The Science of Healthy Behaviors

under a contract from the
National Institutes of Health

National Institute of Nursing Research
Office of Behavioral and Social Sciences Research

BSCS
5415 Mark Dabling Boulevard
Colorado Springs, CO 80918

BSCS Development Team
Rodger W. Bybee, Principal Investigator
Jerry Phillips, Project Director
Kristin Jenkins, Curriculum Developer
Mark Bloom, Curriculum Developer
Pamela Warren, Project Assistant
Ted Lamb, Evaluator
Molly Stuhlsatz, Evaluator
Barbara Perrin, Production Manager
Dottie Watkins, Production Coordinator
Stacey Luce, Production Assistant

BSCS Administrative Staff
Carlo Parravano, Chair, Board of Directors
Rodger W. Bybee, Executive Director
Pam Van Scotter, Director, Curriculum Development Division
Janet Carlson Powell, Associate Director, Chief Science Education Officer

National Institutes of Health
Janice Phillips, National Institute of Nursing Research
Genevieve DeAlmeida-Morris, National Institute of Nursing Research
Melinda Tinkle, National Institute of Nursing Research
Deborah H. Olster, Office of Behavioral and Social Sciences Research
Judith Mulvihill, Office of Behavioral and Social Sciences Research
Bruce Fuchs, Office of Science Education
Lisa Strauss, Office of Science Education
Cindy Allen, Office of Science Education

SAIC Staff
Bach Nguyen, Project Manager
Steve Larson, Project Management Director
James Chandler, Director of Internet Services
Doug Green, Project Lead
Tommy D'Aquino, Multimedia Director
Chris Doud, Video Producer
Mark Ford, Video Producer
John James, Multimedia Developer
Jeff Ludden, Multimedia Programmer
Pat Leffas, Multimedia Programmer
Dave Nevins, Audio Engineer
Katie Riley, Web Developer
Mary Jo Mallonee, Web Developer, Editor, and Quality Assurance

Advisory Committee
Elaine Borawski, Case Western Reserve University, Cleveland, Ohio
Janet Erickson, C.R. Anderson Middle School, Helena, Montana
Baruch Fischoff, Carnegie Mellon University, Pittsburgh, Pennsylvania
Sally Greer, Whitford Middle School, Beaverton, Oregon
Ron Steingard, Massachusetts Executive Office of Health and Human Services

Design Conference Participants
Elaine Borawski, Case Western Reserve University, Cleveland, Ohio
Nsombi Davis, Herbert Hoover Middle School, Rockville, Maryland
Willa Doswell, University of Pittsburgh, Pittsburgh, Pennsylvania
Julie Downs, Carnegie Mellon University, Pittsburgh, Pennsylvania
Brian Finch, RAND Corporation, Santa Monica, California
Norma Gilman, Edison Junior High, San Angelo, Texas
Jeff Marshall, Irving Middle School, Colorado Springs, Colorado
Marvin Nochowitz, Haines School, Chicago, Illinois

Primary Field-Test Teachers
Mitchell Comisky, Forest Glen Middle School, Coral Springs, Florida
Cassie Cox, Sherrard Junior High School, Wheeling, West Virginia
Diane French, Imagine Academy, Granada Hills, California
Laura Hays, Collaborative Education Program, Greeley, Colorado
Susan Liscio, Eastern Middle School, Silver Spring, Maryland
Brian Menzie, Thomas C. Marsh Middle School, Dallas, Texas
Janie Murray, Southeast Middle School, Kernersville, South Carolina
Rosalie Zonder, Our Lady of Mercy School, Madison, Connecticut

Adult Human Behavior Video Cast (SAIC)
Jessica Kolis, Steve Larson, Jessica Nakles, Donnie Pope, Blake Porch, Sung Rho, and Katie Riley

Cover Design
Tim Cook, Medical Arts, National Institutes of Health

This material is based on work supported by the National Institutes of Health under Contract No. 263-03-C-0039. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the view of the funding agency.

Copyright © 2006 by BSCS. All rights reserved. You have the permission of BSCS to reproduce items in this module for your classroom use. The copyright on this module, however, does not cover reproduction of these items for any other use. For permissions and other rights under this copyright, please contact BSCS, 5415 Mark Dabling Blvd., Colorado Springs, CO 80918-3842; *www.bscs.org*; *info@bscs.org*; (719) 531-5550.

NIH Publication Number 07-5288
ISBN: 1-929614-22-5

Please contact the NIH Office of Science Education with questions about this supplement at *supplements@science.education.nih.gov*.

Contents

Foreword v

About the National Institutes of Health vii

About the National Institute of Nursing Research ix

About the Office of Behavioral and Social Sciences Research xi

Introduction to *The Science of Healthy Behaviors* 1
- What Are the Objectives of the Module?
- Why Teach the Module?
- What's in It for the Teacher?

Implementing the Module 5
- What Are the Goals of the Module?
- What Are the Science Concepts and How Are They Connected?
- Science Content of the Lessons
- Conceptual Flow of Activities
- How Does the Module Correlate to the *National Science Education Standards*?
  - Content Standards: Grades 5–8
  - Teaching Standards
  - Assessments Standards
- How Does the BSCS 5E Instructional Model Promote Active, Collaborative, Inquiry-Based Learning?
  - Engage
  - Explore
  - Explain
  - Elaborate
  - Evaluate
- How Does the Module Support Ongoing Assessment?
- How Can Controversial Topics Be Handled in the Classroom?

Using the Student Lessons 17
- Format of the Lessons
- Timeline for the Module

Using the Web Site 19
- Hardware/Software Requirements
- Downloading and Installing Adobe Flash Player
- Getting the Most out of the Web Site
- Collaborative Groups
- Web Activities for Students with Disabilities

Information about the Science of Healthy Behaviors 23
1 What Is Behavior? 23
2 Studying Behavior 23

2.1 Behavioral and Social Sciences . . . 23
2.2 Types of Research . . . 24
2.3 Behavioral and Social Science Tools . . . 25
2.4 Careers in Behavioral and Social Sciences . . . 27
3 Influences on Behavior . . . 27
4 Behavioral and Social Science Research and Cardiovascular Disease . . . 28
4.1 Health Outcomes of Behavior . . . 28
4.2 Identifying Behavioral Trends, Risky Behaviors, and At-Risk Groups . . . 29
4.3 Behavioral Interventions . . . 30
4.4 Maximizing Effective Medical and Behavioral Treatments . . . 30
4.5 Behavioral and Social Science Research and Public Health . . . 31
4.6 The Science of Healthy Behaviors . . . 32
5 Web Resources . . . 32

References . . . 33

Student Lessons
- Lesson 1—*Defining Behavior* . . . 35
- Lesson 2—*Influences on Behavior* . . . 49
- Lesson 3—*Tools of Social and Behavioral Science: The Survey* . . . 57
- Lesson 4—*Behavioral Specialists at Work: The Healthcare Setting* . . . 79
- Lesson 5—*Behavioral Specialists in the Healthcare Setting . . . Again* . . . 95

Masters . . . 101

Letter to Parents and Guardians . . . 137

Foreword

This curriculum supplement, from *The NIH Curriculum Supplements Series*, brings cutting-edge medical science and basic research discoveries from the laboratories of the National Institutes of Health (NIH) into classrooms. As the largest medical research institution in the United States, NIH plays a vital role in the health of all Americans and seeks to foster interest in research, science, and medicine-related careers for future generations. NIH's Office of Science Education (OSE) is dedicated to promoting science education and scientific literacy.

We designed this curriculum supplement to complement existing life science curricula at both the state and local levels and to be consistent with *National Science Education Standards*.[1] It was developed and tested by a team composed of teachers, scientists, medical experts, and other professionals with relevant subject-area expertise from institutes and medical schools from across the country; representatives from the National Institute of Nursing Research and the Office of Behavioral and Social Sciences Research; and curriculum-design experts from Biological Sciences Curriculum Study (BSCS) and SAIC. The authors incorporated real scientific data and actual case studies into classroom activities. A three-year development process included geographically dispersed field tests by teachers and students.

The structure of this module enables teachers to effectively facilitate learning and stimulate student interest by applying scientific concepts to real-life scenarios. Design elements include a conceptual flow of activities based on the BSCS 5E Instructional Model, multisubject integration emphasizing cutting-edge science content, and built-in assessment tools. Activities promote active and collaborative learning and are inquiry-based to help students develop problem-solving strategies and critical thinking.

Each curriculum supplement comes with a complete set of materials for both teachers and students, including printed materials, extensive background and resource information, and a Web site with interactive activities. The supplements are distributed at no cost to teachers across the United States. All materials may be copied for classroom use but may not be sold. We welcome your feedback. For a complete list of curriculum supplements, updates, and availability and ordering information, or to submit feedback, please visit our Web site at *http://science.education.nih.gov* or write to

Curriculum Supplements Series
Office of Science Education
National Institutes of Health
6100 Executive Boulevard
Suite 3E01 MSC 7520
Bethesda, MD 20892-7520

We appreciate the valuable contributions of the talented staff at BSCS and SAIC. We are also grateful to the NIH scientists, advisors, and all other participating professionals for their work and dedication. Finally, we thank the teachers and students who participated in focus groups and field tests to ensure that these supplements are both engaging and effective.

I hope you find our series a valuable addition to your classroom and wish you a productive school year.

Bruce A. Fuchs, Ph.D.
Director
Office of Science Education
National Institutes of Health
supplements@science.education.nih.gov

[1] In 1996, the National Academy of Sciences released the *National Science Education Standards*, which outlines what everyone should understand about science by the time they graduate from high school. The *Standards* encourages teachers to select major science concepts that empower students to use information to solve problems rather than stressing memorization of unrelated information.

About the National Institutes of Health

Begun as the one-room Laboratory of Hygiene in 1887, the National Institutes of Health (NIH) today is one of the world's foremost biomedical and behavioral research centers and the federal focal point for health research in the United States.

Mission and Goals

The NIH mission is science in pursuit of fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to extend healthy life and reduce the burdens of illness and disability. The goals of the agency are to

- foster fundamental creative discoveries and innovative research strategies and their applications as a basis for advancing significantly the nation's capacity to protect and improve health;
- develop, maintain, and renew scientific resources—both human and physical—that will ensure the nation's ability to prevent disease;
- expand the knowledge base in medical and associated sciences in order to enhance the nation's economic well-being and ensure a continued high return on the public investment in research; and
- exemplify and promote the highest level of scientific integrity, public accountability, and social responsibility in the conduct of science.

NIH works toward meeting those goals by providing leadership, direction, and grant support to programs designed to improve the health of the nation through research in the

- causes, diagnosis, prevention, and cure of human diseases;
- processes of human growth and development;
- biological effects of environmental contaminants;
- understanding of mental, addictive, and physical disorders; and
- collection, dissemination, and exchange of information in medicine and health, including the development and support of medical libraries and the training of medical librarians and other health information specialists.

Organization

Composed of 27 separate institutes and centers, NIH is one of eight health agencies of the Public Health Service within the U.S. Department of Health and Human Services. NIH encompasses 75 buildings on more than 300 acres in Bethesda, Md., as well as facilities at several other sites in the United States. The NIH budget has grown from about $300 in 1887 to more than $28 billion in 2005.

Research Programs

One of NIH's principal concerns is to invest wisely the tax dollars entrusted to it for the support and conduct of this research. Approximately 82 percent of the investment is made through grants and contracts supporting research and training in more than 2,000 research institutions throughout the United States and abroad. In fact, NIH grantees are located in every state in the country. These grants and contracts make up the NIH Extramural Research Program.

Approximately 10 percent of the budget goes to NIH's Intramural Research Programs, the more than 2,000 projects conducted mainly in its own laboratories. These projects are central to the NIH scientific effort. First-rate intramural scientists collaborate with one another regardless of institute affiliation or scientific discipline and have the intellectual freedom to pursue their research leads in NIH's own laboratories. These explorations range from

basic biology to behavioral research, to studies on treatment of major diseases.

Grant-Making Process

The grant-making process begins with an idea that an individual scientist describes in a written application for a research grant. The project might be small, or it might involve millions of dollars. The project might become useful immediately as a diagnostic test or new treatment, or it might involve studies of basic biological or behavioral processes whose clinical value may not be apparent for many years.

Each research grant application undergoes peer review. A panel of scientific experts, primarily from outside the government, who are active and productive researchers in the health sciences, first evaluates the scientific merit of the application. Then, a national advisory council or board, composed of eminent scientists as well as members of the public who are interested in health issues or the biomedical or behavioral sciences, determines the project's overall merit and priority in advancing the research agenda of the particular NIH funding institutes and centers.

About 38,500 research and training applications are reviewed annually through the NIH peer-review system. At any given time, NIH supports 35,000 grants in universities, medical schools, and other research and research training institutions, both nationally and internationally.

NIH Nobelists

The roster of people who have conducted NIH research or who have received NIH support over the years includes some of the world's most illustrious scientists and physicians. Among them are 115 winners of Nobel Prizes for achievements as diverse as deciphering the genetic code and identifying the causes of hepatitis. You can learn more about Nobelists who have received NIH support at *http://www.nih.gov/about/almanac/nobel/index.htm*.

Impact on the Nation's Health

Through its research, NIH has played a major role in making possible many achievements over the past few decades, including these:

- Mortality from heart disease, the number one killer in the United States, dropped by 36 percent between 1977 and 1999.
- Improved treatments and detection methods increased the relative five-year survival rate for people with cancer to 60 percent.
- With effective medications and psychotherapy, the 19 million Americans who suffer from depression can now look forward to a better, more productive future.
- Vaccines are now available that protect against infectious diseases that once killed and disabled millions of children and adults.
- In 1990, NIH researchers performed the first trial of gene therapy in humans. Scientists are increasingly able to locate, identify, and describe the functions of many of the genes in the human genome. The ultimate goal is to develop screening tools and gene therapies for the general population for cancer and many other diseases.

Science Education

Science education by NIH and its institutes and centers contributes to ensuring the continued supply of well-trained basic research and clinical investigators, as well as the myriad professionals in the many allied disciplines who support the research enterprise. These efforts also help educate people about scientific results so that they can make informed decisions about their own—and the public's—health.

This curriculum supplement is one such science education effort, a collaboration among four partners: the NIH National Institute for Nursing Research, the NIH Office of Behavioral and Social Sciences Research, the NIH Office of Science Education, and Biological Sciences Curriculum Study.

For more about NIH, visit its Web site at *http://www.nih.gov*.

About the National Institute of Nursing Research

There are more than two and a half million nurses in the United States, making nursing the largest healthcare profession. People consistently rate nurses highly for being trustworthy. You can find nurses in a variety of settings. While most work in hospitals, others work in schools, community centers, clinics, government offices, and businesses, and many provide home care for people outside the hospital.

The National Institute of Nursing Research (NINR), a part of the National Institutes of Health (NIH), is a government agency that supports the work of nurse researchers. Nurse researchers are nurses who have received advanced education in science. They study questions that arise from the daily experiences of nurses. Many of these questions involve finding ways for nurses to help people of all ages stay healthy, prevent diseases, or manage symptoms such as pain, nausea, and fatigue, and to care for the ill or injured.

To promote health or provide care for patients, nurses need to know what methods work best. That is the role of research. For example, nurse researchers have explored ways to help children start healthy habits that can bring lifelong benefits, or overcome a variety of health problems. Here are some of the results from NINR research studies:

- a school exercise program, along with classes on nutrition, smoking, and fitness, helped children lower their body fat and blood pressure;
- a community awareness program decreased the exposure to lead for children in a low-income neighborhood;
- a coping-skills program taught teenagers with diabetes how to improve control of their disease, which also improved their quality of life;
- an educational program helped asthmatic children reduce the severity of their breathing problems; and
- use of relaxation and imagery decreased pain for children after a tonsillectomy.

The work of nurse researchers advances our understanding of health and illness. This allows nurses, doctors, and other healthcare professionals to promote good health and deal with a wide range of health conditions and diseases. The nursing research supported by NINR can and does make a difference in the lives of many people.

For more about NINR, contact the NINR Office of Science Policy and Public Liaison at *info@ninr.nih.gov* or visit this Web site: *http://ninr.nih.gov/ninr.*

About the Office of Behavioral and Social Sciences Research

The National Institutes of Health (NIH) Office of Behavioral and Social Sciences Research (OBSSR) opened officially July 1, 1995. The U.S. Congress established the OBSSR in NIH's Office of the Director in recognition of the key role that behavioral and social factors often play in illness and health. The OBSSR mission is to stimulate behavioral and social sciences research throughout NIH and to integrate these areas of research more fully into others of the NIH health research enterprise, thereby improving our understanding, treatment, and prevention of disease.

The major responsibilities of the OBSSR and its director, set forth in its formal mission statement, are

- to develop initiatives designed to stimulate research in the behavioral and social sciences arena, integrate a bio-behavioral perspective across the research areas of NIH, and encourage the study of behavioral and social sciences across NIH's institutes and centers;
- to initiate and promote studies to evaluate the contributions of behavioral, social, and lifestyle determinants in the development, course, treatment, and prevention of illness and related public health problems;
- to inform and advise the NIH director and other key officials of trends and developments having significant bearing on the missions of NIH, the U.S. Department of Health and Human Services, and other federal agencies;
- to serve as the principal NIH spokesperson regarding research on the importance of behavioral, social, and lifestyle factors in the causation, treatment, and prevention of diseases and to advise and consult on these topics with NIH scientists and others within and outside the federal government;
- to provide leadership in ensuring that findings from behavioral and social sciences research are disseminated to the public; and
- to sponsor seminars, symposia, workshops, and conferences at NIH and at national and international scientific meetings on state-of-the-art behavioral and social sciences research.

Additional information about the OBSSR, including its activities and accomplishments, can be found at this Web site: *http://obssr.od.nih.gov*.

Introduction to *The Science of Healthy Behaviors*

In the past 100 years, chronic diseases, such as heart disease, stroke, diabetes, and cancer, have become the most prevalent, most costly, and, ironically, most preventable health problems that Americans face. Surprisingly, 7 out of 10 Americans who die each year succumb to a chronic disease.[6] The statistics, including the costs associated with chronic diseases, are staggering. Consider the following:

- more than 90 million Americans live with a chronic disease;
- medical care costs for people with chronic diseases account for more than 75 percent of the United States' $1 trillion total medical care costs;
- the direct and indirect costs of diabetes are nearly $100 billion annually;
- the estimated direct and indirect costs associated with smoking are more than $68 billion annually;
- in 2001, approximately $300 billion was spent on all cardiovascular diseases;
- in 2000, the direct medical costs associated with physical inactivity was almost $76 billion; and
- chronic diseases account for one-third of the years of potential life lost before age 65.[6]

Although it may seem that chronic diseases are strictly an issue for adults, such a view is shortsighted. The health of adults is linked to the health of the young people they were, which in turn is linked to decisions made to choose and adopt healthy behaviors. Middle school students need to understand how decisions are made and that decisions made during adolescence can have both long-term and short-term health consequences. Understanding the influence of behavioral and social factors on health will inform students' choices of health-promoting and disease-preventing behaviors.

What Are the Objectives of the Module?

The Science of Healthy Behaviors has several objectives. One is to introduce students to the scientific study of behavior. Through inquiry-based activities, students investigate what behavior is and how it can be studied. They investigate influences on behaviors and examine the health outcomes of behaviors. As behavioral therapists in role-playing activities, students develop their understanding of the module's concepts and prepare to apply them in their own lives.

A second objective is to have students reach the understanding that behaviors have both short-term and long-term consequences to health and that behaviors are influenced in complex ways by a variety of factors. The lessons in this module help students sharpen their skills in observation, critical thinking, experimental design, and data analysis. They also make connections to other disciplines, including English, mathematics, and social science.

A third objective is to convey to students the purpose of scientific research. Ongoing research affects how we understand the world around us and gives us the foundation for improving choices about our personal health and the health of our community. In this module, students experience how science provides evidence that can be used to understand and treat human disease.

The lessons in this module encourage students to think about the relationships among

knowledge, choice, behavior, and human health in this way:

Knowledge (what is known and not known) + Choice = Power

Power + Behavior = Enhanced Human Health

The final objective of this module is to encourage students to think in terms of these relationships now and as they grow older.

Why Teach the Module?

Middle school life science classes offer an ideal setting for integrating many areas of student interest. In this module, students participate in activities that integrate inquiry, science, human health, mathematics, and science-technology-society relationships. The real-life context of the module's classroom lessons is engaging for students, and students can apply the knowledge they gain immediately to their lives.

"The adolescent survey was highly motivating for students. The inquiry-based activity about the survey was excellent. The simulation was excellent—it made students feel important, and they were more motivated to learn."
—Field-Test Teacher

"I liked analyzing things, not just being told them and memorizing them; it wasn't boring. I liked working in a different area of science; it made it more interesting. I liked learning something that can actually apply to the outside world. It made the learning feel more purposeful."
—Field-Test Student

What's in It for the Teacher?

The Science of Healthy Behaviors meets many of the criteria by which teachers and their programs are assessed:

- The module is **standards based** and meets science content, teaching, and assessment standards as expressed in the *National Science Education Standards*.[19] It pays particular attention to the standards that describe what students should know and be able to do with respect to **scientific inquiry**.
- As described above, it is an **integrated** module, drawing most heavily from the subjects of behavioral and social science, mathematics, and health.
- The module has a Web-based **technology component** that includes an interactive database and simulations.
- Finally, the module includes built-in **assessment tools**, which are noted in each of the lessons with an assessment icon.

In addition, the module provides a means for **professional development**. Teachers can engage in new and different teaching practices like those described in this module without completely overhauling their entire program. In *Designing Professional Development for Teachers of Science and Mathematics*, Susan Loucks-Horsley et al.[15] write that replacement modules such as this one can "offer a window through which teachers can get a glimpse of what new teaching strategies look like in action." By experiencing a short-term unit like this one, teachers can "change how they think about teaching and embrace new approaches that stimulate students to problem solve, reason, investigate, and construct their own meaning for the content." The use of supplements like this one can encourage reflection and discussion and stimulate teachers to improve their practices by focusing on student learning through inquiry.

The following table correlates topics often included in the middle school life science curriculum with the major concepts presented in this module. This information is presented to help teachers make decisions about incorporating this material into the curriculum.

Correlation of *The Science of Healthy Behaviors* to Common Middle School Life Science Topics

Topic	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5
Behavior	✓	✓	✓	✓	✓
Scientists formulate and test their explanations of nature using observation, experiments, and theoretical and mathematical models.	✓		✓	✓	
Evaluation includes reviewing the experimental procedures, examining the evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations.	✓		✓	✓	
Human health and medicine			✓	✓	✓
Risk assessment and management			✓	✓	✓
Identify questions that can be answered through scientific investigations.			✓		
Relationships among science, technology, and society	✓		✓	✓	✓
Use appropriate tools and techniques to gather, analyze, and interpret data.	✓		✓	✓	✓
Communicating procedures and evaluations	✓	✓	✓	✓	✓
Mathematics is important in all aspects of scientific inquiry.			✓		

Implementing the Module

The five lessons in this module are designed to be taught in sequence for approximately eight days as a replacement for a part of the standard curriculum in middle school life science. The following pages offer general suggestions about using these materials in the classroom; you will find specific suggestions in the procedures provided for each lesson.

What Are the Goals of the Module?

The Science of Healthy Behaviors is designed to help students reach these major goals associated with scientific literacy:

- to understand a set of basic scientific principles related to the study of behavior and the relationships of behavior to human health;
- to experience the process of scientific inquiry and develop an enhanced understanding of the nature and methods of science; and
- to recognize the role of science in society and the relationship between basic science and human health.

What Are the Science Concepts and How Are They Connected?

The lessons are organized into a conceptual framework that allows students to move from what they already know about behavior, some of which may be incorrect, to a scientific perspective on behavior and its importance to science and to their lives. Students begin by developing their own definition of behavior through observations of human and animal behavior (*Defining Behavior*). Students then explore the relationship between influences on behavior and reasons for behavior (*Influences on Behavior*).

An investigation of factors influencing physical activity introduces students to the survey as a tool of behavioral scientists (*Tools of Social and Behavioral Science: The Survey*). In *Behavioral Specialists at Work: The Healthcare Setting*, Students role-play behavioral scientists in a hospital scenario to investigate the relationships between behavior and health. They also develop a behavioral modification plan to help a fictitious character lower his risk of heart disease.

The final lesson, *Behavior Specialists in the Healthcare Setting ... Again*, allows students to consider what they have learned in previous lessons. They investigate in detail the many influences on a person's behavior and relate this to the reasons underlying behaviors. The following two tables illustrate the science content and conceptual flow of the classroom lessons and activities.

Science Content of the Lessons

Lesson	Science Content
Lesson 1	What is behavior?; observation as a scientific tool
Lesson 2	Influences on behavior
Lesson 3	Using a survey as a scientific tool
Lesson 4	Relationship of behavior to health; changing behaviors
Lesson 5	Pulling it together: changing behavior as it relates to influences on and reasons for behavior

How Does the Module Correlate with the *National Science Education Standards*?

The Science of Healthy Behaviors supports teachers in their efforts to reform science education in the spirit of the National Research Council's 1996 *National Science Education Standards* (*NSES*).[19] The content of the module is explicitly standards based. The chart on pages 7–9 lists the specific content standards that this module addresses.

Conceptual Flow of the Lessons

Lesson	Learning Focus*	Major Concepts
Lesson 1 *Defining Behavior*	Engage Explore Explain	Behavior is any activity in which an organism engages, and it can be innate or learned. Behavior is studied by behavioral and social scientists. Scientists use a variety of tools to study behaviors, including observation and animal models. Some studies occur in the laboratory while others take place in natural settings. Some studies examine behavior in individuals while others collect information about behavior of groups. Understanding behavior is important because many behaviors have long- and short-term impacts on health. Improving health requires an understanding of what behaviors people engage in, why they engage in them, and what the health consequences of those behaviors are.
Lesson 2 *Influences on Behavior*	Explore Explain	Individuals behave in certain ways. Reasons for behavior originate in various influences. These influences can be classified into general categories, such as biological, personal, social, or environmental. Individuals can modify some, but not all, of these influences.
Lesson 3 *Tools of Social and Behavioral Science: The Survey*	Explore Explain	Surveys are important tools for social and behavioral scientists. Surveys provide quantifiable information about behaviors and behavior trends and allow scientists to study the relationships among different influences and behaviors. Survey questions must be designed carefully to ask very specific questions. Sample size and a representative sample are critical to generating useful data from a survey. Different influences can affect a person's physical activity levels.
Lesson 4 *Behavioral Specialists at Work: The Healthcare Setting*	Elaborate	Health is influenced by factors, some of which we cannot modify (such as genetics) and some of which we can control (such as behaviors). Behaviors have both positive and negative outcomes on health. Behaviors may have both short- and long-term consequences for health. Behaviors may be modified to affect health positively.
Lesson 5 *Behavioral Specialists in the Healthcare Setting ... Again*	Evaluate	Individuals behave in certain ways. Reasons for behavior originate in various influences. Asking well-designed, specific questions is an important tool of scientists who study human behavior. Modifying behavior may be difficult and depends on complex relationships among many influences in a person's life.

*See *How Does the BSCS 5E Instructional Model Promote Active, Collaborative, Inquiry-Based Learning?* on page 9.

