functioning when the group



Lifestyle decisions that are made in early and middle adulthood can have a significant impact on longevity. Participation in regular aerobic exercise has a beneficial impact on the cardiovascular system, and on maintaining a high level of intellectual functioning in later life. What other kinds of lifestyle choices might have a positive impact on longevity?

TABLE 1.4 Factors Associated with Longevity

This chart will give you a rough idea of how your life expectancy varies from the norm. To estimate how long you'll live, begin by using the table at right to find the median life expectancy of your age group. Then add or subtract years based on the risk factors listed below (you should adjust your risk-factor score by the percentages at right if you're over 60).

Age	Male	Female
20–59	73	80
60–69	76	81
70–79	78	82
80 +	add five years to current age	

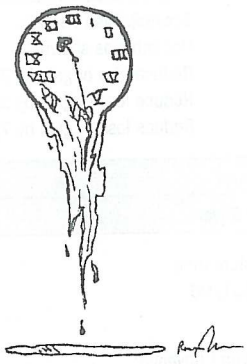
Scoring: Risk Factors
Use table as shown
Reduce loss or gain by 20%
Reduce loss or gain by 50%
Reduce loss or gain by 75%

	Gain in Life Expectancy			No Change	Loss in Life Expectancy			
Health	+3 Years	+2 Years	+1 Year		−1 Year	−2 Years	−3 Years	Tally
Blood Pressure	Between 90/65 and 120/81	Less than 90/65 without heart disease	Between 121/82 and 129/85	130/86	Between 131/87 and 140/90	Between 141/91 and 150/95	More than 151/96	
Diabetes	–	–	–	None	Type II (adult onset)	–	Type I (juvenile onset)	
Total cholesterol	–	–	Less than 160	161–200	201–240	241–280	More than 280	
HDL cholesterol	–	–	More than 55	45–54	40–44	Less than 40	–	
Compared with that of others my age, my health is:	–	–	Excellent	Very good or fair	–	Poor	Extremely poor	
Lifestyle	+3 Years	+2 Years	+1 Year		−1 Year	−2 Years	−3 Years	Tally
Cigarette smoking	None	Ex-smoker, no cigarettes for more than 5 yrs.	Ex-smoker, no cigarettes for 3–5 yrs.	Ex-smoker, no cigarettes for 1–3 yrs.	Ex-smoker, no cigarettes for 5 mos.–1 yr.	Smoker, 0–20 pack-years*	Smoker, more than 20 pack-years	
Secondhand-smoke exposure	–	–	–	None	0–1 hour per day	1–3 hours per day	More than 3 hours per day	
Exercise average (give yourself most positive category)	More than 90 min. per day of exercise (e.g., walking) for more than 3 yrs.	More than 60 min. per day for more than 3 yrs.	More than 20 min. per day for more than 3 yrs.	More than 10 min. per day for more than 3 yrs.	More than 5 min. per day for more than 3 yrs.	Less than 5 min. per day	None	
Saturated fat in diet	–	Less than 20%	20%–30%	31%–40%	–	More than 40%	–	
Fruits and vegetables	–	–	5 servings per day	–	None	–	–	
Family	+3 Years	+2 Years	+1 Year		−1 Year	−2 Years	−3 Years	Tally
Marital status	–	Happily married man	Happily married woman	Single woman, widowed man	Divorced man, widowed woman	Divorced woman	Single man	
Disruptive events in the past year†	–	–	–	–	One	Two	Three	
Social groups, friends seen more than once/month**	–	Three	Two	One	–	None	–	
Parents' age of death	–	–	Both lived past 75	One lived past 75	–	–	Neither lived past 75	
							Your estimated life expectancy ▶	

*A pack-year is one pack per day for a year. †Deaths of family members, job changes, moves, lawsuits, financial insecurity, etc.

**People who offer support through disruptive events (applicable only in case of two or more such events). SOURCE: Michael F. Roizen, M.D., using data abstracted from the real age and age-reduction-planning programs of medical informatics.

SOURCE: *Newsweek*, June 30, 1997, p. 65.



Age, as well as time, are relative. As the lifespan increases, the way we calculate our sense of maturity and aging changes. How old do you feel you are? In what way does your sense of being old depend on the situation?

ranged in age from 65 to 89. These factors included having a fairly high family income; having no hypertension, arthritis, or back pain; being a nonsmoker; having normal weight; and consuming a moderate amount of alcohol. The last three factors in particular are influenced largely by personal decisions, and even hypertension and back pain are linked in part to lifestyle factors that are under a person's control. A growing body of research emphasizes the potential benefits of reduced fat in the diet combined with the strategic use of vitamin and mineral supplements to slow the cellular damage associated with aging (Carper, 1995; Rusting, 1992; Walford, 1990).

Many of our most important life decisions are made with either an implicit or an explicit assumption about how long we expect to live. For example, Colleen expects to live to be about 80 years old. She reasons that there is no rush about getting married since even if she waits until she is 40, she will still have 40 years of married life and that is a long time to get along with one partner. Our perception of our life expectancy has an impact on our behavior, self-concept, attitudes, and outlook on the future.