Content Standards: Grades 5–8

NSES Content Standard	Correlation to *The Science of Healthy Behaviors*
Standard A: As a result of activities in grades 5–8, all students should develop	
Abilities necessary to do scientific inquiry	
• Identify questions that can be answered through scientific investigations.	Lessons 1, 2, 3, 4
• Design and conduct a scientific investigation.	Lessons 2, 3, 4
• Use appropriate tools and techniques to gather, analyze, and interpret data.	Lessons 1, 2, 3, 4
• Develop descriptions, explanations, predictions, and models using evidence.	Lessons 1, 2, 3, 4
• Think critically and logically to make the relationships between evidence and explanations.	Lessons 2, 3, 4
• Recognize and analyze alternative explanations and predictions.	Lessons 2, 3, 4
• Communicate scientific procedures and explanations.	Lessons 2, 3, 4
• Use mathematics in all aspects of scientific inquiry.	Lesson 3
Understandings about scientific inquiry	
• Different kinds of questions suggest different kinds of scientific investigations. Some investigations involve observing and describing objects, organisms, or events; some involve collecting specimens; some involve experiments; some involve seeking more information; some involve discovery of new objects; and some involve making models.	Lessons 1, 2, 3
• Different scientific domains employ different methods, core theories, and standards to advance scientific knowledge and understanding.	Lessons 1, 2, 3
• Mathematics is important in all aspects of scientific inquiry.	Lesson 3
• Asking questions and querying other scientists' explanations is part of scientific inquiry.	Lessons 2, 3, 4
Standard C: As a result of their activities in grades 5–8, all students should develop understanding of	
Structure and function in living systems	
• Disease is a breakdown in structures or functions of an organism.	Lesson 4
Reproduction and heredity	
• The characteristics of an organism can be described in terms of a combination of traits. Some are inherited, and others result from interactions with the environment.	Lessons 2, 4
Regulation and behavior	
• All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing environment.	Lessons 1, 2, 4
• Behavior is one kind of response an organism can make to an internal or environmental stimulus. Behavioral response is a set of actions determined in part by heredity and in part from experience.	All lessons
• An organism's behavior evolves through adaptation to its environment. How a species moves, obtains food, reproduces, and responds to danger is based on the species' evolutionary history.	Lessons 1, 2

NSES Content Standard	Correlation to *The Science of Healthy Behaviors*
Standard F: As a result of their activities in grades 5–8, all students should develop understanding of	
Personal health	
• Regular exercise is important to the maintenance and improvement of health.	Lessons 3, 4, 5
• The use of tobacco increases the risk of illness. Students should understand the influence of short-term social and psychological factors that lead to tobacco use, and the possible long-term detrimental effects of smoking and chewing tobacco.	Lessons 4, 5
Risks and benefits	
• Risk analysis considers the type of hazard and estimates the number of people who might be exposed and the number likely to suffer consequences. The results are used to determine the options for reducing or eliminating risks.	Lesson 3
• Students should understand the risks associated with natural hazards (fires, floods, tornadoes, hurricanes, earthquakes, and volcanic eruptions), chemical hazards (pollutants in air, water, soil, and food), biological hazards (pollen, viruses, bacterial, and parasites), social hazards (occupational safety and transportation), and personal hazards (smoking, dieting, and drinking).	Lessons 4, 5
• Individuals can use a systematic approach to thinking critically about risks and benefits.	Lessons 2, 3, 4, 5
• Important personal and social decisions are made based on perceptions of benefits and risks.	Lesson 2
• Science influences society through its knowledge and world views.	Lessons 1, 4, 5
Standard G: As a result of activities in grades 5–8, all students should develop understanding of	
Science as a human endeavor	
• Women and men of various social and ethnic backgrounds—and with diverse interests, talents, qualities, and motivations—engage in the activities of science, engineering, and related fields such as the health professions. Some scientists work in teams and some work alone, but all communicate extensively with others.	Lessons 1, 4, 5
• Science requires different abilities, depending on such factors as the field of study and type of inquiry. Science is very much a human endeavor, and the work of science relies on basic human qualities, such as reasoning, insight, energy, skills, and creativity.	Lessons 1, 2, 3
• Science also relies on scientific habits of mind, such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas.	Lessons 1, 2, 4, 5

NSES Content Standard	Correlation to *The Science of Healthy Behaviors*
Nature of science (Content Standard G continued)	
• Scientists formulate and test their explanations of nature using observation, experiments, and theoretical and mathematical models.	Lessons 1, 2, 3, 4
• It is part of scientific inquiry to evaluate the results of scientific investigations, experiments, observations, theoretical models, and the explanations proposed by other scientists. Evaluation includes reviewing the experimental procedures, examining the evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations.	Lessons 2, 3, 4

Teaching Standards

The suggested teaching strategies in all the lessons support you as you work to meet the teaching standards outlined in the *National Science Education Standards*. This module helps teachers of science plan an inquiry-based science program by providing short-term objectives for students. It also includes planning tools such as the Conceptual Flow of the Lessons chart (page 6) and the Suggested Timeline for teaching the module (page 18). You can use this module to update your curriculum in response to your students' interest in this topic. The focus on active, collaborative, and inquiry-based learning in the lessons helps teachers support the development of student understanding and nurture a community of science learners.

The structure of the lessons in this module enables teachers to guide and facilitate learning. All the activities encourage and support student inquiry, promote discourse among students, and challenge students to accept and share responsibility for their learning. Using the BSCS 5E Instructional Model, combined with active, collaborative learning, allows teachers to respond effectively to the diversity of student backgrounds and learning styles. The module is fully annotated, with suggestions for how teachers can encourage and model the skills of scientific inquiry, as well as foster the curiosity, openness to new ideas and data, and skepticism that characterize science.

Assessment Standards

You can engage in ongoing assessment of your teaching and of student learning using the variety of assessment components embedded within the module's structure. The assessment tasks are authentic: they are similar in form to tasks that students will encounter outside the classroom or in which scientists participate. Annotations guide you to these opportunities for assessment and provide answers to questions that can help you analyze student feedback.

How Does the BSCS 5E Instructional Model Promote Active, Collaborative, Inquiry-Based Learning?

Because learning does not occur through a process of passive absorption, the lessons in this module promote active learning. Students are involved in more than listening and reading. They are developing skills, analyzing and evaluating evidence, experiencing and discussing, and talking to their peers about their own understanding. Students work collaboratively with others to solve problems and plan investigations. Many students find that they learn better when they work with others in a collaborative environment than when they work alone in a competitive environment. When all this active, collaborative learning is directed toward inquiry science, students succeed in making their own discoveries. They ask questions, observe, analyze, explain, draw conclusions, and ask new questions. These inquiry-based experiences include both those

that involve students in direct experimentation and those in which students develop explanations through critical and logical thinking.

This viewpoint that students are active thinkers who construct their own understanding out of interactions with phenomena, the environment, and other individuals is based on the theory of constructivism. A constructivist view of learning recognizes that students need time to

- express their current thinking;
- interact with objects, organisms, substances, and equipment to develop a range of experiences on which to base their thinking;
- reflect on their thinking by writing and expressing themselves and comparing what they think with what others think; and
- make connections between their learning experiences and the real world.

This module provides a built-in structure for creating a constructivist classroom: the BSCS 5E Instructional Model. This model sequences the learning experiences so that students have the opportunity to construct their understanding of a concept over time. The model leads students through five phases of learning that are easily described using five words that begin with the letter *E*: Engage, Explore, Explain, Elaborate, and Evaluate. The following paragraphs summarize how the five Es are implemented across the lessons in this module.

Engage

Students come to learning situations with prior knowledge. This knowledge may or may not be congruent with the concepts presented in this module. The Engage lesson provides the opportunity for teachers to find out what students already know or what they think they know about the topic and concepts to be developed. It also gives each learner the opportunity to consider what his or her current ideas and thoughts about the topic are. The Engage phase should also capture students' interest and make them curious about the topic and concepts.

The Engage phase of this module, found in Lesson 1, *Defining Behavior*, is designed to

- pique students' curiosity and generate interest in learning about behavior;
- determine students' current understanding about behavior and the scientific study of behavior;
- invite students to raise their own questions about behavioral and social science and about behavior;
- encourage students to compare their ideas with the ideas of others; and
- enable teachers to assess what students do or do not understand about the stated outcomes of the lesson.

Explore

In the Explore phase of the module—Lesson 1, *Defining Behavior*; Lesson 2, *Influences on Behavior*; and Lesson 3, *Tools of Social and Behavioral Science: The Survey*—students investigate behavioral and social science and behaviors by using the behavioral and social science tools of observation and surveys and by exploring factors that influence behaviors. These lessons require students to make observations, analyze familiar situations from a scientific viewpoint, evaluate and interpret data, and draw conclusions. Students

- interact with materials and ideas through classroom demonstrations and simulations;
- consider different ways to study and understand behavior;
- acquire a common set of experiences with their classmates so they can compare results and ideas;
- observe, describe, record, compare, and share their ideas and experiences; and
- express their developing understanding of behavior and the scientific study of behavior by using graphs, analyzing and comparing data, analyzing hypothetical situations, and answering questions.

Explain

The Explain phase provides opportunities for students to connect their previous experiences and to begin to make conceptual sense of the main ideas of the module. This stage also

allows for the introduction of formal language, scientific terms, and content information that might make students' previous experiences easier to describe and explain.

In the Explain lessons in this module—Lesson 1, *Defining Behavior*; Lesson 2, *Influences on Behavior*; and Lesson 3, *Tools of Social and Behavioral Science: The Survey*—students

- explain concepts and ideas about behaviors and behavioral and social science in their own words;
- listen to and compare others' explanations of their results with their own;
- become involved in student-to-student discourse in which they explain their thinking to others and debate their ideas;
- revise their ideas;
- record their ideas and current understanding;
- use labels, terminology, and formal language; and
- compare their current thinking with what they previously thought.

Elaborate

In Elaborate lessons, students apply or extend the concepts in new situations and relate their previous experiences to new ones. In the Elaborate lesson in this module, Lesson 4, *Behavioral Specialists at Work: The Healthcare Setting*, students make conceptual connections between new and former experiences. They draw upon their knowledge about behavioral science and behaviors to investigate factors that affect behaviors with important health outcomes. In this lesson, students

- connect ideas, solve problems, and apply their understanding in a new situation;
- use scientific terms and descriptions;
- draw reasonable conclusions from evidence and data;
- add depth to their understanding of concepts and processes; and
- communicate their understanding to others.

Evaluate

The Evaluate lesson is the final stage of the Instructional Model, but it provides only a snapshot of what the students understand and how far they have come from where they began. In reality, the evaluation of students' conceptual understanding and ability to use skills begins with the Engage lesson and continues throughout each stage of the model, as described in the following section. Combined with the students' written work and performance of tasks throughout the module, however, the Evaluate lesson can serve as a summative assessment of what students know and can do.

The Evaluate lesson in this module, Lesson 5, *Behavioral Specialists in the Healthcare Setting ... Again*, gives students the opportunity to

- demonstrate what they understand about behavioral science and how well they can apply their knowledge to solve a problem;
- share their current thinking with others;
- assess their own progress by comparing their current understanding with their prior knowledge; and
- ask questions that take them deeper into a concept.

To review the relationship of the BSCS 5E Instructional Model to the concepts presented in the module, see the chart, Conceptual Flow of the Lessons, on page 6.

When a teacher uses the 5E Instructional Model, he or she engages in practices that are very different from those of a traditional teacher. In response, students also participate in their learning in ways that are different from those seen in a traditional classroom. The charts What the Teacher Does and What the Students Do, on pages 12–14, outline these differences.

What the Teacher Does

Stage	That is *consistent* with the BSCS 5E Instructional Model	That is *inconsistent* with the BSCS 5E Instructional Model
Engage	• Piques students' curiosity and generates interest • Determines students' current understanding (prior knowledge) of a concept or idea • Invites students to express what they think • Invites students to raise their own questions	• Introduces vocabulary • Explains concepts • Provides definitions and answers • Provides closure • Discourages students' ideas and questions
Explore	• Encourages student-to-student interaction • Observes and listens to the students as they interact • Asks probing questions to help students make sense of their experiences • Provides time for students to puzzle through problems	• Provides answers • Proceeds too rapidly for students to make sense of their experiences • Provides closure • Tells students that they are wrong • Gives information and facts that solve the problem • Leads students step-by-step to a solution
Explain	• Encourages students to use their common experiences and data from the Engage and Explore lessons to develop explanations • Asks questions that help students express understanding and explanations • Requests justification (evidence) for students' explanations • Provides time for students to compare their ideas with those of others and perhaps to revise their thinking • Introduces terminology and alternative explanations after students express their ideas	• Neglects to solicit students' explanations • Ignores data and information students gathered from previous lessons • Dismisses students' ideas • Accepts explanations that are not supported by evidence • Introduces unrelated concepts or skills
Elaborate	• Focuses students' attention on conceptual connections between new and former experiences • Encourages students to use what they have learned to explain a new event or idea • Reinforces students' use of scientific terms and descriptions previously introduced • Asks questions that help students draw reasonable conclusions from evidence and data	• Neglects to help students connect new and former experiences • Provides definitive answers • Tells students that they are wrong • Leads students step-by-step to a solution
Evaluate	• Observes and records as students demonstrate their understanding of concepts and performance of skills • Provides time for students to compare their ideas with those of others and perhaps to revise their thinking • Interviews students to assess their developing understanding • Encourages students to assess their own progress	• Tests vocabulary words, terms, and isolated facts • Introduces new ideas or concepts • Creates ambiguity • Promotes open-ended discussion unrelated to the concept or skill

What the Students Do

Stage	That is *consistent* with the BSCS 5E Instructional Model	That is *inconsistent* with the BSCS 5E Instructional Model
Engage	• Become interested in and curious about the concept or topic • Express current understanding of a concept or idea • Raise questions such as, What do I already know about this? What do I want to know about this? How could I find out?	• Ask for the "right" answer • Offer the "right" answer • Insist on answers or explanations • Seek closure
Explore	• "Mess around" with materials and ideas • Conduct investigations in which they observe, describe, and record data • Try different ways to solve a problem or answer a question • Acquire a common set of experiences so they can compare results and ideas • Compare their ideas with those of others	• Let others do the thinking and exploring (passive involvement) • Work quietly with little or no interaction with others (only appropriate when exploring ideas or feelings) • Stop with one solution • Demand or seek closure
Explain	• Explain concepts and ideas in their own words • Base their explanations on evidence acquired during previous investigations • Record their ideas and current understanding • Reflect on and perhaps revise their ideas • Express their ideas using appropriate scientific language • Compare their ideas with what scientists know and understand	• Propose explanations from "thin air" with no relationship to previous experiences • Bring up irrelevant experiences and examples • Accept explanations without justification • Ignore or dismiss other plausible explanations • Propose explanations without evidence to support their ideas
Elaborate	• Make conceptual connections between new and former experiences • Use what they have learned to explain a new object, event, organism, or idea • Use scientific terms and descriptions • Draw reasonable conclusions from evidence and data • Communicate their understanding to others	• Ignore previous information or evidence • Draw conclusions from "thin air" • Use terminology inappropriately and without understanding
Evaluate	• Demonstrate what they understand about the concept(s) and how well they can implement a skill • Compare their current thinking with that of others and perhaps revise their ideas • Assess their own progress by comparing their current understanding with their prior knowledge • Ask new questions that take them deeper into a concept or topic area	• Disregard evidence or previously accepted explanations in drawing conclusions • Offer only yes-or-no answers or memorized definitions or explanations as answers • Fail to express satisfactory explanations in their own words • Introduce new, irrelevant topics

How Does the Module Support Ongoing Assessment?

Because teachers will use this module in a variety of ways and at a variety of points in their curriculum, the most appropriate mechanism for assessing student learning is one that occurs informally at various points within the five lessons, rather than just once, formally, at the end of the module. Accordingly, integrated within the lessons are specific assessment components. These embedded assessment opportunities include one or more of the following strategies:

- performance-based activities, such as developing graphs or participating in a discussion of health effects or social policies;
- oral presentations to the class, such as reporting experimental results; and
- written assignments, such as answering questions or writing about demonstrations.

These strategies allow teachers to assess a variety of aspects of the learning process, such as students' prior knowledge and current understanding, problem-solving and critical-thinking skills, level of understanding of new information, communication skills, and ability to synthesize ideas and apply understanding to a new situation.

An assessment icon and an annotation that describes the aspect of learning being assessed appear in the margin beside each step in which embedded assessment occurs.

How Can Controversial Topics Be Handled in the Classroom?

Teachers sometimes feel that the discussion of values is inappropriate in the science classroom or that it detracts from the learning of "real" science. The lessons in this module, however, are based on the conviction that there is much to be gained by involving students in analyzing issues of science, behavior, health, and society. Society expects all citizens to participate in the democratic process, and our educational system must provide opportunities for students to learn to deal with contentious issues with civility, objectivity, and fairness. Likewise, students need to learn that science intersects with life in many ways.

In this module, students have a variety of opportunities to discuss, interpret, and evaluate basic science and health issues, some in light of their values and ethics. As students encounter issues about which they feel strongly, some discussions may become controversial. The degree of controversy will depend on many factors, such as how similar the students are with respect to socioeconomic status, perspectives, value systems, and religious preferences. In addition, the language and attitude of the teacher factor into the flow of ideas and the quality of exchange among the students.

The following guidelines may help teachers facilitate discussions that balance factual information with feelings.

- Remain neutral. Neutrality may be the single most important characteristic of a successful discussion facilitator.
- Encourage students to discover as much information about the issue as possible.
- Keep the discussion relevant and moving forward by questioning or posing appropriate problems or hypothetical situations. Encourage everyone to contribute, but do not force reluctant students into the discussion.
- Emphasize that everyone must be open to hearing and considering diverse views.
- Use unbiased questioning to help students critically examine all views presented.
- Allow for the discussion of all feelings and opinions.
- Avoid seeking consensus on all issues. The multifaceted issues that students discuss result in the presentation of divergent views, and students should learn that this is acceptable.
- Acknowledge all contributions in the same evenhanded manner. If a student seems to be saying something for its shock value, see whether other students recognize the inappropriate comment and invite them to respond.

- Create a sense of freedom in the classroom. Remind students, however, that freedom implies the responsibility to exercise that freedom in ways that generate positive results for all.
- Insist upon a nonhostile environment in the classroom. Remind students to respond to ideas instead of to the individuals presenting those ideas.
- Respect silence. Reflective discussions are often slow. If a teacher breaks the silence, students may allow the teacher to dominate the discussion.
- At the end of the discussion, ask students to summarize the points that they and their classmates have made. Respect students regardless of their opinion about any controversial issue.

Using the Student Lessons

The heart of this module is a set of five classroom lessons that allow students to discover important concepts related to behavior and the study of behavior. To review these concepts in detail, refer to the Conceptual Flow of the Lessons chart on page 6.

Format of the Lessons

As you review the lessons, you will find that each contains several major features.

At a Glance offers a convenient summary of the lesson.

- The **Overview** provides a short summary of student activities.
- The **Major Concepts** section presents the central ideas that the lesson is designed to convey.
- **Objectives** lists specific understandings or abilities students should have after completing the lesson.
- **Teacher Background** specifies which sections of Information about the Science of Healthy Behaviors (pages 23–32) relate directly to the lesson. This background reading provides the science content that supports the key concepts covered in the lesson. This information is *not* intended to form the basis of lectures to students nor is it intended as a direct resource for students. Rather, it enhances your understanding of the content so that you can facilitate class discussions, answer student questions, and provide additional examples.

In Advance provides instructions for collecting and preparing materials required to complete the activities in the lesson.

- **Web-Based Activities** tells you which of the lesson's activities use *The Science of Healthy Behaviors* Web site as the basis for instruction.
- **Photocopies** lists the paper copies and transparencies that need to be made from masters that are provided after Lesson 5, at the end of the module.
- **Materials** lists all the materials other than photocopies needed for each activity in the lesson.
- **Preparation** outlines what you need to do to be ready to teach the activities in the lesson.

Procedure details the steps in each activity in the classroom. It provides implementation hints and answers to discussion questions.

Within the procedure section, annotations provide additional commentary.

- **Tip from the field test** details suggestions from field-test teachers for teaching strategies, class management, and module implementation and is identified by a field-test icon (see page 18).
- **Note to teachers** gives information about issues that may be confusing or that need to be emphasized.
- **Assessment** provides strategies for gauging student progress throughout the module, and is identified by an assessment icon (see page 18).
- **Icons** identify specific annotations:

identifies teaching strategies that address specific science content standards as defined by the National Science Education Standards.

identifies when to use the Web site as part of the teaching strategy. Instructions in the Procedures section tell you how to access the Web site and the relevant activity. Specific information about using the Web site can be found in Using the Web Site (see page 19). A print-based alternative to each Web activity is provided for classrooms in which Internet access is not available.

identifies a print-based alternative to a Web-based activity to be used when computers are not available.

The print-based activity addresses the same concepts as its Web-based counterpart.

identifies when an assessment is embedded in the module's structure. An annotation suggests strategies for assessment.

identifies suggestions from field-test teachers for teaching strategies, class management, and module implementation.

The **Lesson Organizer** provides a brief summary of the lesson. It outlines procedural steps for each activity and includes icons that denote where in each activity masters, transparencies, and the Web site are used. The lesson organizer is intended to be a memory aid for you to use only after you become familiar with the detailed procedures for the activities. It can be a handy resource during lesson preparation as well as during classroom instruction.

Masters to be photocopied are found after Lesson 5, at the end of the module.

Timeline for the Module

The timeline below outlines the optimal plan for completing the lessons in this module. This plan assumes you will teach the activities on consecutive days. If your class requires more time to discuss issues raised during a lesson or to complete activities, adjust your timeline accordingly.

Suggested Timeline

Timeline	Activity
3 weeks ahead	Reserve computers. Check performance of the Web site. Be sure appropriate versions of the required plug-ins are installed on the computers. If your school district requires parental consent for students to fill out surveys, copy and distribute the Permission Letter at the end of the supplement (after Master 5.2).
7 days ahead	Make photocopies and transparencies. Gather materials.
Day 1 Monday	**Lesson 1** Activity 1: *What Is Behavior? (Or, What Are You Doing?)*
Day 2 Tuesday	**Lesson 2** Activity 1: *Influences on Behavior (Or, Why Did You Do That?)*
Day 3 Wednesday	**Lesson 3** Activity 1: *Physical Activity Survey (Or, What Do You Do?)* Activity 2: *Analyzing the Physical Activity Survey Results (Or, Who Else Does That?)*
Day 4 Thursday	**Lesson 3 (continued)** Activity 2: conclude
Day 5 Friday	**Lesson 3 (continued)** Activity 3: *Getting More out of Surveys*
Day 6 Monday	**Lesson 4** Activity 1: *What's the Problem?* Activity 2: *Changing Behaviors*
Day 7 Tuesday	**Lesson 4 (continued)** Activity 2: conclude
Day 8 Wednesday	**Lesson 5** Activity 1: *The Problem Remains*

Using the Web Site

The Web site for *The Science of Healthy Behaviors* is a wonderful tool that can engage student interest in learning, enhance students' learning experience, and orchestrate and individualize instruction. The Web site features simulations that articulate with three of the unit's lessons. To access the Web site, type the following URL into your browser: *http://science.education.nih.gov/supplements/healthy/teacher.* Click on the link to a specific lesson under *Web Portion of Student Activities.*

Hardware/Software Requirements

The Web site can be accessed from Apple Macintosh and IBM-compatible personal computers. Links for downloading the Adobe Flash plug-in are provided on the Web site's Getting Started page. *This plug-in is required for the activities to function properly.*

The recommended hardware and software requirements for using the Web site are listed in the table below. Although your computer configuration may differ from what is listed, the Web site may still be functional on your computer. The most important items in this list are current browsers and plug-ins.

Downloading and Installing Adobe Flash Player

To experience full functionality of the Web site, Adobe Flash Player, version 6.0 or higher, must be downloaded and installed on the hard drive of each computer that will be used to access the site. The procedure for downloading and installing Adobe Flash Player is as follows:

- Open a Web browser.
- Access the main page of the Web site at *http://science.education.nih.gov/supplements/healthy/teacher.* Click on "Getting Started."

Recommended Hardware/Software Requirements for Using the Web Site*

CPU/Processor (PC Intel, Mac)	Pentium III, 600 MHz; or Mac G4
Operating system (DOS/Windows, Mac OS)	Windows 2000 or higher; or Mac OS 9 or newer
System memory (RAM)	256 MB or more
Screen setting	1024 × 768 pixels, 32 bit color
Browser	Netscape Communicator, version 7 or better, or Microsoft Internet Explorer, version 6 or better
Browser settings	JavaScript enabled
Free hard drive space	10 MB
Connection speed	T1, cable, or DSL
Plug-ins, installed for your Web browser	Adobe Flash Player (version 6 or better); or Apple QuickTime Player (version 6 or better)
Audio	Sound card with speakers

*For users of screen-reader software, a multichannel sound card such as Sound Blaster Live!™ is recommended.

This will open up a page of information on system requirements for the module.
- Scroll down to the "Recommended Setup" section and click on the link to "Adobe Flash." This will bring up the Adobe Flash Player Download Center Web site.
- The Download Center Web site should present you with the option of installing the latest version (highest number) of Adobe Flash Player. As of June 2006, this was version 8.
- Click on the button marked "Install Now" or "Download Now." Clicking this button will allow Adobe's Web site to download and install Flash Player on your computer's hard drive. If you are using Internet Explorer, the installation will happen automatically after clicking the "Install Now" button. If you are using Netscape, you will have to download and run the installation file. Follow the on-screen instructions provided.
- Your Web browser may present you with a security dialog box asking if you would like to install and run Adobe Flash Player. Click "Yes."
- After a minute or so, you should once again see the Adobe Download Center Web page on your browser. There will be a box toward the top of the page containing clickable text. The appearance of this box in your browser window indicates that you have successfully downloaded and installed Adobe Flash Player.

Getting the Most out of the Web Site

Before you use the Web site, or any other piece of instructional software in your classroom, it may be valuable to identify some of the benefits you expect the software to provide. Well-designed instructional multimedia software can
- motivate students by helping them enjoy learning—students want to learn more when content that might otherwise be uninteresting is enlivened;
- offer unique instructional capabilities that allow students to explore topics in greater depth—technology offers experiences that are closer to actual life than print-based media offer;
- support teachers in experimenting with new instructional approaches that allow students to work independently or in small teams—technology gives teachers increased credibility among today's technology-literate students; and
- increase teachers' productivity—technology helps teachers with assessment, record keeping, and classroom planning and management.

The ideal use of the Web site requires one computer for each student team. However, if you have only one computer available, you can still use the Web site. For example, you can use a projection system to display the monitor image for the whole class to see. Giving selected students in the class the opportunity to manipulate the Web activities in response to suggestions from the class can give students some of the same autonomy in their learning that they would gain from working in small teams. Alternatively, you can rotate student teams through the single computer station. If you do not have access to the Web site, you can use the print-based alternatives provided for each Web activity.

Collaborative Groups

We designed many of the activities in the lessons to be done by teams of students working together. Although individual students working alone can complete these activities, this strategy does not stimulate the types of student-student interactions that are part of active, collaborative, inquiry-based learning. Therefore, we recommend that you organize collaborative teams of two to four students each, depending on the number of computers available. Students in teams larger than this will have difficulty organizing the student-computer interactions equitably. This can lead to one or two students' assuming the primary responsibility for the computer-based work. Although large groups can be efficient, they

do not allow all students to experience the in-depth discovery and analysis that the Web site was designed to stimulate. Team members not involved directly may become bored or disinterested.

We recommend that you keep students in the same collaborative teams for all the activities in the lessons. This will allow each team to develop a shared experience with the Web site and with the ideas and issues that the activities present. A shared experience will also enhance your students' perceptions of the lesson as a conceptual whole.

If your student-to-computer ratio is greater than four to one, you will need to change the way you teach the module from the instructions in the lessons. For example, if you have only one computer available, you may want students to complete the Web-based work over an extended time period. You can do this several ways. The most practical way is to use your computer as a center along with several other centers at which students complete other activities. In this approach, students rotate through the computer center, eventually completing the Web-based work you have assigned.

A second way to structure the lessons if you have only one computer available is to use a projection system to display the desktop screen for the whole class to view. Giving selected students in the class the opportunity to manipulate the Web activities in response to suggestions from the class can give students some of the same autonomy in their learning they would have gained from working in small teams.

Web Activities for Students with Disabilities

The Office of Science Education (OSE) is committed to providing access to the *NIH Curriculum Supplements Series* Curriculum Supplement Series for individuals with disabilities, including members of the public and federal employees. To meet this commitment, we comply with the requirements of Section 508 of the Rehabilitation Act. Section 508 requires that individuals with disabilities who are members of the public seeking these materials will have access to and use of information and data that are comparable to those provided to members of the public who are not individuals with disabilities. The online versions of this series have been prepared to comply with Section 508.

If you use assistive technology (such as a Braille reader or a screen reader) and the format of any materials on our Web site interferes with your ability to access the information, please let us know. To enable us to respond in a manner most helpful to you, please indicate the nature of the problem, the format in which you would like to receive the material, the Web address of the requested material, and your contact information.

Contact us at
Curriculum Supplements Series
Office of Science Education
National Institutes of Health
6100 Executive Boulevard, Suite 3E01
MSC7520
Bethesda, MD 20892-7520
supplements@science.education.nih.gov

The Science of Healthy Behaviors 508-Compliant Web Activities

Lesson, activity	For students with hearing impairment	For students with sight impairment
Lesson 1, Activity 1	The *Learning Behavior* and *Nonhuman Primate Behavior* videos do not have audio and, therefore, do not have captioning. To view the captioning for the *Adult Human Behavior* video, students can click on the closed-captioning icon. The icon is located in the top left corner of the video after it begins playing. The text appears at the bottom of the video.	On each video page, there is a link to a *video with descriptive narration*. These videos include a narrated description of the video.
Lesson 3, Activities 2 and 3	No special considerations are required.	The forms are designed to be compatible with assistive software. The Analyzing the Physical Activity Survey Results report table and graph contain blank areas that are designed to be completed by groups in class. A note for screen-reader software and other assistive software indicates this. The tables and bar graphs in this lesson are designed to be accessible with assistive software.
Lesson 4, Activities 1 and 2	No special considerations are required.	Students using screen-magnification or screen-reading software have the option of choosing an alternate, accessible version of the activity. The content of the alternate activity is equivalent to the original's, but it has been specially designed for use with assistive software. Students can choose this option from a menu that appears when the activity first loads. Supervision is recommended.

Information about the Science of Healthy Behaviors

1 What Is Behavior?

Webster's New World Dictionary defines *behavior* as "the way a person behaves or acts."[28] Behavior effectively includes anything and everything an individual or group does. Behaviors play key roles in survival, long- and short-term health, and emotional and physical well-being. Some behaviors are instinctual, and others are conscious choices. Behaviors result from a complex interaction between genetics and the environment, and they include emotional and physical actions and reactions. Some behaviors are learned and vary from culture to culture. Some behaviors are social, involving interactions with others. Behaviors change based on an individual's age, education, social status, and situation.

Figure 1. *Some behaviors are instinctual and others are conscious choices.*

Given the inclusiveness of the term, it should not be surprising if students have difficulty defining behavior. One of the goals of this curriculum supplement is for students to gain a more complete understanding of what constitutes behavior. Students will also begin to analyze the causes and effects of behaviors and think about the process and results of modifying behaviors. Ideally, this information will provide students with tools to evaluate their own behavioral choices, with the goal of improved health.

2 Studying Behavior

2.1 Behavioral and Social Sciences

The goal of the behavioral and social sciences is to better understand human behaviors and apply this understanding to improving the quality of life for people. Because so many behaviors have an impact on health, social and behavioral sciences are an important component of studying individual and group health.

Social and behavioral sciences are an important component of studying individual and group health.

Developing a valid scientific method for studying behavior is a challenge because *behavior* is so broadly defined. Virtually any activity, from language to walking, constitutes behavior, and behavior may be studied in

an individual or in groups. In addition, the requirement of detaching emotionally from the subject and not projecting personal beliefs or feelings onto the study is difficult to meet. It becomes more difficult when one is studying, ultimately, oneself. Tools and measurable variables for the accurate and reproducible study of behaviors have been designed and identified, however.

The limits of behavioral and social science are difficult to draw since any behavior is a legitimate topic of study. In addition, the subjects of the field of study range from the individual to the global and include internal behaviors, interactions between people, and interactions between people and their environments.[22]

In this curriculum supplement, *behavioral and social science* refers to a large number of fields involved in studying behavior, including traditional fields such as psychology and sociology. The term also includes fields that are based on behavioral and social science methods such as epidemiology, anthropology, and the relatively new field of biopsychosocial research. Biopsychosocial research (also known as biobehavioral or biosocial research) involves the study of the interactions of biological factors with behavioral and social variables and of how they affect each other.

Behaviors include not only cognition, attitudes, emotions, sensation, motivation, perception, and communication but also eating, drinking, sexual, aggressive, and parental behaviors. Biopsychosocial research includes research on basic mechanisms as well as clinical research, and it is not restricted to humans. It includes normal as well as pathological function. It reflects an understanding of the relationship between behavior and health and combines traditional behavioral sciences with clinical and applied biology fields, as in psychoneuroimmunology (the scientific study of the interactions among behavior, the brain, and the immune system).[8] Virtually any field that involves humans makes use of behavioral and social science to some degree.

These combined sciences have brought many changes to the way we live, from fundamental shifts in how society views and copes with mental illness to the design of ergonomically improved environments. Since behavior affects so many aspects of society, behavioral or social science research may contribute to conclusions in other fields such as politics and medicine. For example, polls are a form of survey, and epidemiology relies heavily on behavioral and social science methods for collecting reliable information.

Behavioral and social science research plays an increasing role in health care. By examining the human factors involved in successful treatments, researchers can identify ways to improve the effectiveness of those treatments. In our society, where lifestyle-induced chronic illnesses are affecting an increasing percentage of the population, developing effective behavioral modification therapy and behavior-based disease prevention is essential. Effective behavioral treatments, just like traditional medical treatments, are based on rigorous scientific research.

Effective behavioral treatments, just like traditional medical treatments, are based on rigorous scientific research.

2.2 Types of Research

Behavioral and social science researchers can conduct basic or applied research. Basic research examines general questions, which may or may not have an immediate and obvious application. For example, studying how a rat learns to perform a task does not necessarily have an immediate application in humans, but research of this type often leads researchers to new ideas about human behaviors. People doing applied research often use ideas derived from basic research to develop useful tools for society. For

example, applied research in ergonomics led to the design of the more-visible fluorescent-green fire engines.

Laboratory or clinical research is often tightly controlled to allow researchers to answer specific questions. For example, if researchers want to study the effect of a certain vitamin in a group of patients, they can control the dosage of the vitamin and observe effects in a small group. For a variety of reasons, animals are sometimes studied instead of humans:

- Studying basic behaviors in relatively simple organisms can yield insights about complex behaviors in humans. For example, in studying how a rat or pigeon learns to respond to certain stimuli, such as a flash of light, scientists can better understand how human behaviors are shaped.
- Humans are difficult to work with. They usually don't eat a controlled diet, they grow and reproduce very slowly, and they are not available to the researcher for extended periods of time.
- In some cases, using humans as study subjects would be unethical. For example, in research on addiction, animals are addicted to alcohol or drugs and then exposed to various treatments. This would not be allowed in humans.

Behavioral and social science research is also carried out in a variety of other settings. The concept of "laboratory" research has expanded to include field research, in which humans or animals are studied in their natural settings. This provides a rich source of information about complex behaviors and group interactions that may not be available in the traditional laboratory. For example, nonhuman primate studies in the animals' natural habitat provide a great deal of information about societies and how social structures affect individual and group well-being.

2.3 Behavioral and Social Science Tools

All science is based on the collection of measurable data. Behavioral scientists might measure the number of times a behavior is repeated, the degree to which a subject agrees or disagrees with a question, or the rapidity with which a new behavior is learned. Two tools commonly used in behavioral and social sciences are *observation* and *surveys*. The students using this curriculum will be introduced to these tools, including their applications and limits.

Figure 2. *Many behavioral scientists work with rats or nonhuman primates.*

Two tools commonly used in behavioral and social sciences are observation *and* surveys.

Observation. Effective observation requires attention to detail, careful note taking, and detachment. These skills make comparison of observations across time possible. It is important to observe what is actually happening, or to watch for specific behaviors, while remaining detached from the situation. For example, primatologists studying nonhuman primate behavior must be careful not to allow their own values and judgments to color their observations. Observations are often converted into numbers—for example, the

number of times a behavior was observed or the degree to which a behavior was exhibited. These numbers can be analyzed. Alternatively, observation may lead the scientist to ask new questions, such as why a behavior was exhibited or how the behavior developed.

Survey. Another common tool of social and behavioral science is the survey. It allows collection of data from a larger number of individuals than would be possible with observation. A well-designed survey also reduces the impact of the researcher's bias. However, designing an effective survey is very difficult. Questions must elicit useful answers that aren't misleading. For example, if one were to ask, "What did you eat today?" the answer might be a very detailed list of food, but without any quantities. So although two people answered, "Cereal," one might have eaten one bowl of cereal and the other, three bowls.

Two other aspects of surveys are *representative sample* and *sample size*. They both affect the validity of survey results. *Representative sample* refers to the idea that different groups of people will respond differently to a survey, so each group should be *represented* in the study population. For example, the National Longitudinal Study of Adolescent Health, also known as the Add Health study, is a national survey of middle school students.[18] Because the survey could not be administered to every middle school student in the United States, a smaller population of students representing the different socioeconomic groups in the general population was surveyed. The results can then be extrapolated to the general middle school population. Another approach to surveys is to target a particular group and administer the survey to that group. This limits the results of the survey to only that group.

Sample size affects how accurately a population is represented by a survey. The larger the sample, the more accurate the survey will be. Everyone has heard a story about a friend or family member who smoked or did other unhealthy things and lived to be very old. But even though one hears about these exceptional people more often than others, the reality is that they are exceptions and do not represent the most common experience. Looking at many people, or a "large sample size," ensures that those unusual people do not skew, or influence, the results too much.

Sample size affects how accurately a population is represented by a survey. The larger the sample, the more accurate the survey will be.

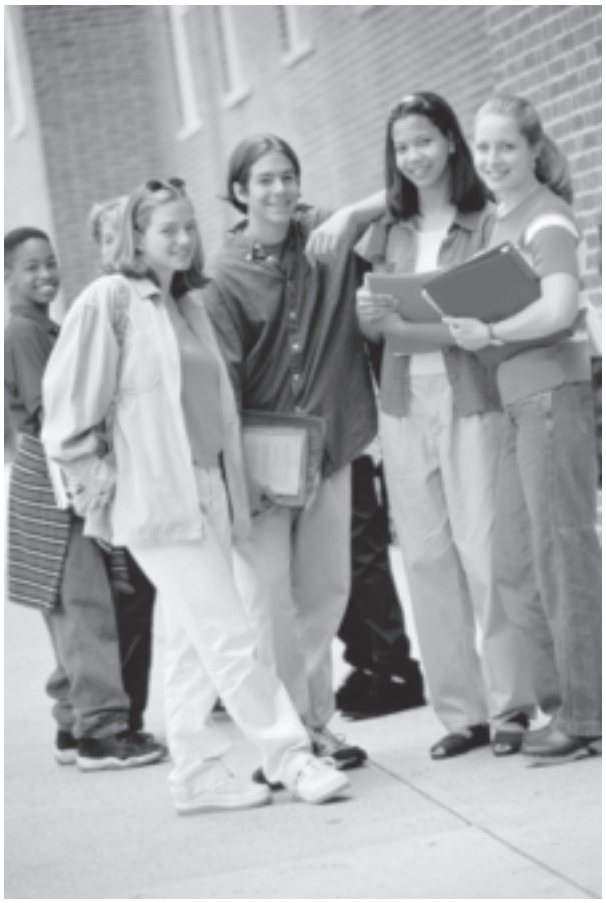


Figure 3. *The Add Health study is a national survey of middle school students that relates behaviors to health.*

2.4 Careers in Behavioral and Social Sciences

While people who have a background in behavioral and social science contribute to society through a variety of careers, some individuals train specifically as social scientists or behavioral scientists. Some of these professionals conduct basic research—for example, studying animal models to gain insight into human behaviors or studying mechanisms underlying normal behaviors in humans to understand disordered behaviors caused by disease. These studies can occur in laboratories or in the field. Others may develop practical applications based on research.

Behavioral and social science is used in many other fields as well. For example, in the healthcare profession, studies of risks and behaviors can help healthcare providers better understand and more effectively serve their patient populations. Community leaders, politicians, and government workers in a variety of fields can use social science to help them design better policies for their constituents. Ergonomics is a field dedicated to studying how people behave in their environments and then using that information to improve the environments by adapting them to human needs and limitations. Educators may also find behavioral and social science helpful in developing educational models to address academic and nonacademic issues.

3 Influences on Behavior

Behavior does not occur in a vacuum. A variety of influences—from genetic to social—weighs in on behaviors. These influences create the reasons for behaviors. The chart on page 28 lists many influences, but it's far from comprehensive. The grouping of various influences into categories is subject to rearrangement based on the situation, behavior, or person. Interactions between influences mediate or exacerbate the effect of other influences. For example, the media may enhance a family influence in attitude about sports. The media can introduce a person to particular lifestyles, and then that person's peer group might encourage an illegal behavior associated with a lifestyle. Different influences have different degrees of influence as well. For example, a strong genetic predisposition to alcoholism may overwhelm a family influence of abstinence from alcohol and a societal message of moderation.

A final mediator of influences on behavior is the level of personal control an individual exercises over that influence. For example, people cannot modify their genetics. However, a person who is genetically predisposed to develop heart disease might actively engage in behaviors that will decrease their risk of heart disease. Another level of control depends on social situation. An adult may decide to improve his or her diet as a result of influences, such as advice from healthcare professionals, educational opportunities, and the availability of a new local market. This person is in a position to modify his or her eating behavior. However, a child in this person's home has very little control over what the family eats.

Adolescents do have control over many influences in their lives. In some cases, they don't realize the extent to which they can modify their own behaviors. It's important for adolescents to be able to

- recognize influences on their behaviors and
- analyze which behaviors they have the ability to modify.

Influences on Behavior: Examples, by Category

Biology/Genetics	Basic Needs	Personal Goals	Family
• Hormones • Diseases • Puberty • Health • Disabilities/ handicaps	• Food • Shelter • Clothing • Social interactions • Affection	• Being healthy • Making friends • Grades • Popularity • Image • Success • Morals	• Adult support • Family values • Culture • Sibling rivalry • Religion
Resources	**Media**	**Social**	**Environment/ Community**
• Money • Time • Educational opportunities • Transportation	• TV • Video games • Magazines • Movies • Music/music videos • Sports • Advertisements	• Peers • Teachers • Sports teams/clubs • Cliques • Mentors/role models • Friends	• Neighborhood • Weather • Playgrounds/parks • Transportation • Policies/laws • Culture

4 Behavioral and Social Science Research and Cardiovascular Disease

In this curriculum supplement, students role-play behavioral clinicians in a scenario involving a patient with heart disease. Heart disease is a collection of conditions that limit the flow of blood to the heart muscle itself, including atherosclerosis, angina, and heart attack. Together, heart disease and stroke, which is a loss of blood flow to the brain, comprise the main components of cardiovascular disease (CVD). Over 930,000 people in the United States die annually as a result of cardiovascular disease, and 64 million Americans suffer from cardiovascular disease.[7] CVD has traditionally been a disease of older people; however, recently, the incidence of heart disease in younger people has risen.

4.1 Health Outcomes of Behavior

Heart disease and stroke share several of the same risk factors, many of which are preventable. These are the same factors that contribute to other chronic diseases, such as diabetes, which can complicate treatment and research. The CDC has identified a limited number of behaviors that are often established during adolescence and contribute to chronic diseases Americans face today:

- tobacco use (smoking, chewing);
- dietary behaviors (food selection, portion-size selection, attitudes toward foods and eating);
- physical activity (type, intensity, duration, frequency);
- alcohol and other drug use;
- sexual behaviors (leading to acquiring sexually transmitted diseases, unwanted pregnancies); and
- behaviors that may result in violence and unintentional injuries (use of weapons, motor vehicles).

Due to large-scale public education efforts, most people, even adolescents, are aware of the risks unhealthy behaviors pose to their health, yet they continue to engage in these behaviors.

Most people, even adolescents, are aware of the risks unhealthy behaviors pose to their health, yet they continue to engage in these behaviors.

A variety of influences contributes to an individual's decision to engage in unhealthy behaviors or avoid them. Among these is an individual's perception of long- and short-term health risks. Behaviors with short-term, or more immediate, health risks may be less appealing than behaviors with long-term risks. For example, while an individual might not refrain from overindulging in alcohol due to long-term consequences, such as addiction or liver disease, he or she might refrain to avoid being ill immediately.

Many people, especially adolescents, believe long-term health consequences can be avoided by a vague plan to change the behavior "later." These expectations of changing behaviors can be unrealistic since changing behaviors is difficult. For example, 79 percent of smokers relapse after quitting.[3]

Figure 4. *Engaging in unhealthy behaviors is influenced by the perception of long- and short-term risks.*

4.2 Identifying Behavioral Trends, Risky Behaviors, and At-Risk Groups

Behavioral and social science research contributes to health care by identifying potential health problems, studying risky behaviors, and evaluating the efficacy of treatments. The influences on the patient's health-related behaviors are similar to the influences on any behavior. For example, genetics, family and cultural norms, and the media play roles in an individual's behaviors.

Research in behavioral and social sciences examines healthcare data to determine the trends in health-related behaviors, including the prevalence of unhealthy behaviors and who is at risk. The research examines the influences that play major roles in these behaviors and that can enhance the effectiveness of prevention programs or medical treatments by determining how to reduce negative influences and enhance beneficial ones. This research can help the healthcare industry identify where to concentrate preventive efforts or how to prepare for upcoming health needs.

Epidemiological reports, such as the American Heart Association's (AHA's) annual report on CVD, reveal disease trends in the population.[1] The AHA report, a statistical analysis of CVD in the United States, provides information on the incidence of CVD, treatments, and at-risk populations. Studies of risk behaviors can identify groups that are more likely to develop CVD. Another report examined the connection between smoking prevalence and levels of education and income.[17]

Healthcare workers with epidemiological information can target at-risk groups for maximal impact of preventive and early care. For example, a 1999 study showed that men whose parents suffered from CVD developed atherosclerosis at a high rate.[27] This was not a surprise, based on genetics; however, the behavioral aspect of the research indicated that stress was a major factor in triggering atherosclerosis in these patients. The

behavioral factor was unexpected and can be used to select appropriate preventive treatments for this group of patients.

4.3 Behavioral Interventions

When patients develop diseases with strong behavioral components, such as cardiovascular disease, behavioral interventions are often recommended in addition to medical treatments. In chronic diseases strongly affected by behavior, changing behavior can help control the disease. Behavioral and social science research has provided many new nondrug interventions for managing chronic diseases, thus preventing the development of new diseases and promoting healthy behaviors.[22]

Behavioral and social science research has provided many new nondrug interventions for managing chronic diseases.

Interventions address self-efficacy or self-confidence issues, provide problem-solving skills, and promote the development of social support systems. Successful interventions take into account various influences in the patient's life and involve individual, family, and community organizations in behavioral modification.[10]

Behavioral intervention is an approach to addressing a behavior that has poor health outcomes and replacing it with a more productive behavior. The primary care provider, such as a physician, nurse midwife, or nurse practitioner, works with the patient to design an initial behavioral intervention plan. First, the patient's readiness for change may be assessed, as well as the patient's views on how important the change is and how likely he or she is to succeed. The patient's medical and behavioral history is reviewed to identify problem behaviors, such as smoking or not exercising. This process involves input by both patient and care provider, and leads to the development of a behavioral modification plan.[9] The patient may be referred to behavioral therapists and other healthcare professionals as needed. Follow-up care with the primary care provider is an important part of treating any chronic disease.[4]

Figure 5. *Behavioral interventions help patients with heart disease improve their health.*

4.4 Maximizing Effective Medical and Behavioral Treatments

Studying how patients deal with chronic disease is an important component of developing effective medical and behavioral treatments. Hostility, depression, and stress play major roles in the progression of many chronic diseases.[12] One important reason for a behavioral intervention approach is that the patient is largely responsible for the day-to-day treatment of chronic illness. This can be an overwhelming task without the proper preparation and support.

Although a patient may be highly motivated to change, many factors are involved in successful

behavior change. In addition to learning about healthy and unhealthy behaviors, patients need to learn new skills and new behaviors, such as self-monitoring.[26] Other important factors include social support and self-confidence.

Patients who have been diagnosed with chronic diseases react differently to sudden requirements to change lifelong behaviors. Some may succeed in changing their behaviors on their own; many others will be only partially successful or even fail completely. Behavioral and social science research can analyze these outcomes to determine what generates successes and failures, giving healthcare providers more information for successful treatment of their patients.

Approaches to changing behaviors include participating in formal programs or support groups and individualized therapy. Many health maintenance organizations (HMOs) and other healthcare groups provide classes, seminars, and printed materials to encourage healthy behaviors. Private groups offer programs designed to change specific habits, such as how to lose weight or stop smoking. One important aspect of behavioral intervention is having a long-term approach. Realistic goal setting, support from friends and family, and adding healthy behaviors before removing unhealthy behaviors all increase success rates.[9, 10] The experience of "going cold turkey" may work for some individuals, but most need to pursue a more gradual approach.

Alternative treatments such as yoga, meditation, acupuncture, and biofeedback may be successful for some patients.[14] Behavioral and social sciences research can be translated into effective behavioral interventions and thus complement or enhance the effectiveness of medical treatment of chronic diseases.

4.5 Behavioral and Social Science Research and Public Health

Behavioral interventions can be provided as informational programs, behavioral and social interventions, or environmental and policy approaches.[11] Because the response to behavioral treatments can vary among demographic groups, meta-analysis of programs is a useful tool. In meta-analyses, researchers compare the results of several similar studies or programs. This allows the researchers to draw conclusions about the general applicability of various approaches to determine whether one approach is more effective than another or whether effectiveness depends on the target audience.

Meta-analyses of risk factors and behavioral interventions provide a summary of findings for practitioners. For example, the *Guide to Community Preventive Services* offers continually updated summaries of a variety of public health interventions.[11] Practitioners can look up the behavior of interest, see what programs have been scientifically tested for effectiveness, and determine which might be most appropriate for their community. A recent review examined the effectiveness of media campaigns and summarized the important points for an effective campaign based on a scientific analysis of this type of campaign.[23] Meta-analysis ensures that evidence-based methods are available to practitioners, which reduces wasted time, effort, and money.

In addition to studying the effectiveness of programs, specifically whether or not the program resulted in the proposed outcomes, social science also examines feasibility of programs.[2] This is particularly important for public health programs, in which a wide audience is targeted with limited funds. Social science research can provide information about

which program is most likely to be effective in a particular community. For example, the *Guide to Community Preventive Services* offers information on effective interventions on a variety of levels, and also provides information about the cost-effectiveness of these programs.[11] An affordable program may not be effective, or a very effective program may require high funding levels and, therefore, be impractical. In addition, information about the community to be served, such as local risk factors, community priorities, and local resources, is critical to ensure an appropriate choice for a given community.[2]

Another important consideration in developing behavioral health programs is cultural sensitivity.[13] Effective programs must be culturally accessible, using people, language, and clothing with which the target audience can identify. In addition, a deeper sense of culture that takes into account traditions and history will increase the effectiveness of programs.[24] For example, in one study on improving nutrition in a black population, the intervention was based in black churches. The churches proved to be an effective location for intervention efforts for this community.[25]

Effective programs must be culturally accessible, using people, language, and clothing with which the target audience can identify.

4.6 The Science of Healthy Behaviors

In this curriculum supplement, students are introduced to the complexities of studying behaviors. Learning how to understand behaviors on a scientific level and deriving practical healthcare applications is a complex but effective process. Through playing the roles of professionals, students should become aware that behaviors can be studied and that there is a scientific basis to behavioral intervention. They should also learn about the many influences on behavior and how an individual can modify behavior. Through their increased understanding of behavior, they should come to understand that changing behaviors "later" is not a good plan, or an easy task. In addition, they should become aware of the many factors that increase the likelihood of successful behavior changes. Students should be able to apply these behavioral and social science concepts to their own lives, thus improving their own chances of successfully practicing healthy behaviors.

5 Web Resources

The following Web sites contain information that may be useful to you:

- *http://ninr.nih.gov/ninr*
- *http://obssr.od.nih.gov*
- *http://www.nhlbi.nih.gov/health/public/heart/index.htm*

References

1. American Heart Association. 2004. *Heart Disease and Stroke Statistics—Updates, 2004.* Retrieved November 5, 2004, from the World Wide Web: *http://www.americanheart.org/downloadable/heart/1075102824882HDSStats2004UpdateREV1-23-04.pdf*

2. Briss, P.A., Brownson, R.C., Fielding, J.E., and Zaza, S. 2004. Developing and using the *Guide to Community Preventive Services:* Lessons learned about evidence-based public health. *Annual Review of Public Health, 25*: 281–302.

3. Burke, L.E., Dunbar-Jacob, J.M., and Hill, M.N. 1997. Compliance with cardiovascular disease prevention strategies: A review of the research. *Annals of Behavioral Medicine, 19*: 239–63.

4. Center for the Advancement of Health. 2000. *Health Behavior Change in Managed Care*. Washington, D.C.: Center for the Advancement of Health. Retrieved March 28, 2005, from *http://www.cfah.org/pdfs/health_monograph.pdf*

5. Center for the Advancement of Health. 2000. Selected evidence for behavioral approaches to chronic disease management: Cardiovascular disease. Retrieved November 4, 2004, from the World Wide Web: *http://www.cfah.org/pdfs/health_topic_cardio.pdf*

6. Centers for Disease Control and Prevention. 2003. Chronic disease prevention: Chronic disease overview. Retrieved June 17, 2003, from the World Wide Web: *http://www.cdc.gov/nccdphp/overview.htm*

7. Centers for Disease Control and Prevention. 2004. *Preventing heart disease and stroke: Addressing the nation's leading killers*. Retrieved November 4, 2004, from the World Wide Web: *http://www.cdc.gov/nccdphp/aag/aag_cvd.htm. Update available at http://www.cdc.gov/nccdphp/publications/aag/cvh.htmI* (April 2006).

8. Committee on Health and Behavior: Research, Practice, and Policy, Board on Neuroscience and Behavioral Health, Institute of Medicine. 2001. *Health and Behavior: The Interplay of Biological, Behavioral, and Social Influences*. Washington, D.C.: National Academy Press.

9. Feinstein, R.E., and Feinstein, M.S. 2001. Psychotherapy for health and lifestyle change. *Journal of Clinical Psychology/In Session, 57*: 1263–1275.

10. Gotay, C.C. 2005. Behavior and cancer prevention. *Journal of Clinical Oncology, 23*: 301–10.

11. Guide to Community Preventive Health. 2004. Retrieved November 5, 2004, from the World Wide Web: *http://www.thecommunityguide.org/pa/default.htm*

12. Krantz, D.S., and McCeney, M.K. 2002. Effects of psychological and social factors on organic disease. *Annual Review of Psychology, 53*: 341–369.

13. Kreuter, M.W., and McClure, S.M. 2004. The role of culture in health communication. *Annual Review of Public Health, 25*: 439–455.