The way we feel about ourselves, our activities, and our relationships are often guided by underlying assumptions about the point we have reached in life. Consider an African-American male born in 1995; he can expect to live to age 68. A European-American female born in 1995 can expect to live to age 80. The African-American male will grow up looking at the years after about age 55 or 60 as old age. In fact, many young African-American males express doubt about whether they will live to be 25. The European-American female will probably not consider herself old until she reaches about age 70. Differences in outlook, coupled with actual differences in health and resources, will affect the way these two people regard themselves and go about their daily activities in middle and later life. As we think about stages of life and themes of development it is important to keep these demographic realities in mind. Our thinking about adulthood and aging has changed over this century to reflect dramatic changes in life expectancy. The field of social gerontology has emerged in part as a result of the large numbers of individuals who are living to advanced ages. At the same time, subgroup differences associated with race, family ancestry, and social class require us to take a flexible outlook on models of the life span.

Chapter Summary

Psychosocial theory emphasizes interaction among the biological, psychological, and societal systems. As a result of maturation and change in each of these systems, individuals' beliefs about themselves and their relationships are modified. Although each life story is unique, we can identify important common patterns, allowing us to anticipate the future and to understand one another.

The scientific process results in a body of knowledge that informs our understanding of human development. Scientific observation must be objective, repeatable, and systematic. Five principal research methods are: observation, case studies, interviews, surveys and tests, and experimentation. Each has its advantages and disadvantages, but all provide insights into continuity and change over the life span. Research design is also important in the study of change. Four significant designs are: retrospective studies, cross-sectional studies, longitudinal studies, and cohort sequential designs. The method and design of research have a powerful effect on how the findings may be interpreted.

Demographic information about the life span stimulates thought about one's own life expectancy. In the United States, the average life expectancy has increased by almost 50% in this century. This dramatic change affects how each of us views our own future. We need to study human development within a constantly changing context. We can never be satisfied that the information from earlier periods will hold true for future generations.

End of Chapter Case

Rose is a 60-year-old woman who has been having serious attacks of dizziness and shortness of breath as Thanksgiving approaches. Rose is normally active and energetic. In the past, she looked forward to entertaining her family, which included three married daughters, one married son, and their children. However, her son has recently been divorced. Feelings between him and his ex-wife are bitter. Any attempts on Rose's part to communicate with her former daughter-in-law or her granddaughter are met with outbursts of hostility from her son. Even though Rose is very fond of her daughter-in-law and her granddaughter, she knows that she cannot invite them to the family gathering without stirring up intense conflict with her son.

Rose's daughters suggest having the dinner at one of their homes in order to prevent further conflict. They hope this solution will take some of the pressure off their mother and ease the attacks. Rose agrees, but her attacks continue.

The biological, psychological, and societal systems are involved in Rose's situation. The conflict is being expressed in the biological system through the symptoms of dizziness and shortness of breath. Psychological and societal demands may elicit responses from the biological system, as they commonly do in people under stress. Although the solution to the problem must be found in the psychological system, the biological system often alerts the person to the severity of the problem through the development of physical symptoms.

Rose's psychological system is involved in interpreting her son's behavior, which she views as forcing her to choose between him and her daughter-in-law and granddaughter. She might also use psychological processes to try to arrive at a solution to the conflict. So far, Rose has not identified any satisfactory solution. Although she can avoid the conflict most of the time, the impending Thanksgiving dinner is forcing her to confront it directly.

The psychological system includes Rose's self-concept as well as her emotional state. Through memory, Rose retains a sense of her family at earlier periods, when they enjoyed greater closeness. Having to face a Thanksgiving dinner at which she will feel angry at her son or guilty about excluding her daughter-in-law and her granddaughter places her in a fundamental conflict. The Thanksgiving meal is also a symbolic event, representing Rose's idea of family unity, which she cannot achieve.

The societal system influences the situation at several levels. First, there are the societal expectations regarding the mother role: Mother is nurturing, loving, and protecting. But Rose cannot be nurturing without sending messages of rejection either to her son or to her daughter-in-law and granddaughter. Second, norms for relating to various family members after a divorce are unclear. How should Rose behave toward her son's former spouse? How should she relate to her grandchild if her son is no longer the child's custodial parent? Rose is confused about what to do.

Third, the Thanksgiving celebration has social, religious, and cultural significance. This family ritual was performed in Rose's home when she was a child, and she has carried it through in her own home as an adult. Now, however, she is being forced to pass the responsibility for this gathering to her daughter before she is ready to do so and, as a result, Rose is likely to feel a special sense of loss. She will also lose the sense of family unity that she has tried to preserve.

Thought Questions

1. How does this case illustrate the interconnections among the biological, psychological, and societal systems?
2. Given what you know about the assumptions of psychosocial theory, how might Rose's stage of development influence her perceptions of this situation and her approach to coping with this conflict?
3. How might you frame a research question based on the information raised in this case study? (For example, how likely is it that parents experience health problems following their child's divorce?)
4. What research method(s) would you use to pursue this research question?