14. Labarthe, D., and Ayala, C. 2002. Nondrug interventions in hypertension prevention and control. *Cardiology Clinics, 20*: 249–63.

15. Loucks-Horsley, S., Hewson, P., Love, N., and Stiles, K. 1998. *Designing Professional Development for Teachers of Science and Mathematics*. Thousand Oaks, CA: Corwin Press.

16. McGinnis, J.M., and Foege, W.H. 1993. Actual causes of death in the United States. *Journal of the American Medical Association, 270*: 2207–2212.

17. *Morbidity and Mortality Weekly Report (MMWR)*. 1999. Achievements in public health, 1900–1999: Tobacco use—United States, 1900–1999. *MMWR* 48(43): 986–993. Available on the World Wide Web at *http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4843a2.htm*

18. National Longitudinal Study of Adolescent Health. 2003. Results available at *http://www.cpc.unc.edu/projects/addhealth*

19. National Research Council. 1996. *National Science Education Standards*. Washington, D.C.: National Academies Press.

20. Office of Behavioral and Social Sciences Research. 2000. Description of Behavioral and Social Sciences Research. Retrieved November 2, 2004, from the World Wide Web; update available at *http://obssr.od.nih.gov/Documents/Publications/NIHBSSR2001.pdf*

21. Office of Behavioral and Social Sciences Research. 2003. Behavioral and Social Sciences Research in the 21st Century: Summary of Recommendations from Six National Academy of Sciences Reports. Retrieved from the World Wide Web on June 17, 2003: *obssr.od.nih.gov/Content/Publications/Books_And_Reports/NRC-Reports.htm*

22. Office of Behavioral and Social Sciences Research. 2004. Information for the public. Retrieved November 3, 2004, from the World Wide Web; now available through *http://obssr.od.nih.gov/Content/Research/BSSR_Guide_To_Grants_at_NIH/*

23. Randolph, W., and Viswanath, K. 2004. Lessons learned from public health mass media campaigns: Marketing health in a crowded media world. *Annual Review of Public Health, 25*: 419–437.

24. Resnicow, K., Baranowski, T., Ahluwalia, J.S., and Braithwaite, R.L. 1999. Cultural sensitivity in public health: Defined and demystified. *Ethnicity and Disease, 9*: 10–21.

25. Resnicow, K., Jackson, A., Wang, T., De, A.K., McCarty, F., Dudley, W.N., and Baranowski, T. 2001. A motivational interviewing intervention to increase fruit and vegetable intake through black churches: Results of the Eat for Life Trial. *American Journal of Public Health, 91*: 1686–1694.

26. Schneiderman, N., Antoni, M.H., Saab, P.G., and Ironson, G. 2001. Health psychology: psychosocial and biobehavioral aspects of chronic disease management. *Annual Review of Psychology, 52*: 555–80.

27. Stoney, C.M., and Hughes, J.W. 1999. Parental history of cardiovascular disease and atherogenic lipid reactivity under stress. *Psychophysiology, 36*: 484–490.

28. *Webster's New World Dictionary, Third College Edition*. 1988. New York: Simon & Schuster, Inc.

Defining Behavior

Lesson 1
Engage
Explore
Explain

At a Glance

Overview

This lesson consists of one activity and should take one class period to complete. Students are introduced to the study of behavior and to observation as an important tool of behavioral and social scientists. After developing a definition of behavior, students view three video clips, observe behaviors, and participate in a class discussion. Students expand their understanding of behavior as it relates to health.

Major Concepts

Behavior is any activity an organism or group engages in, and it can be innate or learned. Behavior is studied by behavioral and social scientists. Scientists use a variety of tools to study behavior, including observation and animal models. Some studies occur in the laboratory, while others take place in natural settings. Some studies examine behavior in individuals, while others collect information about the behavior of groups. Understanding behavior is important because many behaviors have long- and short-term impacts on health. Improving health requires an understanding of what behaviors people engage in, why they engage in them, and what the health consequences of those behaviors are.

Objectives

After completing this lesson, students will

- be able to define behavior,
- be aware that behavior is studied by behavioral and social scientists,
- recognize that animal models are used to understand human behavior,
- recognize that observation is used to study behaviors,
- be aware that behavior can be studied in a laboratory or natural setting,
- recognize that individuals or groups can be studied, and
- recognize that behaviors can affect health.

Teacher Background

See the following section in Information about the Science of Healthy Behaviors:

1 *What Is Behavior?* (page 23)
2 *Studying Behavior* (pages 23–27)

In Advance

Web-Based Activities

Activity	Web component?
1	Yes

Photocopies

Activity	Master	Number of copies
1 For Web version	Master 1.1, *Observation Guide Sheet* Master 1.3, *Health Outcomes of Behaviors*	1 copy per student and 1 transparency 1 copy per student (optional) and 1 transparency
1 For print version	Master 1.2, *Behavior Record* Master 1.3, *Health Outcomes of Behaviors*	1 copy per student and 1 transparency 1 copy per student (optional) and 1 transparency

Materials

Activity	Materials
1 (Web and print versions)	None, other than photocopies and transparencies

Preparation

For classes using the ***Web-based version***:

Reserve computers, if necessary. Make sure that Internet connections are working and that each computer has a functional sound card and speakers. If multiple computers are not available, project images from a single computer for the class.

For classes using the ***print version***:

This version requires preplanning. Students must fill out a behavior-observation worksheet at least the day before beginning Activity 1. Alternatively, you can show the class a minute or two of a movie or television video that depicts a few different human behaviors.

Activity 1: *What Is Behavior? (Or, What Are You Doing?)*

Procedure

For classes using the *Web-based version* of this activity:

1. Divide the class into groups of two to four. Ask students, "What is behavior?"

Write key words from their definitions on the board and try to derive a consensus definition. Accept all responses. When you see that thinking is engaged, move on to the next step.

Note to teachers: Asking this question requires students to call on their prior knowledge and to engage their thinking. At this point, do not critique student responses. Appropriate teacher comments are short and positive, such as "good" and "what else?" Other appropriate teacher responses include, "Why do you believe that?" or "How do you know that?" Questions such as these allow you to assess current student knowledge about the subject and adjust lessons accordingly. They also provide a springboard to "Let's find out" or "Let's investigate." In general, it's time to move forward when you see that thinking has been engaged.

2. Ask students

- **if they have ever heard of anyone who studies behavior in animals or people;**
- **why scientists would study behavior; and**
- **why studying animal behavior might be useful.**

Students may suggest specific people, such as Sigmund Freud or Jane Goodall. Alternatively, they may name professions, such as psychologists or psychiatrists. If necessary, give some examples (see *2.4 Careers in Behavioral and Social Sciences* in Information about the Science of Healthy Behaviors, page 27). Mention school counselors or popular media figures such as Dr. Phil.

Students may also need prompting on animal behavior studies. Suggest some familiar examples such as animal trainers (Siegfried and Roy) or highly trained working animals such as herding or guide dogs. Students may suggest that studying behavior is interesting, or that studying deviant behavior can help people understand and perhaps prevent it. Students may not realize the full value of animal models. They may understand that studying animals can be cheaper or more convenient. (See note below for more on animal models.) Keep this discussion brief. After introducing the idea of studying behaviors scientifically, move on to the next step.

Content Standard A: Behavior is one kind of response an organism can make to an internal or environmental stimulus.

Note to teachers: Studying animal behavior is useful on several levels. For example, many behaviors of nonhuman primates are similar to those of humans. Information derived from observing nonhuman primates can often be applied directly to humans. Some animals' behaviors are much simpler than human's, and these animals can be used to study behaviors that are too complex to understand in humans. For example, in one video that students will view, a rat in a special training environment learns to press a lever to receive food. It is much simpler for scientists to observe a rat in isolated and controlled circumstances than to study how people learn to perform tasks in their complex environments. Finally, humans are not good study subjects for many reasons. For example, humans cannot be kept in a controlled environment, and they reproduce and mature slowly. Also, some studies require treatments that would be unethical in humans. Many would argue that some treatments are unethical in animals as well. Others would cite the valuable knowledge gained from animal studies that benefit both humans and animals. In any case, try to steer students away from an ethics debate, which is beyond the scope of this material.

3. **Explain to students that they will be visiting a behavioral and social science research institute to begin their training as social and behavioral scientists. They will be using observation as their tool for the study they will do. Give each student a copy of Master 1.1, *Observation Guide Sheet*.**

4. **Have students go to the URL *http://science.education.nih.gov/supplements/healthy/student*. This is a main menu page from which student activities can be accessed. Click on "Activity 1—What Is Behavior?"**

   During this activity, students are introduced to the fields of behavioral and social science. They view three video clips (about 30 seconds each) that demonstrate behaviors in humans, nonhuman primates, and a laboratory rat. The students enter the Behavioral and Social Sciences Research Institute. Clicking on the name of one of the institute's faculty members takes the students to a brief description of that scientist's research. After reading the research description, students click on "Proceed to Video." Students then watch a short video in the Flash window.

   Tip from the field test: Make sure students read the research descriptions. These provide a context for the videos and exposure to ways of doing science other than in a laboratory with test tubes and flasks.

5. **After students watch the video, demonstrate the use of Master 1.1, *Observation Guide Sheet*, using your transparency.**

The guide includes a checklist for general categories of behavior as well as space for students to record their observations. In the video, a rat is seen exploring a Skinner box. Skinner boxes are named for a famous behavioral scientist, B.F. Skinner, and are used to study behaviors in a controlled environment. By examining complex behaviors in less-complex organisms, such as rats and pigeons, scientists can break down the components of behaviors to understand them better. Students will notice the rat exploring its new environment. To the left is a food dispenser, which the rat discovers. It then proceeds to eat the food. Every time the rat receives food, a green dot shows. In the next stage of the video, "Lever Press Required," the rat has been trained to press the lever in the left foreground. Every time it presses the lever, more food appears in the food dispenser, as indicated by the green dot. The rat presses the lever, looks for food in the dispenser, eats it, and returns to the lever to earn more food.

Tip from the field test: Using a computer linked to a classroom projector for the first video ensured more easily that the class understood what they were to do with the remaining two videos. This a good time to emphasize that students are only to observe behaviors, not analyze or interpret the reasons behind the behaviors.

6. **Ask students to view the other video clips and record their observations on their copy of Master 1.1, *Observation Guide Sheet*.**

In the *Adult Human Behavior* video, students learn about behaviors by listening to as well as observing the characters. Enhancing their audio "observation" skills is as important as enhancing their visual observation skills. Different students will probably record different observations from each video. For example, in the *Nonhuman Primate* video, some students may observe grooming, while others observe a parent-offspring interaction. There are no "wrong" behaviors to observe; however, students should refrain from interpreting their observations. Students should list as many behaviors as possible in each video clip to test their observational skills. In the *Adult Human Behavior* video, students will use visual and audio observation, and implied behaviors (that is, behaviors that people in the video say they are going to do, such as go for a run, take a walk, eat lunch, and smoke a cigarette) should also be recorded. Therefore, for example, when one man says he is going to smoke a cigarette, students should record *smoking* as a behavior.

Tip from the field test: Enforce a time limit (three to five minutes) for students to view and make careful observations about each video. This will allow both meaningful classroom discussion and completion of the lesson in one class period.

Note to teachers: A brief synopsis of each video is provided below.

Assessment:
This activity allows you to assess students' scientific reasoning skills.

Learning Behavior: (33 seconds) A rat is placed in a Skinner box, which is a tool designed to study learning behaviors, for the first time. The rat explores his surroundings by walking around, sniffing, and standing on his hind legs. He also finds the slot where food is delivered and eats the food. In the second half of the clip, the rat has been trained to push the lever on the side of the box to receive a food reward. After pushing the lever, the rat immediately looks for his food reward and eats it. He then repeats the behavior.

Nonhuman Primate Behavior: (32 seconds) In this clip, two young chimpanzees chase each other and wrestle. An adult, cuddling a baby, watches the two young chimps. Two other adults sitting next to the first adult are grooming one another. Although it is difficult to see, another adult plays with a young chimp swinging from a branch in the background.

Adult Human Behavior: (48 seconds) The clip opens with a man heating lunch in a microwave. There's a close-up shot of his noodles. As he leaves the room, he passes two women who are carrying their lunches. The two women stop to admire each other's lunches. One is a frozen meal, the other is a sandwich. Finally, two men stop by a cubicle where a woman is working at a computer. They tell her it's lunch time, and one man asks if either of them wants to go for a run with him. The other man says he does not like running; he's going to drive over to a restaurant to get some fried chicken. The woman declines, saying she is too busy to stop now, but may go for a walk later. A third man walks by and says he'd like to go for a run if the first man will wait while he smokes a cigarette.

7. **After students have made their observations, reconvene the class. Ask students to share their observations.**

   Use the transparency of the Master 1.1, *Observation Guide Sheet*, to record behaviors that were observed in each video clip.

8. **On the basis of the previous discussions, have students refine their definition of "behavior" if necessary.**

   Guide students to one general definition of behavior based on their observations.

   Note to teachers: Behavior is a very broad term that includes virtually everything any individual or group does, whether instinctual or learned. The goal here is for students to realize that behavior is a very broad, inclusive term, and is not limited to deliberately "good" or "bad" actions.

9. **Ask students what outcomes (or consequences) can result from the behaviors they observed. Are these outcomes good or bad?**

Student responses will vary. You may wish to begin with the *Nonhuman Primate Behavior* video. After surveying student observations, guide the class to the *Adult Human Behavior* video. Use observations from this video for the remainder of the lesson. If students do not suggest outcomes that relate to health, guide the discussion to include this idea. Some behaviors may have both positive and negative health outcomes. For example, a person might twist an ankle while running, but most of the time, they will be in better overall health because of the physical activity.

10. **Hand out Master 1.3, *Health Outcomes of Behaviors*. Ask students to identify which of the health-related outcomes (good and bad) are short-term (that is, the outcome will occur immediately or in the very near future)? Which of the health-related outcomes are long-term (that is, the outcome will occur sometime in the more distant future)?**

    Use an overhead of Master 1.3 to record student comments. Some behaviors may have both short-term and long-term consequences. For example, physical activity can improve cardiac (heart) health in the long term, but it may result in sore muscles or some injury in the short term. Some health consequences may be very subtle. In the *Adult Human Behavior* video, one person wants to smoke, which has an immediate physiological consequence of reaction to nicotine, which may feel good to the smoker but results in serious long-term outcomes. Poor diet, such as habitually eating high-fat-content fried foods, has long-term and short-term health effects. Poor diet can lead to lack of energy or susceptibility to diseases. Long-term problems occur with increasing weight and lack of essential nutrients. The table below offers some suggestions for prompting students.

Behavior	Poor Short-Term Health Outcome	Good Short-Term Health Outcome	Poor Long-Term Health Outcome	Good Long-Term Health Outcome
Smoking	Negligible	Feel good	Lung cancer, decreased lung capacity	None
Exercise	Injury	Have fun, feel good	Negligible	Improved overall health, more energy
Eating a Poor Diet	Lack of energy, increased risk of illness	Possible weight loss with low caloric intake	Overweight or under-weight, increased susceptibility to illness	None

Assessment:
Listening to student responses will allow you to determine how well students are now able to reason scientifically.

11. Ask students for their ideas about *why* the behaviors they observed in the videos occurred. For example, why would an adult go for a run at lunch time?

Students may suggest very specific reasons and outcomes. Separate these two concepts in lists on the board. Bring the students back to the two lists and guide them to general category descriptions that recognize reasons and outcomes as separate concepts. In Lesson 2, students will investigate why people behave in certain ways.

12. Ask students why it would be important to understand the reasons people behave the way they do.

Students may realize that in order to modify a behavior, understanding the reasons for the behavior is critical. Use this idea of the reasons behind behaviors to lead into Lesson 2, in which students explore factors that influence behavior.

For classes using the *print version* of this activity:

1. **The day before you begin this lesson, give each student a copy of Master 1.2, *Behavior Record*. Explain to students that they will begin their training as social and behavioral scientists. They will be using observation as their tool for this study.**

   Have students use the remainder of their day at school and their time at home that evening to fill in the chart. They should bring their completed chart to the next class session. Explain that they have some flexibility in the situations they observe, and that they do not need to make extensive observations. There is no right or wrong set of observations to make. Do not get into a discussion of what behavior is. If students ask for a definition of behavior, ask them to think about it as they make their observations of what people are doing in different situations.

2. **The following day, begin class by asking students, "What is behavior?"**

   Write key words from their definitions on the board and try to derive a consensus definition. Accept all responses. When you see that thinking is engaged, move on to the next step.

   Note to teachers: Asking this question requires students to call on their prior knowledge and to engage their thinking. At this point, do not critique student responses. Appropriate teacher comments are short and positive, such as "good" and "what else?" Other appropriate teacher responses include, "Why do you believe that?"

or "How do you know that?" Questions such as these allow you to assess current student knowledge about the subject and adjust lessons accordingly. They also provide a springboard to "Let's find out" or "Let's investigate." In general, it's time to move forward when you see that thinking has been engaged.

Content Standard A: Behavior is one kind of response an organism can make to an internal or environmental stimulus.

3. **Ask students**
   - **if they have ever heard of anyone who studies behavior in animals or people;**
   - **why scientists would study behavior; and**
   - **why studying animal behavior might be useful.**

Students may suggest specific people, such as Sigmund Freud or Jane Goodall. Alternatively, they may name professions, such as psychologists or psychiatrists. If necessary, give some examples (see *2.4 Careers in Behavioral and Social Sciences* in Information about the Science of Healthy Behaviors). Mention school counselors or popular media figures such as Dr. Phil.

Students may also need prompting on animal behavior studies. Suggest some familiar examples such as animal trainers (Siegfried and Roy) or highly trained working animals such as herding or guide dogs. Students may suggest that studying behavior is interesting, or that studying deviant behavior can help people understand and perhaps prevent it. Students may not realize the full value of animal models. They may understand that studying animals can be cheaper or more convenient. (See note below for more on animal models.) Keep this discussion brief. After introducing the idea of studying behaviors scientifically, move on to the next step.

Note to teachers: Studying animal behavior is useful on several levels. For example, many behaviors of nonhuman primates are similar to those of humans. Information derived from observing nonhuman primates can often be applied directly to humans. Some animals' behaviors are much simpler than human's, and these animals can be used to study behaviors that are too complex to understand in humans. For example, in one video that students will view, a rat in a special training environment learns to press a lever to receive food. It is much simpler for scientists to observe a rat in isolated and controlled circumstances than to study how people learn to perform tasks in their complex environments. Finally, humans are not good study subjects for many reasons. For example, humans cannot be kept in a controlled environment, and they reproduce and mature slowly. Also, some studies require treatments that would be unethical in humans. Many would argue that some treatments are unethical in animals as well. Others would cite the valuable knowledge gained from animal studies that benefit both humans and animals. In any case, try to steer students away from an ethics debate, which is beyond the scope of this material.

4. **Ask students to refer to their completed Master 1.2, *Behavior Record*. Ask them to share their observations for each of the situations listed.**

   Focus on behaviors observed by the students, rather than on time, location, or who was present. Use the transparency of the Master 1.2, *Behavior Record*, or write on the board to show what behaviors were observed in different situations.

5. **Ask students what basic needs these behaviors may have met.**

   Responses may indicate common and important needs, such as obtaining food and nourishment, finding shelter, communicating, social bonding, protecting oneself, and exercising or building strength and physical skills.

6. **On the basis of the previous discussion, have students refine their definition of "behavior," if necessary.**

   Guide students to one general definition using their observations.

   Note to teachers: Behavior is a very broad term that includes virtually everything any individual or group does, whether instinctual or learned. The goal here is for students to realize that behavior is a very broad, inclusive term, and is not limited to deliberately "good" or "bad" actions.

7. **Ask students what outcomes (or consequences) can result from the behaviors they observed. Are these outcomes good or bad?**

   Student responses will vary. For example, students may observe that friends help each other, or that someone cooking dinner was providing necessary food. If students do not suggest outcomes that relate to health, guide the discussion to include this idea. Some behaviors may have both positive and negative health outcomes. For example, a person might receive an injury playing sports, but they will enjoy playing with friends and be in better overall health because of the physical activity.

8. **Hand out Master 1.3, *Health Outcomes of Behaviors*. Ask students to identify which of the health-related outcomes (good and bad) are short-term (that is, the outcome will occur immediately or in the very near future). Which of the health-related outcomes are long-term (that is, the outcome will occur sometime in the more distant future)?**

   Guide students to recognize short-term and long-term health outcomes of different behaviors. Use an overhead of Master 1.3 to record student comments. Some behaviors may have both short-term and long-term consequences. For example, physical activity can

improve cardiac (heart) health in the long term, but it may result in sore muscles or some injury in the short term. Try to keep the discussion moving along the lines of likely health outcomes and not improbable ones. Guide students away from unlikely scenarios, such as walking home could lead to someone's twisting an ankle or being hit by a bus. Some health consequences may be very subtle. For example, students may not recognize the long-term health benefits of having a strong social network. The table below offers some suggestions for prompting students.

Behavior	Poor Short-Term Health Outcome	Good Short-Term Health Outcome	Poor Long-Term Health Outcome	Good Long-Term Health Outcome
Smoking	Negligible	Feel good	Lung cancer, decreased lung capacity	None
Exercise	Injury	Have fun, feel good	Negligible	Improved overall health, more energy
Eating a Poor Diet	Lack of energy, increased risk of illness	Possible weight loss with low caloric intake	Overweight or under-weight, increased susceptibility to illness	None

9. **Have students discuss their ideas about *why* the behaviors they observed occurred. For example, why would someone cook a meal? Why would friends talk to each other?**

   Students may suggest very specific reasons and outcomes. Separate these two concepts in lists on the board. Bring the students back to the two lists and guide them to general category descriptions that recognize reasons and outcomes as different concepts. In Lesson 2, students will investigate why people behave in certain ways.

10. **Ask students why it would be important to understand the reasons people behave they way they do.**

    Students may realize that in order to modify a behavior, understanding the reasons for the behavior is critical. Use this idea of the reasons the behavior occurs to lead into Lesson 2, in which students explore factors that influence behavior.

Lesson 1 Organizer: Web Version

What the Teacher Does	Procedure Reference
Divide the class into groups of two to four. Facilitate a class discussion. Focus on the following questions: • What is behavior? • Have you ever heard of anyone who studies behavior in animals or people? • Why would scientists study behavior? • Why might studying animal behavior be useful?	Pages 37–38 Steps 1 and 2
Explain to students that they will visit a behavioral and social science research institute to begin training as a social and behavioral scientist. Give each student one copy of Master 1.1, *Observation Guide Sheet*.	Page 38 Step 3 M
Have students log onto the Web site and click on "Activity 1—What Is Behavior?"	Page 38 Step 4 www
Instruct groups to click on the "Proceed to Video" link and watch the video. Demonstrate the use of Master 1.1, *Observation Guide Sheet*.	Pages 38–39 Step 5 T
Instruct groups to view the other videos and record their observations on Master 1.1.	Pages 39–40 Step 6
Reconvene the class. Have students share their observations. Ask students whether they refined their definition of behavior and, if so, how.	Page 40 Steps 7 and 8
Ask students, • "What outcomes (or consequences) can result from the observed behaviors?" • "Are these outcomes good or bad?"	Pages 40–41 Step 9
Give each student a copy of Master 1.3, *Health Outcomes of Behaviors*. • Display a transparency of Master 1.3. • Instruct students to identify which health-related outcomes are short-term and which are long-term.	Page 41 Step 10 M T
Ask students, • "Why did the observed behaviors occur?" • "Why might it be important to understand the reasons people behave as they do?"	Page 42 Steps 11 and 12

M = Involves copying a master. www = Involves using the Internet. T = Involves making a transparency.

Lesson 1 Organizer: Print Version

What the Teacher Does	Procedure Reference
Activity 1: *What Is Behavior? (Or, What Are You Doing?)*	
The day before beginning the lesson, give each student one copy of Master 1.2, *Behavior Record*. Explain to students that they will begin their training as social and behavioral scientists.	Page 42 Step 1 M
Begin the lesson by facilitating a class discussion. Focus on the following questions: • What is behavior? • Have you ever heard of anyone who studies behavior in animals or people? • Why would scientists study behavior? • Why might studying animal behavior be useful?	Pages 42–43 Steps 2 and 3
Display a transparency of Master 1.2, *Behavior Record*. Ask students to share their observations of each situation and write them on the transparency.	Page 44 Step 4 T
Ask students to identify the basic needs that each behavior may have met.	Page 44 Step 5
Ask students if they have refined their definition of behavior and, if so, how.	Page 44 Step 6
Ask students, • "What outcomes (or consequences) can result from the observed behaviors?" • "Are these outcomes good or bad?"	Page 44 Step 7
Give each student a copy of Master 1.3, *Health Outcomes of Behaviors*. • Display a transparency of Master 1.3. • Instruct students to identify which health-related outcomes are short-term and which are long-term.	Pages 44–45 Step 8 M T
Ask students, • "Why did the observed behaviors occur?" • "Why might it be important to understand the reasons people behave as they do?"	Page 45 Steps 9 and 10

M = Involves copying a master. T = Involves making a transparency.

Lesson 2
Explore
Explain

Influences on Behavior

At a Glance

Overview

This lesson consists of one activity and should take one class period to complete. It focuses on having students recognize the reasons underlying behaviors (that is, why people behave as they do) as well as the many factors influencing behaviors. Students begin by examining reasons for common behaviors and thinking about the influences that create these reasons. Students then create a diagram depicting these influences on behavior. Students also consider the extent to which an individual can modify his or her behavior based on the influences in his or her life.

Major Concepts

Individuals behave in certain ways for particular reasons. Reasons for behavior stem from various influences. These influences can be classified in general categories, such as biological, personal, social, or environmental. Individuals can modify the behaviors based on some influences more easily than they can modify the behaviors based on others.

Objectives

After completing this lesson, students will

- be able to describe the reasons for behaviors,
- recognize and be able to describe influences on behaviors, and
- be able to describe behaviors that can be modified more easily and those that can be modified either with more difficulty or not at all.

Teacher Background

See the following section in Information about the Science of Healthy Behaviors:

3 *Influences on Behavior* (pages 27–28)

In Advance

Web-Based Activities

Activity	Web component?
1	No

Photocopies

Activity	Master	Number of copies
1	Master 2.1, *Influences: Examples, by Category*	1 transparency
	Master 2.2, *Influences on Behavior*	1 transparency

Materials

Activity	Materials
1	Blank transparencies, 1 per group Pen to write on transparency, 1 per group

Preparation

Activity 1

For a class of 30 students, form 10 groups of 3 students each. Select five of the following behaviors and write each behavior on two slips of paper so that two groups will work on each behavior. For smaller classes, have two groups work on at least one behavior for comparison purposes. Adjust the number of behaviors according to class size. Suggested behaviors include social bullying, preening/grooming, playing a team sport, watching TV, skipping lunch, skipping school, participating in an individual sport, volunteering in the community, attending religious services, and recreational shopping. You will also need a box, bag, or other container from which students can draw the slips of paper.

Procedure

Activity 1: *Influences on Behavior (Or, Why Did You Do That?)*

Note to teachers: The concepts introduced in this activity will appear fairly obvious as they are introduced. However, it is important that students be aware of these ideas before moving on to Lessons 3 and 4. Influences on behavior and the ability of individuals to modify their behaviors play a major role in Lessons 3, 4, and 5. Keep this activity moving along quickly.

1. **Divide the class into groups of three or four.**

2. **Write "stealing" on the board. Ask students, "Why do people engage in this behavior?"**

List students' responses on the board, rephrasing if needed. Students may suggest need, desire, revenge, excitement, and peer pressure.

3. **Tell students that they have created a list of *reasons* for behaving in a certain way.**

   Note to teachers: This activity begins with students' identifying reasons, or motivations, for a behavior. However, the focus of the lesson is influences rather than motivations. Motivation is a concept used to describe the factors within an individual that produce, maintain, and channel behavior toward a goal. Another way to say this is that motivation is goal-directed behavior. While it is easy to observe a person's behavior, it is much more difficult to guess why they are behaving that way. As an example, consider a hard-working student. It may be that that student is working hard because he or she wants to get high marks, but it may also be that the student really enjoys learning that subject. The student may be striving for high marks because he or she wants to impress her friends or because of parental pressure. The marks themselves are really a step toward another goal. In this example, one can identify influences such as peer pressure and family, while it is not as easy to firmly identify motivations.

4. **Have each group select one behavior slip from the bag or box in which you have placed the slips.**

5. **Ask the students of each group to discuss the behavior they chose and then to record on paper what reasons a person might give for that behavior.**

   Give the students about five minutes to generate ideas. They are to list only reasons at this point. They will focus on factors influencing those reasons in Step 8.

6. **Keeping the students in groups, reconvene the class. Ask each group to name the reasons for the behavior they studied, and write those reasons on the board.**

   Groups will probably name similar reasons, especially if they are studying the same behavior.

7. **Show the transparency of Master 2.1, *Influences: Examples, by Category.* Tell the students that influences are the source of these reasons. In some cases, one influence is behind the reason, but in most cases, two or more influences generate reasons for a behavior.**

   Students may observe that some influences and reasons are indistinguishable, such as "need." It is sometimes difficult to separate reasons and influences.

NSES

Content Standard F: Important personal and social decisions are made based on perceptions of benefits and risks.

Note to teachers: The list of influences in Master 2.1 is not comprehensive. Also, the grouping of influences is open to interpretation. If certain groupings bother students, feel free to move the influences around. As the lesson continues, add influences that students suggest to the list.

8. **Pick one of the reasons suggested by students. Ask students what influences in a person's life may create this reason and the associated behavior. Write student responses on the board.**

   For example, if the reason was to "fit in," students may choose peers, popularity, TV, and movies as influences. If the reason was "to win," students may choose success, culture, and advertisements as influences. There are no right or wrong answers. As long as the influence makes sense to the students, it is valid. Remind students that they may add additional influences.

9. **Display the transparency of Master 2.2, *Influences on Behavior.* Explain the general structure of the diagram.**

   Keep the diagram visible as a reference during the next step. The diagram shows an individual and a specific behavior (stealing). The circles represent different categories of influence on that behavior. As examples, three influences are described. Blank circles are provided for you to add other influences, if you like.

   Note to teachers: There are several ways to represent the impact and relationship of influences and behaviors. In this activity, students use a simple method that allows them to look at a variety of influences without determining a particular order or hierarchy of influences or interactions between influences. The key at the bottom allows students to define the reasons more formally.

Assessment: At the end of the lesson, collect each group's diagram. The students' understanding of the concept of influences will be apparent in their lists of influences and reasons.

10. **Hand out transparencies and pens. Ask groups to construct a diagram for the behavior their group selected using the example in Master 2.2 as a guide. Students should choose the three or four influences they believe are most important. For each influence, students should list two or three reasons for the behavior, as in the example.**

    Give students 5 to 10 minutes to complete this step. While the groups are working on their diagrams, move around the room and check their work. Identify two groups working on the same behavior who have selected substantially different influences. Use these groups for the presentation that follows in the next step.

Content Standard A: Think critically and logically to make the relationships between evidence and explanations.

11. **Reconvene the class. Select two groups working on the same behavior and have both groups present their diagrams.**

12. **Ask students why there are differences between the two diagrams. Did looking at these two different diagrams give them new insight into the behavior?**

Avoid ranking the diagrams (for example, by which is better) or attempting to redesign them. Guide students to realize that the interpretation of data is influenced by personal experience. These two different interpretations may lead students to new understandings of the behavior.

Note to teachers: A key idea in science is that different people interpret data differently. This leads to novel insights and applications. Groups will identify different influences and reasons based on their experiences. This is perfectly acceptable and mirrors how scientific research is conducted.

13. **Using the two diagrams just presented, ask students which influences can be modified easily. Which can be modified, but with more difficulty? Which cannot be modified?**

In most cases, students will probably decide that there are aspects of many influences and the resulting behaviors that an individual can modify to various extents. For example, we cannot modify the genes we inherit from our parents. However, as students will see in later lessons, individuals can reduce some inherited risks (for example, heart disease) by modifying specific behaviors (such as increased physical activity). Students will probably recognize that children, adolescents, and teenagers can modify influences and their resulting behaviors to a lesser extent than adults can. Adults make decisions not only for themselves, but also for their dependents. For example, middle school students may not be able to participate in a group sport if their caretakers cannot provide transportation or pay fees. Another example is that children eat the foods adults choose to buy and feed them. During adolescence, children gain progressively more ability to modify influences and their behaviors. They gain responsibility for those behaviors as well.

14. **Ask students how they would find out what influenced a certain behavior in another person.**

Use one of the behaviors given to the students to work with, or the original stealing behavior. Students may suggest watching (observation) the person or questioning the person. When students suggest questioning the person, use this as a lead-in to the next activity.

Tip from the field test: The transparencies of Master 2.1, *Influences: Examples, by Category*, and Master 2.2, *Influences on Behavior*, will be useful in Lesson 5. Keep them available.

Lesson 2 Organizer

What the Teacher Does	Procedure Reference
Divide the class into groups of three or four students. • Write the word "stealing" on the board. • Ask students, "Why do people engage in this behavior?" and write their answers on the board.	Pages 50–51 Steps 1 and 2
Explain that students have created a list of *reasons* for the behavior.	Page 51 Step 3
Have each group draw one behavior slip from the container. Instruct the groups to discuss their behavior and write down reasons a person might give for engaging in that behavior.	Page 51 Steps 4 and 5
Reconvene the class. Ask each group to provide the reasons they identified with the behavior written on their slip of paper. Write the behaviors and their associated reasons on the board.	Page 51 Step 6
Display a transparency of Master 2.1, *Influences: Examples, by Category*. Explain that these influences underlie the reasons for behaviors.	Pages 51–52 Step 7 T
Select a reason suggested by a student. • Ask students what influences in a person's life might create the reason and its associated behavior. • Write students' responses on the board.	Page 52 Step 8
Display a transparency of Master 2.2, *Influences on Behavior*, and explain the structure of the diagram.	Page 52 Step 9 T
Reassemble student groups. Provide each group with a fresh transparency and a pen. • Using the example on Master 2.2 as a guide, instruct groups to construct a diagram for their group's behavior. • Students should choose the three or four influences that they feel are most important. • For each influence, students should list two or three reasons for the behavior.	Page 52 Step 10 T

Reconvene the class. Select two groups that worked on the same behavior and have each present their diagram. Ask students, • "Why are there differences between the two diagrams?" • "Does examining these diagrams give you new insight into the behavior?"	Pages 52–53 Steps 11 and 12
Ask students, • "Which influences can be modified easily?" • "Which influences can be modified with more difficulty?" • "Which influences cannot be modified?" • "How would you identify influences on a specific behavior in another person?"	Page 53 Steps 13 and 14

T = Involves making a transparency.

Tools of Social and Behavioral Science: The Survey

Lesson 3
Explore
Explain

At a Glance

Overview

This lesson consists of three activities and should take three class periods to complete. In the first activity, students are introduced to surveys and survey questions. They consider the concepts of sample size and representative samples. Students then participate in a survey of physical activity. In the second activity, students investigate how social and behavioral scientists can use a survey to study behavior. They compare data from their class's surveys, from surveys submitted by all classes using this curriculum, and from a national survey (the National Longitudinal Study of Adolescent Health, or Add Health study; see Reference 18) to further explore the concepts of sample size and representative sample. Finally, in the third activity, students use data from the Add Health study to design and answer research questions about relationships between influences on behavior and physical activity.

Major Concepts

Surveys are important tools for social and behavioral scientists. They can provide quantifiable information about behaviors and behavior trends and allow scientists to study the relationships among different influences and behaviors. Survey questions must be designed carefully so that they are very specific. Sample size and a representative sample are critical to generate useful data from a survey. Different influences can affect a person's physical activity levels.

Objectives

After completing this lesson, students will

- be aware that behavior is studied by behavioral and social scientists,
- be able to explain how surveys can be used to study behaviors,
- recognize that individuals or groups can be studied,
- be able to explain why sample size and an appropriate, representative sample are critical to generating useful data from a survey,
- be able to interpret data from a survey, and
- recognize that influences interact to affect behaviors through analysis and interpretation of survey data.

Teacher Background

See the following section in Information about the Science of Healthy Behaviors:
2.3 Behavioral and Social Science Tools (pages 25–26)

In Advance

Web-Based Activities

Activity	Web component?
1	No
2	Yes
3	Yes

Photocopies

Activity	Master	Number of copies
1 For Web and print versions	Master 3.1, *Survey* Permission Letter	1 copy per student and 1 transparency 1 copy per student if required by school district
2 For Web version	Master 3.2, *Comparison Guide*	1 copy per student and 1 transparency
2 For print version	Master 3.1, *Survey* Master 3.3, *Add Health Study Data* Master 3.4, *Class and Add Health Study Comparison*	1 transparency 1 copy per student team and 1 transparency 1 copy per student and 1 transparency
3 For Web version	Master 3.5, *Analysis Guide*	1 copy per student and 1 transparency
3 For print version	Master 3.5, *Analysis Guide* Master 3.6, *Influences on Physical Activity Behaviors*	1 copy per student and 1 transparency 1 copy per student team and 1 transparency

Materials

Activity	Materials
1	None
2	Colored pencils Calculators
3	Colored pencils Calculators

Preparation

Activity 1

If your school district requires parental consent for students to fill out surveys, please distribute and then collect signed copies of the Permission Letter master at the end of the supplement, after Master 5.2. Otherwise, no preparation is necessary.

Activity 2

If you are using the ***Web version*** of this activity, you must establish a unique class code for each class that will enter data into the Web database. To do this, go to the URL *http://science.education.nih.gov/supplements/healthy/student*. This is a menu page from which you can access the Teacher Administration page by clicking on "Lesson 3—Database Administration." The Database Administration page is for teachers only and allows you to register your classes and create a unique identifier for each class data set. Enter the user name **healthyadmin** and the password **admin**, and then click "Sign In" to enter this site and register your classes. Write down the class code(s) that appear on screen. The class code(s) will also be sent to you by e-mail. Verify that the computer lab is reserved for your classes for Activities 2 and 3 or that classroom computers are ready to use.

If you are using the ***print version*** of this activity, no other preparation is needed.

Activity 3

Same as for Activity 2.

Procedure

Activity 1: *Physical Activity Survey (Or, What Do You Do?)*

For classes using the *Web* or *print versions* of this activity:

NS ES

Content Standard A: Use appropriate tools and techniques to gather, analyze, and interpret data.

1. **Ask students to raise their hands if they have ever taken a survey. Then ask them to describe what a survey is.**

   Write responses on the board. Most students will have taken a survey or at least seen one. Guide students to discuss what surveys might ask about, who might administer them, and what the information might be used for.

2. **On the board, write the question, Do you play a sport? Ask only two or three students for a response to the question and write their responses on the board.**

Ask *only* two or three students in a class of about 30. Ask *only* one or two students in smaller classes. This question is purposely general and should elicit a variety of answers, including, "Yes," "No," "Sometimes," "Not now," "I used to," and "Basketball." Write each student's answer in a separate column.

3. **Tell the class that you want to study physical activity patterns in students. On the basis of this information, ask students to get a more specific answer by either revising the question or asking a new question.**

   Write the new questions on the board below the original question. Ask the same students who answered the original question these new questions. Write their answers on the board in the appropriate column, below their answer to the first question.

   Students may suggest asking additional questions such as, Do you play a team or individual sport?; Which sport do you play?; Do you participate in a physical activity that is not considered a sport?; or, How often do you play?

4. **Return to the questions on the board. Select the answers from one student. Ask the class,**
   - **"Do these answers from one person represent how all or most of the students in the class would respond?" (Does everyone agree with these answers?)**
   - **"How many people would need to answer the question to represent how all or most of the students in the class would respond?"**
   - **"Would the answers represent how all or most of the students in the school would answer the questions?"**
   - **"Would the answers represent how middle school students in other schools in the city, state, or country would answer the questions?"**
   - **"Would the answers represent how students in lower or higher grades would answer the questions?"**

   Students will probably realize that one person does not accurately reflect all students in the class, the school, the community, or in other grades. After a brief discussion of how many people it would take to provide an accurate representation, introduce the term *sample size*. Sample size is determined by two factors: the size of the population of interest, and how confident you need to be that your results are representative of that population. Sample size can be determined by mathematical formulas, which are beyond the scope of this curriculum. However, consider the following table that relates population size, confidence level, and sample size.

Sample Size Needed for	Population Size*					
	30	100	1,000	5,000	10,000	50,000
90 percent confidence	27 (90%)	73 (73%)	214 (21.0%)	258 (0.05%)	265 (0.03%)	271 (0.01%)
95 percent confidence	28 (93%)	79 (79%)	278 (28.0%)	357 (0.07%)	370 (0.04%)	381 (0.01%)
99 percent confidence	29 (97%)	87 (87%)	399 (40.0%)	586 (0.12%)	622 (0.06%)	655 (0.01%)

* Sample size as a percent of population size is in parentheses.

Data in this table demonstrate that the smaller the population, the larger the percentage of that population the sample size must be to be a representative sample. Make a transparency of this table if you believe it would help your students understand sample size.

Introduce the term *representative sample* when discussing which other groups may be represented accurately in a class survey. For example, students will probably recognize that first-graders would give very different answers from their own. Likewise, college students would give substantially different answers. Additionally, middle school students from different parts of the country, as well as from urban, rural, or suburban areas, would probably give different answers. Therefore, students need to be aware that a survey provides information about a specific population that may not be applicable to other groups. In other words, the group of people participating in the survey needs to be carefully defined to ensure that the survey is useful; then, a random sample within that population should be surveyed to avoid skewing the results.

5. **Give each student a copy of Master 3.1, *Survey*. (If your school district requires parental permission for students to fill out surveys, you should have collected the Permission Letters by now.) Tell the students that they will now participate in a survey of physical activity behaviors of middle school students.**

   Students will answer questions about various forms of physical activity as well as influences on physical activity. Then they compare their class data with a larger database of all classes using this curriculum and with data derived from the national Add Health study in Activity 2.

   Students should take the survey in a manner that respects and preserves their privacy. Their personal data remain anonymous in further activities. However, students should keep their surveys to make their own comparisons with data from other sources. As soon as students complete their surveys, they should either enter their data in the online database (for the *Web version* of this activity) or

tally their information for the class (*print version* of this activity). In either case, students should move on to Activity 2 as soon as they complete their surveys.

Note to teachers: The student survey is part of an extensive national study of adolescents. In this study, the National Longitudinal Study of Adolescent Health (or Add Health study), over 20,000 students in grades 7 through 12 answered a very long survey in school, followed by three in-home interviews over the next eight years. The information provided in this curriculum supplement uses responses from over 6,000 seventh-grade students. The Add Health study uses a very large sample size and draws from a nationally representative sample. Data from the Add Health study have been used by epidemiologists around the country to investigate various aspects of adolescent behavior and health.

Activity 2: *Analyzing the Physical Activity Survey Results (Or, Who Else Does That?)*

For classes using the *Web version* of this activity:

Note to teachers: You will need to examine your school's computer and Web resources to determine the most effective way to enter data into the database. Can an entire class get computer access and enter data simultaneously? Can small groups access a few computers while the remainder of the class is working on other tasks? One option is to have students fill out the survey on paper and then have one person enter the data. To protect students' privacy, remind students not to write their names on the survey.

It will save time to have the computers online and at the correct URL: ***http://science.education.nih.gov/supplements/healthy/student***. This is a main menu page from which you and students can access this activity. Students will need the class code you established for their class to access the Activity 2—Data Entry and Activity 2—Analyzing the Survey Results menu pages.

We recommend that the survey and the discussion of the use of the database be completed during class. Students can then generate reports during class or, if necessary, from home.

1. **Have students open their browser to *http://science.education.nih.gov/supplements/healthy/student* and click on the link "Activity 2—Data Entry." They should enter the unique class code you obtained for their class and then enter their survey data by clicking on the appropriate response for each of the 12 questions.**

You may want to demonstrate for students how this is done to ensure that data entry proceeds smoothly and quickly.

2. **When student data entry has been completed, divide the class into groups of two to four. Give each student a copy of Master 3.2, *Comparison Guide,* and ask students to click on the link to "Activity 2—Analyzing the Survey Results."**

3. **Explain that each group will compare their class's results with data from all classes entering survey data and with data from the Add Health study.**

   Each group of students will compare one question that has two possible answers (that is, *no or yes* questions) and one question that has four or five possible answers (that is, *how many times* questions). You may assign the questions or let students select them.

4. **Tell students they will be given the number of respondents to each answer for their class but will have to calculate the percentage of the total population that that number of respondents represents and graph the results themselves.**

   The number of respondents, percentages, and the graphs from the all-classes database and Add Health database are provided for students online. Results are presented in table and bar-graph formats. Students should copy their class's data onto their copy of Master 3.2, *Comparison Guide*, make the calculations for their class, and draw the corresponding bar graph. Students should then answer the questions on the master. Students can use colored pencils to draw the bars on their graph. Make sure students label the legend on their graph. Students should compare the data they get from all three data sources. They should also discuss the reasons for any difference or lack of difference in results among data sources. Allow approximately 15 minutes for completion of this step.

   Tip from the field test: Be prepared to review how to calculate percentages.

   Note to teachers: The data are provided to students in two forms. Tables generated for each question include both the actual number and the percentage of respondents who gave each answer. The all-classes database includes all classes that have taken the survey as part of *The Science of Healthy Behaviors* curriculum supplement and entered these data online. In the data from the Add Health study, the total number of respondents differs between questions. This is because respondents could choose not to answer questions or could

NSES

Content Standard A: Mathematics is important in all aspects of scientific inquiry.

select answers, such as "not applicable," that are not available to students using the survey in this curriculum supplement.

5. **Reconvene the class. Refer to Master 3.2, *Comparison Guide*, and ask students if they observed a difference between data from different sources for the same question. Between which data sources were the differences greatest? Why? Which data set do the students think is the most accurate (or most representative of middle school students)?**

   Students will probably observe differences among the data from the three sources. Remind students about the concept of sample size. This should affect their decision about which data set is the most accurate (or most representative of middle school students).

   Note to teachers: Initially, results from all classes entering survey data may be very similar to results from individual classes. Over time, however, results from all classes using this supplement will grow larger and more representative and should become similar to the results from the Add Health study.

6. **In some cases, similar percentages are observed for responses to the same questions on both data sets, although the numbers of respondents are very different. Why is this?**

   Students may observe similar percentages even though the numbers are very different. This indicates that the smaller samples are representative. Remind the students of the concepts of sample size and representative sample if they do not bring them up in the discussion.

Tip from the field test: Students are familiar with making scientific measurements in a laboratory. This is a good time to point out to students that human behavior also can be measured and studied scientifically.

For classrooms using the *print version* of this activity:

1. **Tally the class data from the individual student surveys.**

   Write the number of students responding to each answer of each question on a transparency of Master 3.1, *Survey*.

2. **Divide the class into groups of two to four. Give each group a copy of Master 3.3, *Add Health Study Data*, and each student a copy of Master 3.4, *Class and Add Health Study Comparison*.**

3. **Explain that each group will compare their class's results with data from the Add Health study.**

   Each group of students will compare one question that has two possible answers (that is, *no or yes* questions) and one question that has four or five possible answers (that is, *how many times* questions). You may assign the questions or let the students select them.

   Students should copy their class's data onto their copy of Master 3.4, *Class and Add Health Study Comparison*, and answer the questions about their class's data on the master. They will have to calculate the percentages for their class.

   Tip from the field test: Be prepared to review how to calculate percentages.

4. **Ask students to copy the Add Health data into the tables on Master 3.4. Then they will graph the percentages for each data set.**

   Students can use colored pencils to draw their bars on the graph. Make sure students label the legend on their graphs. On page 3 of Master 3.4, students should compare the data from the two data sources. They should also discuss the reasons for any difference in results between the two data sources. Allow approximately 15 minutes for students to complete Steps 3 and 4.

   Note to teachers: The data are provided to students in two forms. Tables indicate both the actual number and the percentage of respondents who gave a particular answer. In the results from the Add Health study, the total number of respondents differs between questions. This is because respondents could choose not to answer questions or could select answers, such as "not applicable," that are not available to students using the survey in this curriculum supplement.

5. **Reconvene the class. Refer to Master 3.4, *Class and Add Health Study Comparison*, and ask students if they observed a difference between the data sets from the two sources for the same question. Why? Which data set do the students think is more accurate (or more representative of middle school students)?**

   Students will probably recognize differences between the data from the two sources. Remind the students about the concept of sample

NSES

Content Standard A: Mathematics is important in all aspects of scientific inquiry.

size. This should affect their decision about which data set is more accurate (or more representative).

6. **In some cases, similar percentages may be observed for responses to the same questions on both data sets, although the numbers of respondents are very different. Why is this?**

   Students may observe similar percentages even though the numbers are very different. This indicates that the smaller samples are representative. Remind students of the concepts of sample size and representative sample if they do not bring them up in the discussion.

Activity 3: *Getting More out of Surveys*

For classrooms using the *Web version* of this activity:

1. **Divide the class into groups of three or four again, and have the groups proceed to the computers.**

   Remind students that the goals of the survey they took are to examine physical activity behaviors in middle school students and to evaluate some influences on those behaviors.

2. **Ask students if the summary data that they reviewed in Activity 2 is all the information they could get from the surveys.**

   Accept a couple of responses quickly. Students may believe that each question stands alone and the only information that can be obtained from the survey relates to data for each question individually.

3. **Ask students to suggest ways to get more information about physical activity behaviors and influences from the survey.**

   Accept all student responses. Do this quickly.

4. **Give students an example of how to get more information from the survey results. For example, scientists could ask, Do males play an active sport more times per week than females do?**

   A large number of questions can be asked. Students could compare males and females for each behavior. For example, Do males watch TV or play video games more than females do? Students can phrase a question that relates any of the behaviors to any of the influences besides male and female. For example, Do middle school students who have a physical fitness or recreational center in their neighborhood exercise more times per week than students

who don't? Asking questions such as these allows us to learn about relationships that exist between influences and behaviors.

5. **Have students proceed to the URL *http://science.education.nih.gov/supplements/healthy/student* and click on the link to Activity 3—Getting More out of Surveys.**

6. **Using the transparency of Master 3.5, *Analysis Guide*, lead students through the following example before they work on their own. Ask each group to select "*Active work around the house, such as cleaning, laundry, or yardwork*" from "Behaviors" and "*Male*" from "Influences."**

   On the transparency of Master 3.5, write *active work around the house* as the behavior being studied. Then write *gender* as the influence being studied. Doing a comparison of female versus male results requires that two reports be generated, one for males and one for females. Behaviors are from Questions 2 to 7 of the survey the students took. Influences are from Questions 1 and 8 to 12 of the survey.

7. **Have the students type in the research question, Do males or females do more active work around the house? Have students click the "Generate Report" button.**

   Write the research question on the transparency. Write the results in the table at the top of page 2 of Master 3.5.

8. **Tell students to click the "Back" button on the browser. They should select "*Active work around the house*" as the behavior and "*Female*" as the influence. (If the research question box is blank, they will have to reenter the question.) Finish by clicking the "Generate Report" button.**

   Enter the data that appear in the table at the bottom of Master 3.5, page 2. The following table shows the results for this research question:

Influence:	Behavior: active work around the house				
Gender	Not at all	1 or 2 times	3 or 4 times	5 or more times	
Male	5.1%	30.5%	31.7%	32.8%	
Female	2.9%	23.9%	30.5%	42.8%	

In this table, the rows add up to 100%, representing either 100% of the males who responded to this question or 100% of the females who responded. The columns indicate percentage of respondents in

these two groups who selected each of the frequencies for "During the past week, how many times did you do active work around the house, such as cleaning, laundry, or yardwork?" For example, 5.1% of males responding indicated that they did no work around the house during the past week. Overall, the results indicate that about 43% fewer females than males did no housework (5.1 – 2.9 = 2.2; 2.2/5.1 = 43%), while about 30% more females than males did housework 5 or more times during the past week (42.8 – 32.8 = 10; 10/32.8 = 30%).

9. **Ask students for responses to Question 1 on the second page of Master 3.5, *Analysis Guide*.**

   Students should recognize that gender (that is, male or female) does appear to influence the frequency with which middle school students do work around the house. However, the answer to the research question is not a simple, "Males [or females] do work around the house more times per week." The data show that more males than females either did no housework or did housework 1 or 2 times per week. An approximately equal number of males and females did housework 3 or 4 times per week. Additionally, about 30% more females than males did housework 5 or more times per week.

   Tip from the field test: You can discuss with students whether gender is the only influence involved in this example. For example, are there other external influences? Do parents ask female children to help with housework more than they ask male children to help? If they do, could this be the result of cultural influences? Do females expect to do more housework just because they are females? Are females' beliefs influenced not only by parents, other siblings, and culture but also by media (TV shows and literature that depict or describe female behaviors, for example)? What information would students need to answer these questions? This is a good time to discuss the nature of science and how science is done. Students should become aware that the results of one investigation raise questions for other investigations, and that science is an ongoing process.

   Students will answer Question 2 on page 2 of Master 3.5 when they complete their own analysis (Step 11).

10. **Give each student a copy of Master 3.5, *Analysis Guide*. Instruct students to do their own analysis. They should choose a behavior and an influence. They should then write the research question they are investigating and click "Generate Report."**

Remind students that some analyses require generating more than one report. Comparisons of female and male behaviors, as in the example you have just completed, require two separate reports, one with males selected as the influence and one with females selected. Additionally, three of the remaining influences can be grouped as family (parents let you decide about TV, played a sport with father, and played a sport with mother) and two as environment (recreation center in neighborhood and feeling safe in neighborhood). These influences can be studied individually, in which case only one report is required. Alternatively, they may be studied as a group, in which case multiple reports are required.

11. **Instruct students to write the results of their investigation on Master 3.5, *Analysis Guide*, and to answer the two questions on page 2 of the master.**

12. **If time allows, ask groups to present their research question to the class. They should explain which behavior and influence they were investigating and briefly explain their results.**

    Students may require guidance in interpreting their results.

13. **Ask students,**
    - **"Which influences seem to have an impact on behaviors?"**
    - **"Do you see any difference in the results for males compared with females?"**
    - **"Which influences can an individual modify?"**
    - **"Which can an individual not modify (or modify with difficulty)?"**

14. **Point out to students that social and behavioral scientists would use a survey in exactly the same way. They would develop research questions, collect and analyze data to answer them, draw conclusions, and decide on the next steps in the research plan or on how to apply the information.**

Content Standard B: Asking questions and querying other scientists' explanations is part of scientific inquiry.

Assessment: This analysis can be turned in at the end of the class and used as a formal assessment of student understanding.

For classes using the *print version* of this activity:

1. **Ask students if the summary data that they saw in Activity 2 is all the information they could get from the surveys.**

   Accept a couple of responses quickly. Students may believe that each question stands alone and the only information that can be obtained from the survey relates to data for each question individually.

2. **Ask students to suggest ways to get more information about physical activity behaviors and influences from the survey.**

   Accept all student responses. Do this quickly.

3. **Give students an example of how to get more information from the survey results. For example, scientists could ask, Do males play an active sport more times per week than females do?**

   A large number of questions can be asked. Students could compare males and females for each behavior. For example, Do males watch TV or play video games more than females do? Students can phrase a question that relates any of the behaviors to any of the influences besides male and female. For example, Do middle school students who have a physical fitness or recreational center in their neighborhood exercise more times per week than students who don't? Asking questions such as these allows us to learn about relationships that exist between influences and behaviors.

4. **Display a transparency of Master 3.6, *Influences on Physical Activity Behaviors*. Explain the data to students.**

   Master 3.6, *Influences on Physical Activity Behaviors*, provides data comparing males with females for the behaviors asked about on the survey. Several other examples relating an influence to a physical activity behavior are also provided.

5. **Using the transparency of Master 3.5, *Analysis Guide*, lead students through the following example before they work on their own. Select "*active work around the house*" from "Behavior" and "*Male*" (a gender influence).**

   On the transparency of Master 3.5, write *active work around the house* as the behavior being studied. Then write *gender* as the influence being studied. Doing a comparison of female versus male results requires that two reports be generated, one for males and one for females. Behaviors are from Questions 2 to 7 of the survey the students took. Influences are from Questions 1 and 8 to 12 of the survey.

6. **On the transparency, write the research question, Do males or females do more active work around the house?**

7. **Transfer the appropriate data for the selected behavior for both males and females to the table at the top of page 2 of Master 3.5.**

The following table shows the results for this research question:

Influence: Gender	Behavior: active work around the house				
	Not at all	1 or 2 times	3 or 4 times	5 or more times	
Male	5.1%	30.5%	31.7%	32.8%	
Female	2.9%	23.9%	30.5%	42.8%	

In this table, the rows add up to 100%, representing either 100% of the males who responded to this question or 100% of the females who responded. The columns indicate percentage of respondents in these two groups who selected each of the frequencies for "During the past week, how many times did you do active work around the house, such as cleaning, laundry, or yardwork?" For example, 5.1% of males responding indicated that they did no work around the house during the past week. Overall, the results indicate that about 43% fewer females than males did no housework, while about 30% more females than males did housework 5 or more times during the past week.

8. **Ask students for responses to Question 1 on the second page of Master 3.5, *Analysis Guide*.**

Students should see that gender (that is, male or female) does appear to influence the frequency with which middle school students do work around the house. However, the answer to the research question is not a simple, "Males [or females] do work around the house more times per week." The data show that more males than females either did no housework or did housework 1 or 2 times per week. An approximately equal number of males and females did housework 3 or 4 times per week. Additionally, about 30% more females than males did housework 5 or more times per week.

Tip from the field test: You can discuss with students whether gender is the only influence involved in this example. For example, are there other external influences? Do parents ask female children to help with housework more than they ask male children to help? If they do, could this be the result of cultural influences? Do females expect to do more housework just because they are females? Are females' beliefs influenced not only by parents, other siblings, and culture but also by media (TV shows and literature that depict or describe female behaviors, for example)? What information would students need to answer these questions? This is a good time to discuss the nature of science and how science is done. Students should become aware that the results of one investigation raise questions for other investigations, and that science is an ongoing process.

Content Standard B: Asking questions and querying other scientists' explanations is part of scientific inquiry.

Assessment: This analysis can be turned in at the end of the class and used as a formal assessment of student understanding.

Students will answer Question 2 on page 2 of the master when they complete their own analysis (Step 10).

9. **Give each student a copy of Master 3.5, *Analysis Guide*, and give each team a copy of Master 3.6, *Influences on Physical Activity Behaviors*.**

10. **Instruct students to do their own analysis. They should choose a behavior and an influence. They should then write the research question they are investigating and transfer the correct data from Master 3.6 to the table on Master 3.5.**

    Master 3.5, *Analysis Guide*, will provide students with prompts for their analysis. Remind students that some analyses require generating more than one report. Comparisons of female and male behaviors, as in the example you have just completed, require two separate reports, one with males selected as the influence and one with females selected.

11. **Ask students to briefly explain their results as they refer to their completed Master 3.5, *Analysis Guide*.**

    Students may require guidance in interpreting their results.

12. **Ask students,**
    - **"Which influences seem to have an impact on behaviors?"**
    - **"Do you see any difference in the results for males compared with females?"**
    - **"Which influences can an individual modify?"**
    - **"Which can an individual not modify (or modify with difficulty)?"**

13. **Point out to students that social and behavioral scientists would use a survey in exactly the same way. They would develop research questions, collect and analyze data to answer them, draw conclusions, and decide on the next steps in the research plan or on how to apply the information.**

Lesson 3 Organizer: Web Version

What the Teacher Does	Procedure Reference
Instruct students to raise their hands if they have ever participated in a survey. Ask students for their definition of a survey.	Page 59 Step 1
On the board, write the question, "Do you play a sport?" • Ask two or three students to respond. • Write their answers on the board.	Pages 59–60 Step 2
Explain that they will study physical activity patterns among students. • Ask students if they would revise the question on the board or ask a new one. • Write new questions and their answers on the board.	Page 60 Step 3
Select answers from a single student. Ask the class, • "Does everyone agree with these answers?" • "How many students must answer a question to represent how all (or most) students would respond?" • "Would the answers represent how all (or most) students in the school would respond?" • "Would the answers represent how middle school students at other schools in the city, state, or country would respond?" • "Would the answers represent how students in lower or higher grades would respond?"	Pages 60–61 Step 4
Give each student one copy of Master 3.1, *Survey*. Explain to students that they will participate in a survey of physical activity behaviors of middle school students.	Pages 61–62 Step 5
Have students log onto the Web site and click on "Lesson 3—Activity 2: Data Entry." • Students first enter their unique class code. • Students enter their responses to the 12 questions provided.	Pages 62–63 Step 1
After data entry, divide the class into groups of two to four students. • Give each student one copy of Master 3.2, *Comparison Guide*. • Instruct students to click on Lesson 3—Activity 2: "Analyzing the Survey Results."	Page 63 Step 2
Explain that each group will compare their class's responses for two questions with those from all classes in the database and with data from the Add Health study.	Page 63 Step 3

Instruct the groups to use the number of respondents in their class for each answer to calculate the percentage responses. Tell students to graph their results on Master 3.2, *Comparison Guide*.	Pages 63–64 Step 4
Reconvene the class. Ask students if they observed response differences between their class, all classes in the database, and participants of the Add Health study. Ask, • "Between which data sources did you see the greatest differences? Why?" • "Which data set is the most accurate?" • "Sometimes, small and large data sets show similar percentages for responses to the same question. Why?"	Page 64 Steps 5 and 6
Activity 3: *Getting More out of Surveys*	
Divide the class into groups of three or four students. • Ask students, "Do the summary data from the previous activity contain all the information that can be obtained from the survey?" • Suggest ways to get more information about physical activity behaviors and influences form the survey. • Give students an example of a question that can elicit more information from the survey data.	Pages 66–67 Steps 1–4
Have students log onto the Web site and click on "Lesson 3—Activity 3, *Getting More out of Surveys*."	Pages 65–66 Step 5
Display a transparency of Master 3.5 *Analysis Guide*, and lead students through a sample analysis. • From "Behavior," select "Active work around the house such as cleaning, laundry, or yardwork." • From "Influences," select "Male."	Page 67 Step 6
Instruct students to type in the research question, Do males or females do more active work around the house? • Have students click the "Generate Report" button. • Write the research question and the results on the transparency.	Page 67 Step 7
Instruct students to click on the "Back" button. • From "Behavior," have students select "Active work around the house such as cleaning laundry or yardwork." • From "Influences," have students select "Female." • If necessary, have students reenter the research question. • Have students click the "Generate Report" button.	Pages 67–68 Step 8
Ask students to answer the research question posed earlier and provide evidence for their responses.	Page 68 Step 9

Give each student one copy of Master 3.5, *Analysis Guide*. Instruct students to perform their own survey analysis. Groups should • Choose a behavior and an influence. • Write their research question. • Click the "Generate Report" button. • Record their results on Master 3.5 and answer the questions on the second page of the master.	Pages 68–69 Steps 10 and 11
If time permits, ask student volunteers to report their research questions and the results of their analyses.	Page 69 Step 12
Ask students, • "Which influences seem to have an impact on behaviors?" • "Do you see any difference in the results for males compared with females?" • "Which influences can an individual modify?" • "Which influences can an individual not modify (or modify with difficulty)?"	Page 69 Step 13
Explain that social and behavioral scientists use surveys in the same way. They develop research questions, collect and analyze data, draw conclusions, and decide how to continue their investigation.	Page 69 Step 14

M = Involves copying a master. T = Involves making a transparency. www = Involves using the Internet.

Lesson 3 Organizer: Print Version

What the Teacher Does	Procedure Reference
Activity 1: *Physical Activity Survey (Or, What Do You Do?)*	
Instruct students to raise their hands if they have ever participated in a survey. Ask students for their definition of a survey.	Page 59 Step 1
On the board, write the question, Do you play a sport? • Ask two or three students to respond. • Write their answers on the board.	Pages 59–60 Step 2
Explain that they will study physical activity patterns among students. • Ask students to revise the question on the board or ask a new one. • Write new questions and their answers on the board.	Page 60 Step 3
Select answers from a single student. Ask the class, • "Does everyone agree with these answers?" • "How many students must answer a question to represent how all (or most) students would respond?" • "Would the answers represent how all (or most) students in the school would respond?" • "Would the answers represent how middle school students at other schools in the city, state, or country would respond?" • "Would the answers represent how students in lower or higher grades would respond?"	Pages 60–61 Step 4
Give each student one copy of Master 3.1, *Survey*. Explain to students that they will participate in a survey of physical activity behaviors of middle school students.	Pages 61–62 Step 5 M
Activity 2: *Analyzing the Physical Activity Survey Results (Or, Who Else Does That?)*	
Display a transparency of Master 3.1, *Survey*. Tally the class data from the individual student surveys.	Page 64 Step 1 T
Divide the class into groups of two to four students. • Give each group one copy of Master 3.3, *Add Health Study Data.* • Give each student one copy of Master 3.4, *Class and Add Health Study Comparison*.	Page 65 Step 2 M
Explain that each group will compare their class's responses for two questions with those from all classes in the database and with data from the Add Health study.	Page 65 Step 3

Instruct the groups to copy the Add Health data into the tables on Master 3.4, *Class and Add Health Study Comparison*. • Students should graph the percentages on Master 3.4.	Page 65 Step 4
Reconvene the class. Ask students if they observed response differences between their class and participants of the Add Health study, and if so, why? Ask, • "Which data set is the most accurate?" • "Sometimes, small and large data sets show similar percentages for responses to the same question. Why?"	Pages 65–66 Steps 5 and 6
Activity 3: *Getting More out of Surveys*	
Ask students, "Do the summary data from the previous activity contain all the information that can be obtained from the survey?" Suggest ways to get more information about physical activity behaviors and influences form the survey. Provide students with an example of a question that can elicit more information from the survey data.	Pages 69–70 Steps 1–3
Display a transparency of Master 3.6, *Influences on Physical Activity*. Explain the data to students.	Page 70 Step 4 T
Display a transparency of Master 3.5, *Analysis Guide*, and lead students through a sample analysis. • From "Behavior" on Master 2.6, select "active work around the house such as cleaning, laundry, or yardwork." • Select "Male" as the influence. • On the transparency, write the research question, Do males or females do more active work around the house?	Page 70 Steps 5 and 6 T
Transfer the appropriate data for males and females to the transparency of Master 3.5, *Analysis Guide*.	Pages 70–71 Step 7
Ask students to answer the research question posed earlier and provide evidence for their responses.	Pages 71–72 Step 8
Give each student one copy of Master 3.5, *Analysis Guide*, and give each group one copy of Master 3.6, *Influences on Physical Activity Behaviors*.	Page 72 Step 9 M
Instruct students to perform their own survey analysis. Groups should • Choose a behavior and an influence. • Write their research question • Transfer the appropriate data from Master 3.6 to the table on Master 3.5.	Page 72 Step 10
If time permits, ask student volunteers to report their research questions and the results of their analyses.	Page 72 Step 11

Ask students, • "Which influences seem to have an impact on behaviors?" • "Do you see any difference in the results for males compared with females?" • "Which influences can an individual modify?" • "Which influences can an individual not modify (or modify with difficulty)?"	Page 72 Step 12
Explain that social and behavioral scientists use surveys in the same way. They develop research questions, collect and analyze data, draw conclusions, and decide how to continue their investigation.	Page 72 Step 13

M = Involves copying a master. T = Involves making a transparency.

Behavioral Specialists at Work: The Healthcare Setting

Lesson 4
Elaborate

At a Glance

Overview

This lesson consists of two activities and should take two class periods to complete. Students role-play behavioral clinicians in a hospital scenario to investigate factors that may have influenced the health of a fictitious person, Joe M., who has been admitted to the hospital for heart disease. In Activity 1, student teams analyze and evaluate various data for Joe, including his behavioral history and his own and his family's medical histories. In Activity 2, students develop recommendations for changes in specific behaviors that should decrease Joe's risk of continued health problems. These activities allow students to combine their understandings of what behavior is and how behavior is studied from Lessons 1 and 3 and their understanding of influences on behavior from Lessons 2 and 3. Students develop an awareness that behaviors can have long-term, health-related outcomes and that behaviors can be modified. This lesson can be done on the Web or with printed materials.

Major Concepts

Health is influenced by factors that we may not be able to modify (such as genetics) and by factors that we may be able to modify by changing behaviors (such as being physically inactive). Behaviors have both positive and negative effects on health. Behaviors can have both short-term and long-term effects on health. Behaviors can be modified to affect health positively.

Objectives

After completing this activity, students will

- recognize that health is influenced by various factors, some of which relate to behavior;
- explain how modifying behaviors can change factors that affect human health;
- recognize the relationship between behavior and health, including positive and negative outcomes, and long-term and short-term outcomes, or effects; and
- identify ways in which behaviors can be changed to improve health outcomes.

Background Information

See the following sections in Information about the Science of Healthy Behaviors:

3 *Influences on Behavior* (pages 27–28)

4 *Behavioral and Social Science Research and Cardiovascular Disease* (pages 28–32)

In Advance

Web-Based Activities

Activity	Web component?
1	Yes
2	Yes

Photocopies

Activity	Master	Number of copies
1 For Web version	Master 4.1, *The First Memo*	1 copy per team or 1 transparency
	Master 4.2, *Behavioral Sciences Evaluation Form, Page 1*	1 copy per student
1 For print version	Master 4.1, *The First Memo*	1 copy per student or 1 transparency
	Master 4.2, *Behavioral Sciences Evaluation Form, Page 1*	1 copy per student
	Master 4.3, *Patient Notes*	1 copy per team
	Master 4.4, *Reference Manual*	1 copy per team
2 For Web version	Master 4.2, *Behavioral Sciences Evaluation Form, Page 2*	1 copy per student
	Master 4.5, *The Second Memo*	1 copy per team or 1 transparency
	Master 4.6, *Prescription Pad*	1 transparency
2 For print version	Master 4.2, *Behavioral Sciences Evaluation Form, Page 2*	1 copy per student
	Master 4.5, *The Second Memo*	1 copy per team or 1 transparency
	Master 4.6, *Prescription Pad*	1 transparency
	Master 4.7, *Joe M.'s Environment*	1 copy per team

Materials

Activity	Materials
1 (print and Web versions)	None
2 (print and Web versions)	None

Preparation

Activity 1

For classrooms using the ***Web version*** of this activity, you will need computers with an Internet connection. Verify that the computer lab is reserved for your classes or that classroom computers are ready to use. To save time, have computers online and at the correct URL: *http://science.education.nih.gov/supplements/healthy/student*. This is a main menu page that contains links to this unit's Web activities.

For classrooms using the ***print version*** of this activity, you will need to create enough "patient files" so that each student team has both a copy of Master 4.3, *Patient Notes*, and a copy of Master 4.4, *Reference Manual*. You can place each team's materials in a manila folder.

Activity 2

Students using the ***Web version*** of this activity will continue to work on the computer for a portion of the class.

For classrooms using the ***print version*** of this activity, no additional preparations are required.

Activity 1: *What's the Problem?*

Procedure

In classrooms using the *Web version* of this activity:

1. **Tell students that their preliminary training as behavioral scientists is complete. Ask them to tell you the key concepts of their work from Lessons 1, 2, and 3.**

   Write student responses on the board. The list should include the following:
   - a definition of *behavior*,
   - scientists have tools they can use when they study behavior,
   - some behavior has health-related outcomes, and
   - various factors influence behavior.

   This review should be done quickly.

Assessment: Step 1 will stimulate thinking about the topic and give you an opportunity to assess informally students' understanding of key concepts from Lessons 1, 2, and 3.

NSES

Content Standard F: Individuals can use a systematic approach to thinking critically about risks and benefits.

2. **Tell the class that they are ready to put their training to the test. In a clinical (that is, health-related) setting, they will use the knowledge gained by behavioral and social scientists to investigate behaviors that may have influenced the health of a person who has been admitted to the hospital for heart problems.**

3. **Organize students into teams of three or four and distribute one copy of Master 4.1, *The First Memo*, to each team. Tell students to read the memo. Alternatively, show the transparency of the memo and read it with the class.**

   The memo sets up the scenario. Student teams play behavioral-health-team members at a hospital. The students' task is to evaluate the behaviors of a fictitious patient and determine which behaviors may have been factors in the patient's heart disease. In Activity 2, students will make recommendations to the hospital's behavioral sciences review board for changes in specific behaviors that should decrease the patient's risk of continued health problems.

4. **Explain to students that their first task is to identify factors that may have contributed to the patient's heart disease.**

   They will have access to a reference manual (see Step 6) and a patient file (see Step 8).

5. **Direct the teams to their computer stations and ask them to wait for instructions.**

   Computers should be at the URL *http://science.education.nih.gov/supplements/healthy/student*. This is a main menu page that contains a link for this activity.

6. **Students should then click on the link to Lesson 4—The Healthcare Setting, "Activity 1—What's the Problem?"**

   Students view a short animation, in which they enter County Hospital and are given a file labeled "Joe M." As the animation sequence ends, students see the reference manual's Table of Contents overlaying the information contained within Joe M.'s file.

7. **Before students begin their work, point out the topics covered in the manual. Emphasize that the manual contains valuable information that students need to complete their tasks.**

   The reference manual contains the information students need to complete this activity. It provides a definition of heart disease and brief discussions of the risk factors for heart disease that are relevant to this lesson.

Tip from the field test: Reviewing the reference manual with students at this time is important; otherwise, they may not consult it and will have difficulty completing the activity satisfactorily.

8. **Ask students to close the reference manual for now (they may open it again at any time as they review the information in Joe's file). Point out the information students must review to complete their tasks.**

   Information accessed on this page sets the stage for the students' work. Students see links to the following:
   - patient information, including a statement of the patient's health problem,
   - medical history,
   - family medical history, and
   - behavioral history.

9. **Ask students to click on the link to "Patient Information."**

   Information on the Patient Information page introduces students to Joe M.

10. **Give each student one copy of Master 4.2, *Behavioral Sciences Evaluation Form, Page 1*, and tell students to proceed with their evaluation.**

    Student teams should begin by determining which factors may have contributed to the patient's heart disease. They can do this by evaluating the information on the Medical History, Family Medical History, and Behavioral History pages. Students can view this information in any order they want. Allow students 20 to 30 minutes to complete this part of the activity. Students should consult the reference manual for help with their evaluation. For example, if they read in the patient's chart that he is overweight, they may check the manual to see whether being overweight is a risk factor for heart disease. Students will make recommendations for behavioral changes in Activity 2.

    Students can identify the following risk factors as those the patient may not be able to modify:
    - family history of heart disease (genetics) and
    - the high blood cholesterol if it is due to genetics and not the patient's diet.

    Students can identify the following risk factors as those the patient may be able to modify by changing behaviors:
    - smoking,

NSES

Content Standard F: Regular exercise is important to the maintenance and improvement of health.

- physical activity,
- nutrition,
- weight control, and
- stress.

Note that while an individual cannot modify the genes they inherit from their parents, one can modify an inherited health risk, such as heart disease, by modifying behaviors. This should become clear as students consider a behavioral modification program for Joe M.

Assessment: Collect and review Master 4.2, *Behavioral Sciences Evaluation Form, Page 1*, from each student. Students will need the information on Master 4.2, *Page 1*, to complete Activity 2.

In classrooms using the *print version* of this activity:

1. **Tell students that their preliminary training as behavioral scientists is complete. Ask them to tell you the key concepts of their work from Lessons 1, 2, and 3.**

   Write student responses on the board. The list should include the following:
   - a definition of *behavior*,
   - scientists have tools they can use when they study behavior,
   - some behavior has health-related outcomes, and
   - various factors influence behavior.

   This review should be done quickly.

Assessment: Step 1 will stimulate thinking about the topic and give you an opportunity to assess informally students' understanding of key concepts from Lessons 1, 2, and 3.

2. **Tell the class that they are ready to put their training to the test. In a clinical (that is, health-related) setting, they will apply the knowledge gained by behavioral and social scientists to investigate behaviors that may have influenced the health of a person who has been admitted to the hospital for heart problems.**

3. **Organize students into teams of three or four and distribute one copy of Master 4.1, *The First Memo*, to each team. Tell students to read the memo. Alternatively, show the transparency of the memo and read it with the class.**

   The memo sets up the scenario. Student teams play behavioral-health-team members at a hospital. The students' task is to evaluate the behaviors of a fictitious patient and determine which behaviors may have been factors in the patient's heart disease. In Activity 2, students will make recommendations for changes in specific behaviors that should decrease the patient's risk of continued health problems.

Content Standard F: Individuals can use a systematic approach to thinking critically about risks and benefits.

4. **Give each team a "patient file" containing one copy of Master 4.3, *Patient Notes*, and one copy of Master 4.4, *Reference Manual*.**

5. **Explain to students that their first task is to identify factors that may have contributed to the patient's heart disease.**

Students have the following information available to them:

- a patient file that contains
  - patient information, including a statement of the patient's health problem,
  - medical history,
  - family medical history, and
  - behavioral history, and
- a reference manual.

6. **Ask students to look at their copy of the reference manual. Point out the topics covered in the manual. Emphasize that the manual contains valuable information students need to complete their tasks.**

   The reference manual contains the information students need to complete this activity. It provides a definition of heart disease and brief discussions of the risk factors for heart disease that are relevant to this lesson.

Tip from the field test: Reviewing the reference manual with students at this time is important; otherwise, they may not consult it and will have difficulty completing the activity satisfactorily.

7. **Ask students to read the information provided on the Patient Information form.**

   Information on the Patient Information form introduces students to Joe M.

Content Standard F: Regular exercise is important to the maintenance and improvement of health.

8. **Give each student one copy of Master 4.2, *Behavioral Sciences Evaluation Form, Page 1*, and tell students to proceed with their evaluation.**

   Student teams should begin by determining which factors may have contributed to the patient's heart disease. They can do this by evaluating the information on the Medical History, Family Medical History, and Behavioral History forms. Students can view this information in any order they want. Allow students 20 to 30 minutes to complete this part of the activity. Students should consult the reference manual for help with their evaluation. For example, if they read in the patient's chart that he is overweight, they may check the manual to see whether being overweight is a risk factor for heart disease. Students will make recommendations for behavioral changes in Activity 2.

   Students can identify the following risk factors as those the patient may not be able to modify:

   - family history of heart disease (genetics) and
   - the high blood cholesterol if it is due to genetics and not the patient's diet.

Assessment: Collect and review Master 4.2, *Behavioral Sciences Evaluation Form, Page 1*, from each student. Students will need the information on Master 4.2, *Page 1*, to complete Activity 2.

Students can identify the following risk factors as those which the patient may be able to modify by changing behaviors:

- smoking,
- physical activity,
- nutrition,
- weight control, and
- stress.

Note that while an individual cannot modify the genes they inherit from their parents, one can modify an inherited health risk, such as heart disease, by modifying behaviors. This should become clear as students consider a behavioral modification program for Joe M.

Activity 2: *Changing Behaviors*

Note to teachers: This activity presents a simplified view of how professionals would design a behavioral intervention for a patient. For example, professionals would work with a patient directly to design and implement a plan with the greatest chance of success, rather than simply designing an intervention for a patient as students do here.

In classrooms using the *Web version* of this activity:

1. **Reconvene the class while students are at their computer stations. Ask students to share with the class some risk factors for heart disease that they believe the patient cannot modify.**

   Write responses on the board.

   Note to teachers: Steps 1 to 3 should be done quickly, even though there are opportunities for longer discussions.

2. **Ask students to share with the class some risk factors for heart disease that they believe the patient can modify.**

   Write responses on the board.

3. **Ask students if they believe it is possible for people to change their behaviors.**

   Students may respond with more than yes or no. They may qualify answers and respond, for example, that people can change their behaviors, but it is not easy to do. Listen to what students have to say and make notes on the board, if necessary. In Lesson 5, students will deal with the results of Joe M.'s attempts to modify his behaviors.

4. **Give one copy of Master 4.5, *The Second Memo*, to each team. Tell students to read the memo. Alternatively, show a transparency of the memo and read it with the class.**

   The memo asks the students to prepare a behavioral intervention, or a plan outlining behavioral changes, for Joe M. to help decrease his risk for continued heart disease.

5. **Have students proceed to the URL *http://science.education.nih.gov/supplements/healthy/student* and click on the link to Lesson 4—The Healthcare Setting, Activity 2—*Changing Behaviors*.**

   Clicking on this link brings up information about Joe M.'s environment. For example, there are maps detailing the locations of Joe's house, Joe's office, restaurants, and places where Joe can exercise and catch the bus (see "Overhead View" map). The general environment around Joe's house is depicted. Bus schedules and local restaurant menus are available by clicking on the appropriate links.

6. **Give each student a copy of Master 4.2, *Behavioral Sciences Evaluation Form, Page* 2. Assign students the following tasks:**
   - **review the behavioral risk factors for heart disease that Joe M. may be able to modify;**
   - **decide how Joe M. should change specific behaviors in general (that is, do more or less of something);**
   - **consult the information on the Web about Joe M.'s environment; and**
   - **on the prescription form (Master 4.2, page 2), make specific recommendations for behavioral changes to lower Joe's risk of further complications from heart disease.**

   Move among groups as students complete this activity and ensure that recommendations are specific. For example, recommending that Joe stop smoking is specific. However, recommending that Joe increase his physical activity is not specific. Information is provided for students to evaluate a number of very specific ways for Joe to increase his physical activity, including walking to work, taking the bus to work (this would involve walking to and from bus stops), and taking the stairs to his office instead of the elevator. Many other recommendations can be made as well from the information provided. If necessary, students can consult the information in Joe's patient file.

   Note to teachers: Students may be unsure of what to do with the information provided in the restaurant menus, since it is beyond the scope of this unit to provide detailed information about human nutrition and the nutritional content of foods. However, it is sufficient at this time that students recognize that some diets are

NSES

Content Standard C:
Disease is a breakdown in structures or functions of an organism.

Assessment:
Collect each student's completed copy of Master 4.2 to formally assess understanding of the major concepts of this lesson.

more healthful than others. For example, if students indicate that Joe should eat at Souvlaki Shack rather than Quick Burger, ask them, "Why?" If students respond that the food at Souvlaki Shack is better for Joe than eating a cheeseburger, accept that response as an indication that students are thinking about differences among foods and relationships between diet and health.

7. **Reconvene the class. Ask groups to share their recommendations for changes to Joe's behavior. Write responses on the transparency of Master 4.6, *Prescription Pad*.**

   Encourage discussion and have students question the recommendations of their classmates. Ensure that students provide reasons to back up their recommendations.

In classrooms using the *print version* of this activity:

1. **Reconvene the class. Ask students to share with the class some risk factors for heart disease that they believe the patient cannot modify.**

   Write responses on the board.

   Note to teachers: Steps 1–3 should be done quickly, even though there are opportunities for longer discussions.

2. **Ask students to share with the class some risk factors for heart disease that they believe the patient can modify.**

   Write responses on the board.

3. **Ask students if they believe it is possible for people to change their behaviors.**

   Students may respond with more than yes or no. They may qualify answers and respond, for example, that people can change their behaviors, but it is not easy to do. Listen to what students have to say and make notes on the board, if necessary. In Lesson 5, students will deal with the results of Joe M.'s attempts to modify his behavior.

4. **Give one copy of Master 4.5, *The Second Memo*, to each team. Tell students to read the memo. Alternatively, show a transparency of the memo and read it with the class.**

   The memo asks the students to prepare a behavioral intervention, or a plan outlining behavioral changes, for Joe M. to help decrease his risk for continued heart disease.

5. **Give each student one copy of Master 4.2, *Behavioral Sciences Evaluation Form, Page 2*. Give one copy of Master 4.7, *Joe M.'s Environment*, to each group. Assign students the following tasks:**
   - **review the behavioral risk factors for heart disease that Joe M. may be able to modify;**
   - **decide how Joe M. should change specific behaviors in general (that is, do more or less of something);**
   - **consult the information on Master 4.7 about Joe M.'s environment; and**
   - **on the prescription form (page 2 of Master 4.2), make specific recommendations for behavioral changes to lower Joe's risk of further complications from heart disease.**

   Move among groups as students complete this activity and ensure that recommendations are specific. For example, recommending that Joe stop smoking is specific. However, recommending that Joe increase his physical activity is not specific. Information is provided for students to evaluate a number of very specific ways for Joe to increase his physical activity, including walking to work, taking the bus to work (this would involve walking to and from bus stops), and taking the stairs to his office instead of the elevator. Many other recommendations can be made as well from the information provided. If necessary, students can consult the information in Joe's patient file.

6. **Reconvene the class. Ask groups to share their recommendations for changes to Joe's behavior. Write responses on the transparency of Master 4.6, *Prescription Pad*.**

   Encourage discussion and have students question the recommendations of their classmates. Ensure that students provide reasons to back up their recommendations.

Assessment:
Collect each student's completed copy of Master 4.2 to formally assess understanding of the major concepts of this lesson.

NS ES

Content Standard C:
Disease is a breakdown in structures or functions of an organism.

Lesson 4 Organizer: Web Version

What the Teacher Does	Procedure Reference
Ask students to reflect on their preliminary training as behavioral scientists and explain to you what they have learned during the previous lessons.	Page 81 Step 1
Explain to students that they will use their training to investigate behaviors of an individual who has been admitted to the hospital with heart problems.	Page 82 Step 2
Divide the class into groups of three or four students. • Give each group one copy of Master 4.1, *The First Memo*. • Display a transparency of Master 4.1, *The First Memo*, and ask a volunteer to read it aloud. • Instruct students to identify factors that may have contributed to the patient's heart disease.	Page 82 Steps 3 and 4 M T
Have students log on to the Web site and click on the link to Lesson 4—Healthcare Setting, Activity 1—What's the Problem?	Page 82 Steps 5 and 6
Acquaint students with the reference manual and explain how it will help them accomplish their task.	Pages 82–83 Step 7
Acquaint students with the following activity links: • Patient Information • Medical History • Family Medical History • Behavioral History	Page 83 Step 8
Instruct students to click on the Patient Information button.	Page 83 Step 9
Give each student one copy of Master 4.2, *Behavioral Sciences Evaluation Form, Page 1*. • Instruct students to proceed with their evaluation.	Pages 83–84 Step 10 M
Reconvene the class in groups of three or four students. Ask students to suggest risk factors for heart disease that a patient cannot modify. • Write their suggestions on the board.	Page 86 Step 1
Ask students to suggest risk factors for heart disease that a patient can modify. • Write their suggestions on the board.	Page 86 Step 2
Ask students if they believe that people can change their behaviors.	Page 86 Step 3

Give each group one copy of Master 4.5, *Second Memo*. Display a transparency of the master and ask a student to read it aloud.	Page 87 Step 4
Have students log on to the Web site and click on the link to Lesson 4—Healthcare Setting, "Activity 2—Changing Behaviors."	Page 87 Step 5
Give each student one copy of Master 4.2, *Behavioral Sciences Evaluation Form, Page 2*. Instruct groups to • review the modifiable risk factors for heart disease, • decide how Joe M. should change specific behaviors, • consult the information about Joe's environment, and • record on page 2 of Master 4.2 specific behavioral recommendations aimed at lowering Joe's risk for heart disease.	Pages 87–88 Step 6
Reconvene the class. Ask groups to share their recommendations. Write the responses on a transparency of Master 4.6, *Prescription Pad*.	Page 88 Step 7

= Involves copying a master. = Involves making a transparency. = Involves using the Internet.

Lesson 4 Organizer: Print Version

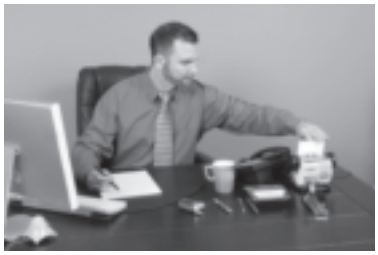
What the Teacher Does	Procedure Reference
Activity 1: *What's the Problem?*	
Ask students to reflect on their preliminary training as behavioral scientists and explain to you what they have learned during the previous lessons.	Page 84 Step 1
Explain to students that they will use their training to investigate behaviors of an individual who has been admitted into the hospital with heart problems.	Page 84 Step 2
Divide the class into groups of three or four students. • Give each group one copy of Master 4.1, *The First Memo*. • Display a transparency of Master 4.1, *The First Memo*, and ask a volunteer to read it aloud.	Page 84 Step 3 M T
Give each group one copy of Master 4.3, *Patient Notes*, and one copy of Master 4.4, *Reference Manual*.	Page 84 Step 4 M
Instruct students to identify factors that may have contributed to the patient's heart disease. • Acquaint students with the reference manual and explain how it will help them accomplish their task.	Pages 84–85 Steps 5 and 6
Ask students to read the General Patient Information found on Master 4.3, *Patient Notes*.	Page 85 Step 7
Give each student one copy of Master 4.2, *Behavioral Sciences Evaluation Form, Page 1*. • Instruct students to proceed with their evaluation.	Pages 85–86 Step 8 M
Activity 2: *Changing Behaviors*	
Reconvene the class in groups of three or four students. Ask students to suggest risk factors for heart disease that a patient cannot modify. • Write their suggestions on the board.	Page 88 Step 1
Ask students to suggest risk factors for heart disease that a patient can modify. • Write their suggestions on the board.	Page 88 Step 2
Ask students if they believe that people can change their behaviors.	Page 88 Step 3
Give each group one copy of Master 4.5, *Second Memo*. Display a transparency of the master and ask a student to read it aloud.	Page 88 Step 4 M T

Give each student one copy of Master 4.2, *Behavioral Sciences Evaluation Form, Page 2*. Give each group one copy of Master 4.7, *Joe's Environment*. Instruct groups to • review the modifiable risk factors for heart disease, • decide how Joe M. should change specific behaviors, • consult the information about Joe's environment, and • record on page 2 of Master 4.2 specific behavioral recommendations aimed at lowering Joe's risk for heart disease.	Page 89 Step 5 M
Reconvene the class. Ask groups to share their recommendations. Write the responses on a transparency of Master 4.6, *Prescription Pad*.	Page 89 Step 6 T

M = Involves copying a master. T = Involves making a transparency.

Lesson 5
Evaluate

Behavioral Specialists in the Healthcare Setting . . . Again



At a Glance

Overview

This lesson consists of one activity and should take one classroom period to complete. It provides an opportunity for students to pull information together and demonstrate an understanding of basic concepts investigated in earlier lessons. Students continue to role-play behavioral specialists in a hospital scenario. After learning that Joe M., the fictitious patient from Lesson 4, has had only limited success maintaining his program of behavior modification, students are presented with their final tasks. They prepare a list of influences on Joe's behaviors and then design questions to gain specific information about these influences.

Major Concepts

Individuals exhibit specific behaviors. Behaviors originate from various influences. Asking well-designed, specific questions is an important tool of scientists who study human behavior. Modifying behavior depends on complex relationships among many influences in a person's life.

Objectives

After completing this activity, students will

- recognize that changing one's behavior requires an understanding of the influences in one's life, and
- be able to design specific questions to clarify the role that specific influences play in determining behavior.

Background Information

See the following sections in Information about the Science of Healthy Behaviors:

2.3 *Behavioral and Social Science Tools* (pages 25–26)
3 *Influences on Behavior* (pages 27–28)
4 *Behavioral and Social Science Research and Cardiovascular Disease* (pages 28–32)

In Advance

Web-Based Activities

Activity	Web component?
1	No

Photocopies

Activity	Master	Number of copies
1	Master 5.1, *The Final Memo*	1 copy per team or 1 transparency
	Master 5.2, *The Final Tasks*	1 copy per student

Materials

Activity	Materials
1	None

Preparation

Activity 1

Students who used the Web version of Lesson 4 will need either access to a computer to review Joe M.'s patient information or a hard copy of Master 4.3, *Patient Notes*. Students also will need their recommendations for modifications to Joe M.'s behaviors from the previous lesson.

Procedure

Activity 1: *The Problem Remains*

1. **Ask students if they have ever tried to change a behavior.**

   You can ask for a show of hands and then accept a specific example from one or two students.

2. **Ask students if they were successful in changing a behavior. If they were not successful, why do they believe they could not change the behavior?**

   You can ask for a show of hands and again accept an example from one or two students. Keep the discussion short, but make sure it includes mention of the many influences on behavior and the relationships among influences. Students studied these in Lessons 2 and 3.

3. **Tell students that it is time to see how well Joe M. did with his behavior modification plan. Divide the class into groups of three or four. Give each group a copy of Master 5.1, *The Final Memo,***

and read it with the class. Alternatively, display a transparency of Master 5.1 for the class to follow.

The memo describes the final tasks for the class. Students' major tasks are twofold. First, after reviewing Joe's old and new patient information, students are to pick one of Joe's behaviors and list influences on that behavior. If necessary, clarify for students that "people (groups)" could refer to family, friends, or co-workers, for instance. They may identify additional groups. Second, students should prepare lists of questions to gain specific information about the influences they identify. They should prepare a list for each influence.

Tip from the field test: It may be helpful to show students the transparency of Master 2.1, *Influences*, to reengage them about the many influences on behavior.

4. **Give each student a copy of Master 5.2, *The Final Tasks*, and ask them to review the updated behavioral history information for Joe M.**

   Students learn that Joe M. has had some success modifying his behaviors. They learn that Joe successfully quit smoking, and his wife's quitting at the same time had a positive influence on this. Furthermore, students learn about Joe's partially successful and unsuccessful attempts to change some other behaviors. A hint is provided concerning Joe's attempt to increase his physical activity.

5. **Explain to students that they should begin by choosing one of Joe's behaviors and then listing influences in Joe's life on that behavior.**

   Students can list the influences on the back of Master 5.2, *The Final Tasks*. Give students five minutes for this task. Students may choose from any of Joe's behaviors, including engaging in physical activity and eating. They should be able to identify a number of influences on the behavior they choose (such as family, co-workers, Joe's job itself, climate, and various aspects of Joe's environment), as well as speculate about a number of others (for example, Joe probably has friends, watches TV, and reads magazines). Students may identify influences relating to socioeconomic status. For instance, they may speculate that Joe's income may determine whether he can continue to afford his gym membership or buy healthy foods, which tend to be more expensive than less-healthy foods. Allow students to be creative.

6. **Reconvene the class. Ask several groups to share the influences they identified.**

NSES

Content Standard F: Students should understand the risks associated with natural hazards, biological hazards, social hazards, and personal hazards.

After one or two groups have responded, you can ask if other groups have anything new to offer. Limit discussion at this point and move to the next task.

7. **Tell students that they now must gain *specific* information about the influences in Joe M.'s life. They should make a list of questions to gain information about the influences they identified.**

   Allow students about 15 minutes to do this. You may want to limit students to what they determine to be the three or four major influences. In the interest of time, each group member can focus on a different influence. Good questions are simple and ask for only one piece of information at a time. Questions should be specific and ask for information that will enhance students' understanding of why people behave as they do. For instance, students probably have identified family as an influence for Joe. Consequently, they may want to know if Joe's wife engages in regular physical activity. If she does, in what activities does she engage? How often does she engage in physical activity? Is it possible for Joe and his wife to exercise together? Does anyone in Joe's family like to cook? What are typical meals at Joe's house? Does the family eat together? Because there are so many questions that can be asked, you may consider limiting the number of questions students should generate (for example, 5 to 10).

Assessment: As a formal assessment, collect students' copies of Master 5.2, *The Final Tasks*.

8. **Ask students to include a brief statement of how the answers to these questions will help in preparing a new behavior plan for Joe.**

   Students are answering the questions, Why do I want to know the answer to this question? and How would I use the information I get from Joe? If, for example, Joe's family engages in regular physical activity, Joe may find it easier to become more physically active himself. A new behavioral intervention plan could suggest that Joe and members of his family make time to walk together, for example.

9. **Reconvene the class. Ask different groups to share the questions they came up with and explain specifically why they want to ask each question.**

   Do this as time allows.

Lesson 5 Organizer

What the Teacher Does	Procedure Reference
Ask students, • "Have you ever tried to change a behavior?" • "If so, were you successful?" • "If you were not successful, why did you fail?"	Page 96 Steps 1 and 2
Explain to students they will now learn what progress was made by Joe M. in changing his behaviors related to risk for heart disease. • Divide the class into groups of three or four students. • Give each group one copy of Master 5.1, *The Final Memo*. • Display a transparency of Master 5.1 and ask a student volunteer to read it aloud.	Pages 96–97 Step 3 M T
Give each student one copy of Master 5.2, *The Final Tasks*. Ask students to review the updated behavioral history for Joe M. • Groups should select one behavior and list influences in Joe's life on that behavior.	Page 97 Steps 4 and 5 T
Reconvene the class and ask groups to share their results.	Pages 97–98 Step 6
Explain to students that they need to obtain specific information about the influences in Joe M.'s life. Instruct them to work in groups and create a list of questions designed to gain information about the influences that they identified.	Page 98 Step 7
Ask students to write a brief statement explaining how answers to these questions will help prepare a new behavioral plan for Joe.	Page 98 Step 8
Reconvene the class. Ask groups to share the questions they have prepared. Students should explain why they want to ask each question.	Page 98 Step 9

M = Involves copying a master. T = Involves making a transparency.

Masters

Lesson 1, *Defining Behavior*

Master 1.1, *Observation Guide Sheet* . . . . . student copies and transparency (*Web version only*)
Master 1.2, *Behavior Record* . . . . . student copies and transparency (*print version only*)
Master 1.3, *Health Outcomes of Behaviors* . . . . . student copies (optional) and transparency

Lesson 2, *Influences on Behavior*

Master 2.1, *Influences: Examples, by Category* . . . . . transparency
Master 2.2, *Influences on Behavior* . . . . . transparency

Lesson 3, *Tools of Social and Behavioral Science: The Survey*

Master 3.1, *Survey* . . . . . student copies and transparency
Master 3.2, *Comparison Guide* . . . . . student copies and transparency (*Web version only*)
Master 3.3, *Add Health Study Data* . . . . . team copies and transparency (*print version only*)
Master 3.4, *Class and Add Health Study Comparison.* . . . . . student copies and transparency (*print version only*)
Master 3.5, *Analysis Guide* . . . . . student copies and transparency
Master 3.6, *Influences on Physical Activity Behaviors* . . . . . team copies and transparency (*print version only*)

Lesson 4, *Behavioral Specialists at Work: The Healthcare Setting*

Master 4.1, *The First Memo* . . . . . team copies or transparency
Master 4.2, *Behavioral Sciences Evaluation Form (2 pages)* . . . . . student copies
Master 4.3, *Patient Notes* . . . . . team copies (*print version only*)
Master 4.4, *Reference Manual (3 pages)* . . . . . team copies (*print version only*)
Master 4.5, *The Second Memo* . . . . . team copies or transparency
Master 4.6, *Prescription Pad* . . . . . transparency
Master 4.7, *Joe M.'s Environment* . . . . . team copies

Lesson 5, *Behavioral Specialists in the Healthcare Setting ... Again*

Master 5.1, *The Final Memo* . . . . . team copies or transparency
Master 5.2, *The Final Tasks* . . . . . team copies

Permission Letter

Letter to Parents and Guardians . . . . . student copies, if school district requires

Observation Guide Sheet

Name: _____

Record your observations of the video clips on this sheet. Record behaviors you observe, as well as those you only hear about. Record as many behaviors as you can, but be careful to record only the behavior and not what you think it means. Use the third column, General Behaviors, to record overall categories of behavior. Check each box that applies.

Research Project	Specific Behaviors	General Behaviors (check all that apply)
Learning behavior		☐ Social bonding ☐ Obtaining/Eating Food ☐ Activity/Exercise ☐ Self-protection ☐ Communication ☐ Other:_____
Nonhuman primate behavior		☐ Social bonding ☐ Obtaining/Eating Food ☐ Activity/Exercise ☐ Self-protection ☐ Communication ☐ Other:_____
Adult human behavior		☐ Social bonding ☐ Obtaining/Eating Food ☐ Activity/Exercise ☐ Self-protection ☐ Communication ☐ Other:_____

Behavior Record

Name: _____

For each situation listed in the first column, find an example of it in your own life. Note the time and location and who was present. Observe the behaviors for two to five minutes. Describe the behaviors you observed in that time, but be careful to record only the behaviors. Do not record the reasons for the behaviors.

Situation	Time and location	Who was present?	Describe behavior
Students in class	1:30 p.m., Jefferson Middle School	Teacher, Mr. Smith; 32 8th-grade students	Mr. Smith handed out papers and explained the assignment, showing an example on the board. Most students listened, but three people in the back of the room were whispering to each other. One person asked a question about the assignment.
Interactions between friends			
Preparing or eating food			

Adults working at home or at work			
Animal behavior (for example, birds, cats, dogs, or fish doing something)			

Health Outcomes of Behaviors

Name: _____

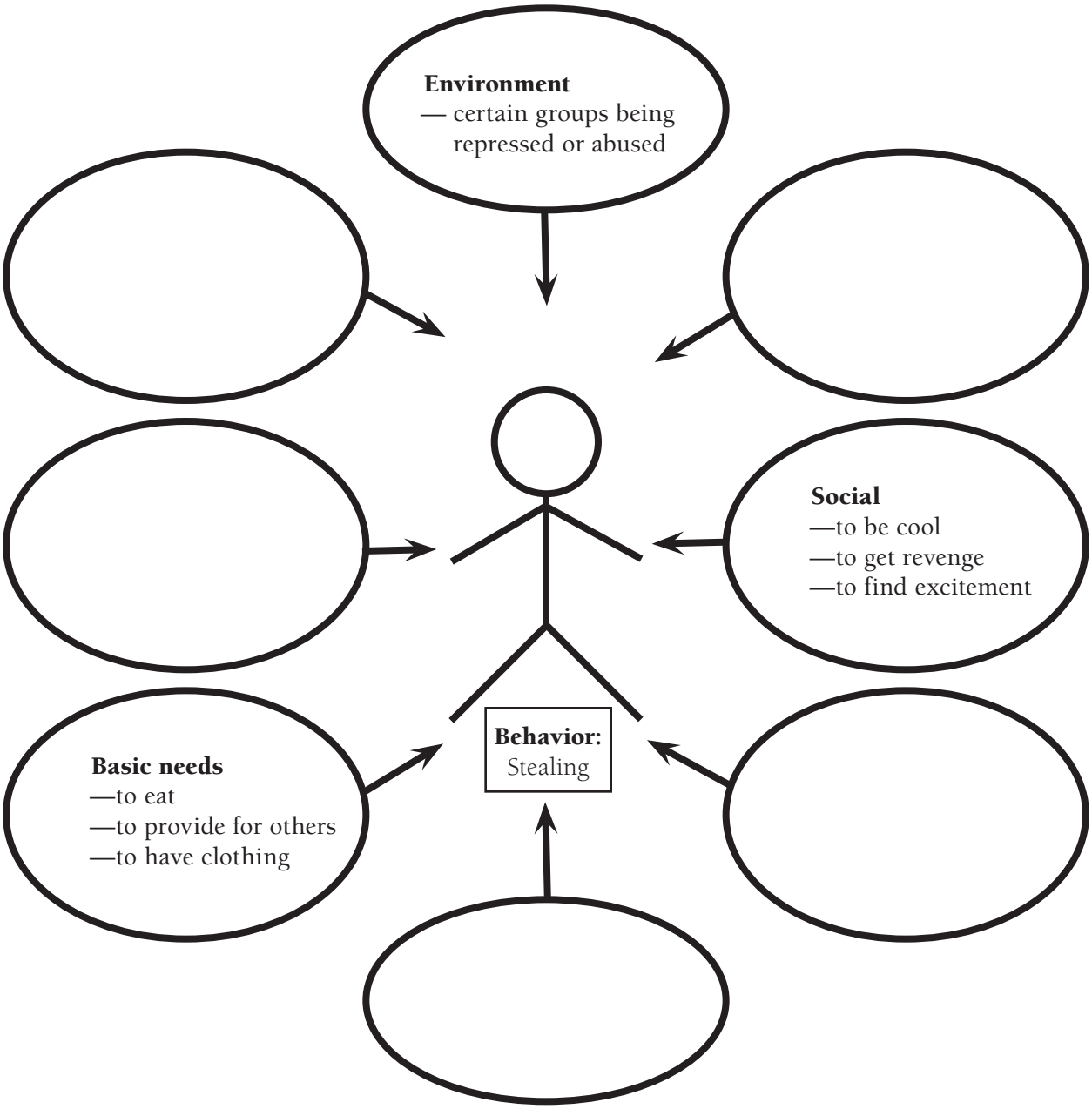
Behavior	Poor Short-Term Health Outcome	Good Short-Term Health Outcome	Poor Long-Term Health Outcome	Good Long-Term Health Outcome
Smoking				
Exercise				
Eating a poor diet				

Influences: Examples, by Category

Biology/ Genetics	Basic Needs	Personal Goals	Family	Resources
• Hormones • Diseases • Puberty • Health • Disabilities/ handicaps	• Food • Shelter • Clothing • Social interactions • Affection	• Being healthy • Making friends • Grades • Popularity • Image • Success • Morals	• Adult support • Family values • Culture • Sibling rivalry • Religion	• Money • Time • Educational opportunities • Transpor-tation

Media	Social	Environment/ Community	Other Categories and Examples
• TV • Video games • Magazines • Movies • Music/music videos • Sports • Advertisements	• Peers • Teachers • Sports teams/ clubs • Cliques • Mentors/role models • Friends	• Neighborhood • Weather • Playgrounds/ parks • Transportation • Policies/laws • Culture	

Influences on Behavior



Examples of Influences on Behavior	Examples of Reasons for Behavior
Basic needs	Hunger, clothing, dependents' needs
Environment (community)	Government policies (for example, war-time situations in which an occupying army restricts the local population's access to food and other necessities)
Social	Peer pressure, role models, excitement

Survey

What Do You Do?

For this survey of physical activity, select the best answer that applies to you. Your information will remain private and confidential. Keep this paper copy for future reference.

1. What sex are you?
   ☐ Male ☐ Female

2. During the past week, how many times did you do active work around the house, such as cleaning, laundry, or yardwork?
   ☐ not at all ☐ 1 or 2 times ☐ 3 or 4 times ☐ 5 or more times

3. During the past week, how many times did you watch television or videos or play video games?
   ☐ not at all ☐ 1 or 2 times ☐ 3 or 4 times ☐ 5 or more times

4. How many times in a normal week do you work, play, or exercise hard enough to make you sweat and breathe heavily?
   ☐ not at all ☐ 1 or 2 times ☐ 3 to 5 times ☐ 6 to 7 times ☐ more than 7 times

5. During the past week, how many times did you go rollerblading, roller-skating, skate-boarding, or bicycling? Count commuting to school or other activities.
   ☐ not at all ☐ 1 or 2 times ☐ 3 or 4 times ☐ 5 or more times

6. During the past week, how many times did you play an active sport, such as baseball, softball, basketball, soccer, swimming, or football?
   ☐ not at all ☐ 1 or 2 times ☐ 3 or 4 times ☐ 5 or more times

7. During the past week, how many times did you do exercise, such as jogging, walking, karate, jumping rope, gymnastics, or dancing?
   ☐ not at all ☐ 1 or 2 times ☐ 3 or 4 times ☐ 5 or more times

8. Do your parents let you make your own decisions about how much television you watch?
   ☐ No ☐ Yes

9. Have you played a sport with your mother/adoptive mother/stepmother/foster mother/etc. in the past four weeks?
   ☐ No ☐ Yes

10. Have you played a sport with your father/adoptive father/stepfather/foster father/etc. in the past four weeks?
    ☐ No ☐ Yes

11. Do you use a physical fitness or recreation center in your neighborhood?
    ☐ No ☐ Yes

12. Do you usually feel safe playing outside in your neighborhood?
    ☐ No ☐ Yes

Comparison Guide

Name: _____

Comparing the Data

In this activity, you will compare data from three sources: your class, all classes that enter survey data, and a national study of adolescents (the Add Health study). Compare the results for two survey questions. Copy the information from your online analysis to this sheet. Compare one *No/Yes* question and one *How many times...* question.

What was the *No/Yes* question you compared?

_____

_____

Copy the numbers of responses and the percentage of respondents giving each answer to the table. Calculate the percentages for your class. Use the percentages for all three data sources to make a bar graph (don't forget to fill in your legend).

Response	Data Source					
	Your Class		All Classes		Add Health Study	
	number of respondents	percent of respondents	number of respondents	percent of respondents	number of respondents	percent of respondents
No						
Yes						

Graph Title: _____

What was the *How many times* question you compared?

_____

_____

_____

Fill in the appropriate response choices (Never, 1 or 2 times a week, etc.). Copy the numbers of responses to the table, and copy the percentages onto the bar graph below (don't forget to fill in your legend). Calculate the percentages for your class and graph the data for your class.

Response Choices	**Data Source**					
	Your Class		**All Classes**		**Add Health Study**	
	number of respondents	**percent of respondents**	**number of respondents**	**percent of respondents**	**number of respondents**	**percent of respondents**

Graph Title: _____

1. Why is it important to look at the percentages in addition to the number of responses?

_____

_____

_____

_____

2. Was there a difference in the percentages between data sources?

_____

_____

3. If you saw a difference between the data sources, which data sources was it between and why was there a difference?

_____

_____

_____

_____

4.

Were data from your class a representative sample of	**No or Yes**	**Why?**
... your class?		
... your school?		
... middle school students in your community?		
... middle school students in your state?		
... middle school students in the United States?		

Add Health Study Data

The following data were collected in the Add Health study.

1. What sex are you?

	Number	Percent
Female	3356	51.6
Male	3147	48.4
Total	6503	100.0

2. During the past week, how many times did you do active work around the house, such as cleaning, laundry, or yardwork?

	Number	Percent
Not at All	255	3.9
1 or 2 times	1759	27.1
3 or 4 times	2016	31.0
5 or more	2466	38.0
Total	6496	100.0

3. During the past week, how many times did you watch television or videos or play video games?

	Number	Percent
Not at all	223	3.4
1 or 2 times	1031	15.9
3 or 4 times	1433	22.1
5 or more times	3811	58.6
Total	6498	100.0

4. How many times in a normal week do you work, play, or exercise hard enough to make you sweat and breathe heavily?

	Number	Percent
Never	231	5.4
1 or 2 times	958	22.2
3 to5 times	1362	31.6
6 to 7 times	732	17.0
More than 7 times	1029	23.9
Total	4312	100.1

5. During the past week, how many times did you go rollerblading, roller-skating, skate-boarding, or bicycling? Count commuting to school or other activities.

	Number	Percent
Not at all	4101	63.1
1 or 2 times	1341	20.6
3 or 4 times	551	8.5
5 or more times	505	7.8
Total	6498	100.0

6. During the past week, how many times did you play an active sport, such as baseball, softball, basketball, soccer, swimming, or football?

	Number	Percent
Not at all	1908	29.4
1 or 2 times	1786	27.5
3 or 4 times	1222	18.8
5 or more times	1582	24.3
Total	6498	100.0

7. During the past week, how many times did you do exercise, such as jogging, walking, karate, jumping rope, gymnastics, or dancing?

	Number	Percent
Not at all	1072	16.5
1 or 2 times	2059	31.7
3 or 4 times	1618	24.9
5 or more times	1749	26.9
Total	6498	100.0

8. Do your parents let you make your own decisions about how much television you watch?

	Number	Percent
No	1115	17.5
Yes	5248	82.5
Total	6363	100.0

9. Have you played a sport with your mother/adoptive mother/stepmother/foster mother/etc. in the past four weeks?

	Number	Percent
No	5577	91.1
Yes	546	8.9
Total	6123	100.0

10. Have you played a sport with your father/adoptive father/stepfather/foster father/etc. in the past four weeks?

	Number	Percent
No	3170	69.8
Yes	1372	30.2
Total	4542	100.0

11. Do you use a physical fitness or recreation center in your neighborhood?

	Number	Percent
No	5172	80.0
Yes	1291	20.0
Total	6463	100.0

12. Do you usually feel safe playing outside in your neighborhood?

	Number	Percent
No	675	10.4
Yes	5793	89.6
Total	6468	100.0

Class and Add Health Study Comparison

Name: _____

In this activity, you will compare results from your class with results from the national Add Health study. You will compare results from one *No/Yes* question and one *How many times...* question.

What was the *No/Yes* question you compared?

_____

_____

_____

Record the numbers of responses and the percentages for your class and the Add Health study in the table. Calculate the percentages for your class.

Response	Data Source			
	Your Class		Add Health Study	
	number of respondents	percent of respondents	number of respondents	percent of respondents
No				
Yes				

Graph the percentages on the bar graph below. Don't forget to fill in the legend.

Graph Title: _____

What was the *How many times* question you compared?

_____

_____

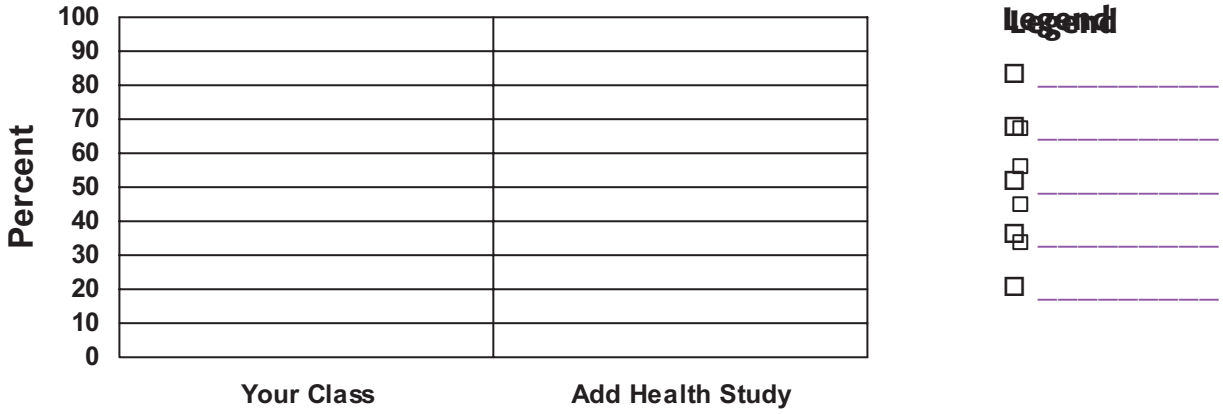
_____

Copy the results to this table.

Response Choices	Data Source			
	Your Class		Add Health Study	
	number of respondents	percent of respondents	number of respondents	percent of respondents

Use the percentages to construct a bar graph. Don't forget to fill in your legend.

Graph Title: _____



1. Why is it important to look at the percentages as well as the number of responses?

_____

_____

_____

2. Was there a difference in the percentages between data from your class and data from the Add Health study?

_____

_____

3. If you saw a difference between the data from your class and data from the Add health study, why was there was a difference?

_____

_____

_____

_____

4.

Were data from your class a representative sample of	**No or Yes**	**Why?**
... your class?		
... your school?		
... middle school students in your community?		
... middle school students in your state?		
... middle school students in the United States?		

Analysis Guide

Name: _____

Analysis of Influences on Behavior

Write down the behavior and the influence that you used for your analysis.

Behavior:

_____

_____

Influence:

_____

_____

Write your research question:

_____

_____

_____

_____

Write your results in the table below.

Influence	**Behavior**				
Male					
Female					

1. How would you answer your research question? That is, what is your interpretation of the results you obtained? Make sure you provide evidence for your answer.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

2. Of the influences listed, which, if any, can a middle school student modify?

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Influences on Physical Activity Behaviors

This table summarizes the effects of one influence, gender (sex), on behaviors described in Questions 2 to 7 from the survey you took. Other results follow on the next page. All data are from the Add Health study.

Behavior	Male (%)	Female (%)
active work around house		
not at all	5.1	2.9
1 or 2 times	30.5	23.9
3 or 4 times	31.7	30.5
5 or more times	32.8	42.8
watch television or videos		
not at all	3	3.9
1 or 2 times	15.2	16.5
3 or 4 times	21.3	22.7
5 or more times	60.6	56.9
exercise to make you sweat		
not at all	3.3	7.1
1 or 2 times	13.7	29.6
3 to 5 times	28.5	34.3
6 to 7 times	19.4	14.9
more than 7 times	35.1	14.1
rollerblade, roller-skate, etc.		
not at all	57.8	68.1
1 or 2 times	20	21.2
3 or 4 times	10.7	6.4
5 or more times	11.5	4.3
play active sport		
not at all	19.8	38.3
1 or 2 times	24.1	30.6
3 or 4 times	22.1	15.7
5 or more times	33.9	15.4
exercise like jogging, walking		
not at all	20.1	13.1
1 or 2 times	28.6	34.6
3 or 4 times	23.7	26
5 or more times	27.6	26.2

Behavior: During the past week, how many times did you do exercise, such as jogging, walking, karate, jumping rope, gymnastics, or dancing?

Influence: Do you use a physical fitness or recreation center in your neighborhood? (environmental resources)

Influence	**Behavior**			
	Not at all	1 or 2 times	3 or 4 times	5 or more times
No	17.2%	32.8%	25.1%	24.9%
Yes	13.5%	27.1%	24.2%	35.2%

Behavior: During the past week, how many times did you play an active sport, such as baseball, softball, basketball, soccer, swimming, or football?

Influence: Have you played a sport with your Father/Adoptive Father/Stepfather/Foster Father/etc in the past four weeks? (family)

Influence	**Behavior**			
	Not at all	1 or 2 times	3 or 4 times	5 or more times
No	35.8%	28.6%	16.8%	18.8%
Yes	10.3%	23.4%	26.2%	40.0%

Behavior: During the past week, how many times did you play an active sport, such as baseball, softball, basketball, soccer, swimming, or football?

Influence: Have you played a sport with your Mother/ Adoptive Mother/Stepmother/Foster Mother/etc in the past four weeks? (family)

Influence	**Behavior**			
	Not at all	1 or 2 times	3 or 4 times	5 or more times
No	30.5%	27.8%	18.7%	22.9%
Yes	11.0%	24.2%	22.9%	41.9%

Behavior: During the past week, how many times did you watch television or videos, or play video games?

Influence: Do your parents let you make your own decisions about how much television you watch? (family)

Influence	**Behavior**			
	Not at all	1 or 2 times	3 or 4 times	5 or more times
No	3.4%	15.6%	23.1%	57.8%
Yes	3.3%	15.9%	21.8%	59.1%

Behavior: During the past week, how many times did you play an active sport, such as baseball, softball, basketball, soccer, swimming, or football?

Influence: Do you use a physical fitness or recreation center in your neighborhood?

Influence	**Behavior**			
	Not at all	1 or 2 times	3 or 4 times	5 or more times
No	31.7%	28.5%	18.0%	21.8%
Yes	20.1%	23.2%	22.0%	34.7%

The First Memo

County Hospital

Behavioral Sciences Clinic

MEMORANDUM

TO: **Behavioral Health Team**

FROM: **E. Duran, Director**

SUBJECT: **Patient evaluation**

Dear Behavioral Health Team Members,

Joe M. was admitted to County Hospital yesterday with heart disease. His physician has asked for our help. As you know, there are many factors that can contribute to heart disease. People may be able to modify behaviors to decrease the health risks associated with some of these factors. Here is what I need you to do.

1. Review Joe M.'s patient file.
2. Identify factors that may have contributed to his heart disease.
3. Indicate which factors Joe M. may be able to modify and which factors he may not be able to modify.
4. Complete our Behavioral Sciences Evaluation Form and discuss your results with your colleagues.

Let me know when you have completed this work. I have one more important task for you.

Behavioral Sciences Evaluation Form, Page 1

Name of evaluator: _____

Patient's name: ___Joe M._____

List risk factors that may have contributed to the patient's heart disease.

Risk factors that the patient can modify	Risk factors that the patient cannot modify

Why may the patient not be able to modify the risk factors you named?

Behavioral Sciences Evaluation Form, Page 2

Patient's name: Joe M.

Modifiable risk factors	Behavioral change to lower risk

Rx **County Hospital** **Rx**

Behavioral Sciences Clinic

Prescription

Patient's Name: Joe M.

Instructions: Please follow the behavioral modification program described below. Do not hesitate to call the clinic if you have questions. Call your physician with questions or if complications develop.

Please do the following:

Authorized: _____

Member, Behavioral Health Team

Patient Notes

General Patient Information

Patient: Joe M. **CONFIDENTIAL**

Sex: Male
Age: 42
Marital Status: Married
Children: Son, age 12
Daughter, age 14
Occupation: Small business owner (six employees); does bookkeeping and taxes for small and medium-size businesses.

Admitted to County Hospital on Monday. Patient presented with chest pains and shortness of breath. Diagnosed with early stage heart disease.

Medical History

Patient: Joe M. **CONFIDENTIAL**

Height: 6 feet
Weight: 205 pounds (slightly overweight for build)
Last physical examination: Two years ago
History of previous heart disease: No
Blood pressure: Higher than normal
Blood cholesterol level: Higher than normal
Blood sugar: Normal
Blood CRP level: Increased level

Prescription medications: None
Non-prescription medications: Multivitamin tablet daily

Family Medical History

Patient: Joe M. **CONFIDENTIAL**

Relative	Alive?	Age (or age at death)	Major health problems	Cause of death, if deceased?
Father	Yes	66	None	—
Mother	Yes	65	Heart disease	—
Brother	Yes	38	High blood pressure	—
Sister	Yes	35	High blood pressure	—
Mother's Father	No	72	—	Heart failure
Mother's Mother	No	77	—	Pneumonia
Father's Father	No	68	—	Lung cancer
Father's Mother	Yes	86	Type 2 diabetes	—

Behavioral History

Patient: Joe M. **CONFIDENTIAL**

- Smoked cigarettes from age 13 to age 30; quit until recently; has 1 or 2 cigarettes per day.
- Physical activity: golf every Saturday morning; used to play basketball and hike regularly; hikes now, but only on summer vacations.
- Patient lives 1.5 miles from work; drives to work; arrives at 7:00 a.m., leaves at 6:00 p.m.
- Work environment: desk job; office on 3rd floor of 10-story building; takes elevator to office; building has exercise room on 5th floor.
- Has gained an average of 3 pounds per year for last 5 years.
- Wife describes patient as hard-working and his job as stressful.
- Patient's eating habits have changed during last year; he eats fast food for lunch at least three times per week; fruit and vegetable intake is below government recommendations.

Reference Manual

Heart Disease

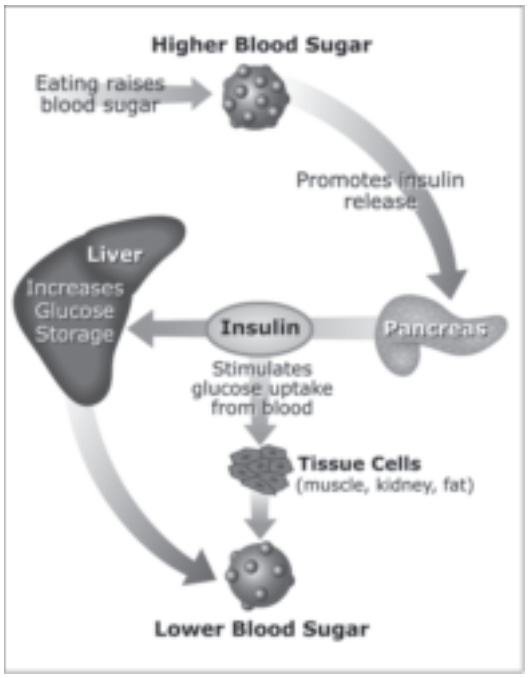
Heart disease is also known as cardiovascular disease. It refers to changes in the heart, arteries, and veins that result in less oxygen being delivered to vital life-sustaining areas of the body, such as the brain, the heart itself, and other organs. Cells, tissues, and organs cannot live without oxygen.

- Heart disease is one of the leading causes of death for both men and women among all racial and ethnic groups in the United States.
- Almost one million Americans die of heart disease each year (that is, one death every 30 seconds). This amounts to 42 percent of all deaths.
- Heart disease does not affect only older persons. It is the leading cause of death for all Americans age 35 and older. Persons aged 35–64 years old account for 16 percent of all deaths caused by heart disease.

In most cases, heart disease develops over many years. It results from the interaction of many factors over time.

Risk Factors for Heart Disease

Body weight: Obesity is a chronic condition characterized by having a high amount of body fat. Individuals traditionally have been considered obese if they are more than 20 percent over their ideal weight. That ideal weight must take into account the person's height, age, sex, and build. Overweight is a condition in which one is too heavy for one's height. Obesity and overweight increase high blood pressure in all ethnic groups at all ages. Weight loss may control high blood pressure. Increased body weight also increases the work the heart must do to supply all body tissues with oxygen and nutrients.

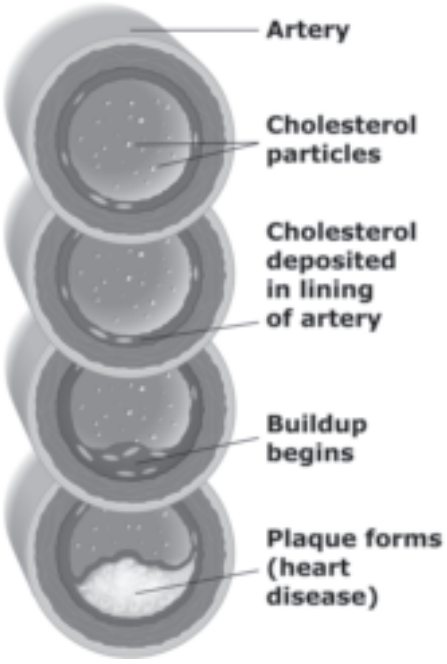


Diabetes: Glucose, a common sugar, is used by the cells of the body to produce energy. Diabetes is a disease in which the movement of glucose from the blood to body cells is decreased. Glucose levels in the blood increase. There are several forms of diabetes. The adult form is called type 2 diabetes.

About 80 percent of those with type 2 diabetes are overweight. It is more common among people who are older, are physically inactive or obese, or have a family history of diabetes. It is more common among people of Asian, Hispanic, African, or Native American ancestry. Type 2 diabetes is a progressive disease that can lead to many problems, including heart disease. Type 2 diabetes can be treated, delayed, or prevented by moderate weight loss, exercise, and medication.

Genetics (characteristics inherited from mom and dad): The risk of developing heart disease is about two times greater if a member of one's immediate family (a blood relative) has heart disease. The risk is higher if the family member developed heart disease at an early age (before age 55 in men and before age 65 in women). As is common in many diseases, heart disease results from an interaction between genes and other factors. These factors modify the risk for developing heart disease by either increasing or decreasing it. Some of these important factors are described in this manual.

High blood pressure: Blood pressure is the force of the blood pushing against the walls of the blood vessels, especially the arteries. When blood pressure is higher than normal, the heart works harder and arteries may become damaged. This increases the risk of heart disease. High blood pressure is related to a person's genetic makeup.



High cholesterol: Cholesterol is a waxy, fat-like material that is found in all parts of the body. It comes from two sources: it is made in the body by the liver (how much each person makes is determined by genetics); and we get it from eating meat and dairy products. High levels of cholesterol in the blood can narrow or block arteries. This reduces blood flow to the heart and other areas and increases the risk of heart disease. Decreasing blood cholesterol by as little as 10 percent decreases the risk of heart disease. Cholesterol levels can be reduced by alterations in diet and physical activity and by medication.

Inflammation: Inflammation is the body's defense against injury or against invaders like bacteria and viruses. Inflammation to the heart and blood vessels can occur in different ways. For example, it can occur as the result of the buildup of fatty deposits in blood vessels or by exposure of the heart and blood vessels to bacteria. Inflammation increases the risk of heart disease. Increased levels of a protein, known as C-reactive protein (CRP), in the blood indicate the presence of inflammation. Inflammation can be decreased by medications, proper nutrition, increased physical activity, and weight loss.

Risk Factors for Heart Disease (continued)

Medications, not taking as prescribed: Medications to lower blood pressure and cholesterol, for example, need to be taken exactly as prescribed in order to effectively lower the risk of heart disease.

Nutrition: Diet directly affects the risk of heart disease. Diet affects blood cholesterol levels, blood pressure, blood sugar levels, and body weight. To lower blood pressure, the American Heart Association recommends a diet low in fat and cholesterol and rich in fruits and vegetables.

Physical activity, lack of: Physical activity results in the body using energy. Physical activity can lead to physical fitness. People do not have to achieve a high level of physical fitness to realize health benefits. All types of physical activity can produce significant health benefits.

- Lack of physical activity doubles the risk of heart disease.
- Regular physical activity
  - helps control weight,
  - helps control blood pressure,
  - helps control blood cholesterol,
  - helps control blood sugar levels in persons with diabetes, and
  - improves blood circulation throughout the body.

Stress: Stress contributes to heart disease in many ways. It can cause the release of hormones and other agents that increase heart rate and blood pressure. Stress can increase blood clot formation. Blood clots can cause heart attacks by blocking blood flow to the heart. In some cases, stress can trigger irregular heart beat rhythms and reduce blood flow to the heart. Pre-diabetes conditions can be trigged by stress as well. Stress can be generated at home or at work. Stress can be reduced in many ways, including changing lifestyle, increasing exercise, and with therapy for dealing with stress.

Tobacco use: Chemicals in tobacco smoke reduce the amount of oxygen the blood can carry. The chemical nicotine in tobacco increases heart rate and blood pressure. Over time, this causes excessive wear and tear on the heart and blood vessels.

- Smokers have twice the risk of heart disease as nonsmokers.
- Twenty to 30 percent of the one million deaths each year from heart disease are caused by smoking.
- Quitting smoking can cut the risk of continued heart disease in half within one year.
- When a person quits smoking tobacco, the risk of death due to heart disease begins to decrease right away. However, it takes 10 years of no smoking for the risk to equal that of a nonsmoker.

The Second Memo

County Hospital

Behavioral Sciences Clinic

MEMORANDUM

TO: **Behavioral Health Team**

FROM: **E. Duran, Director**

SUBJECT: **Patient evaluation**

Dear Behavioral Health Team Members,

Thank you for your work so far. Identifying risk factors for heart disease that our patient Joe M. may be able to modify is very important. You now have one additional and important task.

Joe M. must change some of his behaviors to lower his risk of further complications from heart disease. I am asking you and your team members to develop a behavioral intervention for Joe. Please use the information available to you and come up with a behavioral plan Joe can follow that would improve his health. I look forward to seeing what you prescribe to help Joe.

Prescription Pad

Rx

County Hospital
Behavioral Sciences Clinic
Prescription

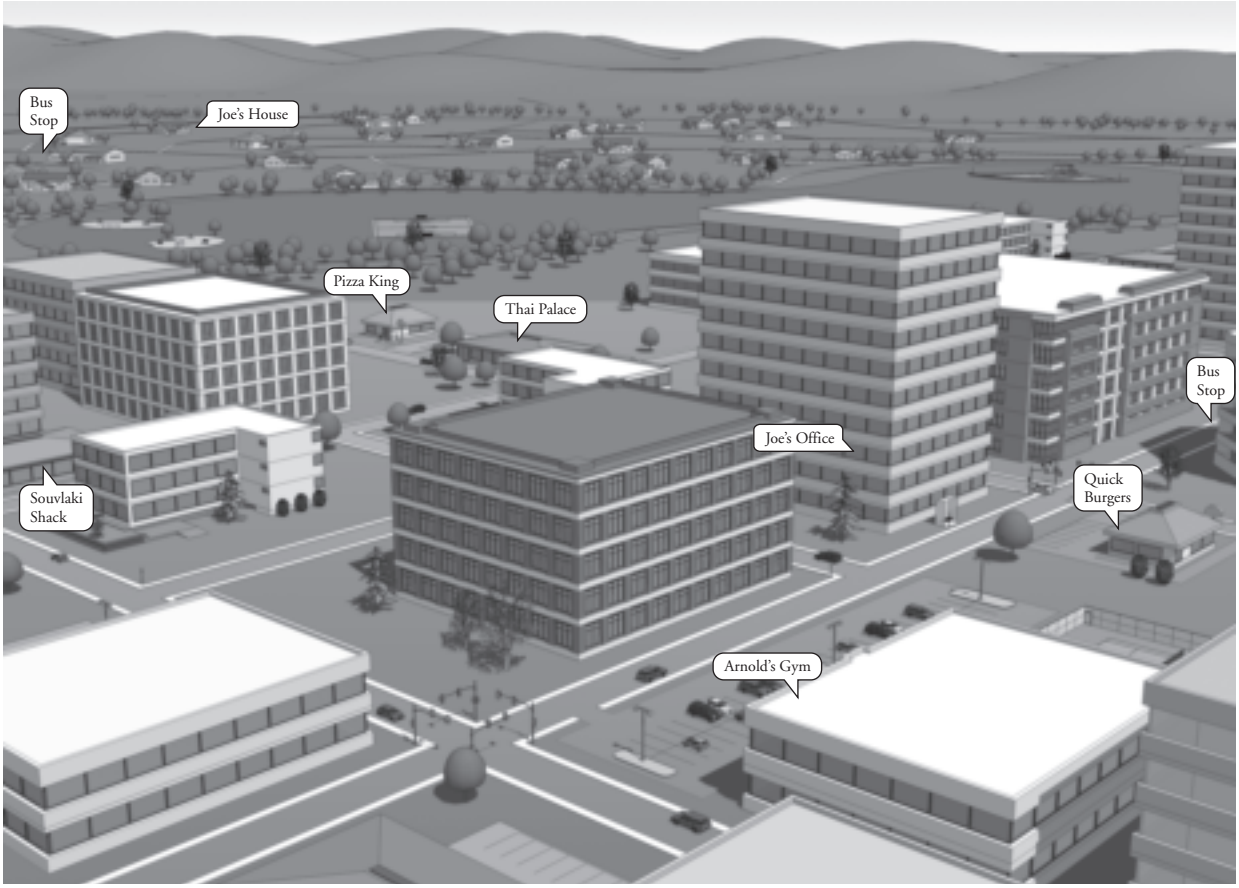
Rx

Patient's Name: Joe M.
Instructions: Please follow the behavioral modification program described below. Do not hesitate to call the clinic if you have questions. Call your physician with questions or if complications develop.

Please do the following:

Authorized: _____
Member, Behavioral Health Team

Joe M.'s Environment



The Final Memo

County Hospital

Behavioral Sciences Clinic

MEMORANDUM

TO: **Behavioral Health Team**

FROM: **E. Duran, Director**

SUBJECT: **Follow-up, patient Joe M.**

You prepared a behavior modification plan for Joe M., who was admitted to County Hospital with heart disease six months ago. Joe had some success following your recommendations for changing his behaviors, but additional help is needed. Our staff will meet with Joe soon and work with him to develop a behavior modification plan that we hope will allow him to continue to improve his health. Joe does want to succeed.

Before we meet with Joe, we need some important information. As behavioral scientists, you know that behaviors are influenced by many factors. Also, you know that you must ask specific questions to get information that helps you understand how those influences affect behavior. Here is what I need you to do.

1. Quickly review the information in Joe M.'s patient file and your recommendations for changes in his behavior.
2. Review the updated patient information for Joe (you will receive this shortly).
3. Select one of Joe's behaviors and identify influences in Joe's life that may affect that behavior. Include people (by groups), internal factors (those that relate directly to who Joe is as a person), and external factors (those in Joe's environment) that may influence that behavior.
4. Please prepare a list of questions for Joe relating to each of the influences you have identified. We must get specific information about the influences in Joe's life so that a new plan for behavior change can be made with Joe.

Thanks again for all of your hard work on this project.

The Final Tasks

Name: _____

Review all available information about Joe M. On the back of this form, you will list influences for one of Joe's behaviors. Then, use the guide at the bottom of this page to develop a series of questions to get specific information to help develop a new behavioral modification plan for Joe.

Updated History

Patient: Joe M. **CONFIDENTIAL**

Behavioral Sciences Clinic staff interviewed Joe M. and obtained the following information.

- Patient quit smoking. Stated that having wife quit smoking at the same time was helpful to him.
- Patient joined a gym, but does not like working out alone and only goes to gym once a week on average; says he prefers team sports and also thinks the membership dues at the gym are too expensive.
- Patient initially lost some weight, but has gained it back. He has tried several diets but can't keep weight off. Wife does cooking at home.
- Patient still eats fast food several times each week (says he's busy at work and just wants food that's fast), works long hours, and drives to work; takes stairs up to office sometimes; says he finds watching TV at night relaxing.
- Patient takes medications as directed; cholesterol and blood pressure lower, but still higher than normal.

Which behavior are you investigating? _____

1. On the back of this form, list influences in Joe's life on this behavior.
2. Develop and list questions to get specific information about each influence.
3. Justify each question by indicating how Joe's answers will help you develop a new behavioral modification plan for Joe—that is, why do you want this information?

Behavior you selected: _____

Influences	Questions	Justifications

Letter to Parents and Guardians

Dear Parents and Guardians,

Next week students in my class will begin a short unit called *The Science of Healthy Behaviors*. As part of the unit, students will be asked to fill out a confidential, 12-question survey about their physical activities. The purpose of the survey is to get a sense of how active students are in their daily lives. We will compare the class's data with results from middle school students across the country.

Please fill in the permission slip below and return it by _____. Students who don't participate in the survey will work with other (anonymous) students' data.

Thank you for your continued support.

_____
Teacher's Signature

✂- ✂- ✂- - - - - - - - - - - - - - - -

____ My child, _____, has permission to participate in the physical activity survey.

____ My child, _____, will not participate in the survey and will analyze data from other (anonymous) students.

_____ _____
Parent's or Guardian's Signature Date