

# The Science of Mental Illness

under a contract from the  
National Institutes of Health

National Institute of Mental Health



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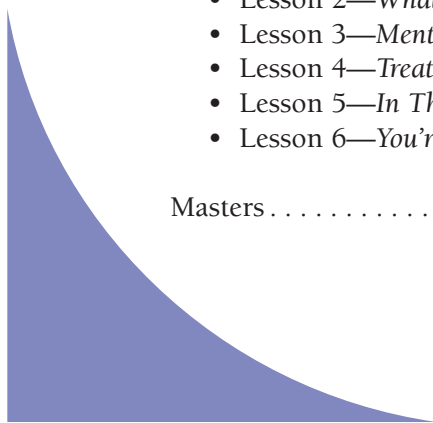
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# Foreword

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*.<sup>1</sup> 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 across the country; representatives from the National Institute of Mental Health; and curriculum-design experts from Biological Sciences Curriculum Study (BSCS), and Ai Group. 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 lessons based on BSCS's 5E Instructional Model of Learning, 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 feedback from our users. For a complete list of curriculum supplements, updates, availability, and ordering information, or to submit feedback, please visit our Web site at <http://science.education.nih.gov> or write to

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We appreciate the valuable contributions of the talented staff at BSCS and Ai Group. 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.

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<sup>1</sup> In 1996, the National Academy of Sciences released the *National Science Education Standards*, which outlines what all citizens 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

## 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, 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 million 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 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 biomedical 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 sciences, determines the project's overall merit and priority in advancing the research agenda of the particular NIH funding institutes.

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.

Five Nobelists made their prize-winning discoveries in NIH laboratories. 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

- 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 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 three partners: the NIH National Institute of Mental Health, 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 Mental Health

The National Institute of Mental Health (NIMH), one of the institutes that makes up the National Institutes of Health (NIH), is the largest scientific organization in the world dedicated to research focused on the understanding, treatment, and prevention of mental disorders and the promotion of mental health. The mission of NIMH is to reduce the burden of mental illness and behavioral disorders through research on mind, brain, and behavior.

The goals of NIMH become even more significant when you look at the occurrence of mental illnesses in our society. Mental disorders are widespread and affect people of all ages. Approximately 44 million Americans over the age of 18 and nearly one in five children will have a diagnosable mental disorder this year. Millions more will experience mental distress that diminishes quality of life, hinders academic achievement, and disrupts productivity on the job. Mental disorders represent 4 of the 10 leading causes of disability for persons age 5 and older. Among “developed” nations, including the United States, major depression is the leading cause of disability. Manic-depressive illness, schizophrenia, and obsessive-compulsive disorder rank near the top. Mental disorders contribute to mortality, with suicide representing one of the leading preventable causes of death in the United States and worldwide. Although mental illness problems can be highly disabling, they can be identified, diagnosed, and effectively treated.

NIMH strives to accomplish its mission in several ways. The NIH campus in Bethesda,

Maryland, supports research about mental illnesses. This research encompasses the scientific fields of neuroscience, molecular genetics, behavioral science, and brain imaging, among others. The results of these fundamental scientific investigations pave the way for clinical studies to test new medications and psychosocial interventions. The goal of all of these studies is to understand the biology of the brain that underlies mental illness and to provide improved ways to treat or prevent mental illnesses.

Research supported by NIMH, conducted both at the NIH campus in Bethesda and at universities around the country, investigates all aspects of mental illness. Some of the specific goals for NIMH research for the coming years include

- developing new and more effective treatments for mental illness,
- discovering genes that place individuals at risk for mental illnesses,
- generating information that will reduce the toll of suicide,
- refining the behavioral interventions that help reduce HIV/AIDS transmission, and
- developing new strategies for the prevention of mental illness.

NIMH also strives to make sure that treatment is responsive to the people who either have or are at risk for mental illness. The goal is to eliminate disparities in the availability of and access to high-quality mental health services. These disparities affect the mental health status of all Americans but impinge most greatly on members of ethnic or cultural minority groups, women, children, and elderly people.



Another way NIMH works to reduce the impact of mental illness on the public health is through education. Through its Web site, numerous publications, and this curriculum supplement, NIMH provides information to people who have questions about their own mental health or the health of a family member or friend.

Scientific progress and an informed public are powerful means of combating the stigma that is

often attached to mental disorders. NIMH seeks to ensure that citizens have a clear understanding of mental disorders and to afford all people who have these illnesses the opportunity to receive timely, appropriate, and effective treatments.

For more information about NIMH, please visit the Web site at <http://www.nimh.nih.gov>.

# Introduction to *The Science of Mental Illness*

## **What Are the Objectives of the Module?**

*The Science of Mental Illness* has several objectives. One is to introduce students to the key concept that mental illnesses have a biological basis and are therefore not that different from other illnesses or diseases. Through inquiry-based activities, students gain a better understanding of what mental illnesses are—and what they are not.

A second objective is to convey to students how science can help us make informed decisions. Scientific evidence helps us understand the world around us and gives us the foundation for improving choices about our personal health and the health of our community. There is a great deal that scientists do not yet understand about mental illnesses. Continuing scientific research into the causes, treatment, and, ultimately, cures for mental illnesses will benefit everyone who is affected by them, either directly or indirectly. Because the mission of the National Institute of Mental Health (NIMH) includes helping the public understand what is known about mental illnesses, the Institute believes that education is important.

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?**

One challenge for science teachers is to make science meaningful to students. Middle school students want to see the relevance of the material to their lives. The lessons in this module present fundamental information about mental illnesses. At some time in their young lives, many students have already experienced someone who has a mental illness, whether it be a family member, a friend, a schoolmate, or someone at a public event. These experiences and interactions with someone who has a mental illness can make adolescents (and adults) feel uncomfortable and confused because they don't understand what is going on. Students can apply the knowledge they gain from this module as they encounter new situations and make decisions about their lives.

In addition to learning some basic information about mental illnesses, the lessons ask students to practice several important skills related to scientific inquiry. Students will practice their skills of observation, problem solving, critical thinking, and data analysis. The lessons also offer an opportunity to integrate science with other disciplines, including health and language arts.

*“Many of the students didn't know what mental illness was or thought mentally ill people were crazy at the beginning of the unit. By the end, they realized that mental illness was just another disease, they weren't scared of the words mental*

*illness and seemed very accepting of mental illnesses. It really changed their perspective and educated them.”*

—Field-Test Teacher

*“The materials were well written for this age level. The materials covered a difficult topic that is not touched upon in most schools. The questions in the materials were probing and led students to new conceptualizations about mental illness.”*

—Field-Test Teacher

*“The inquiry-based method of teaching allowed students to discover a great deal on their own. The activities got the students involved and interested in learning the material.”*

—Field-Test Teacher

*“Students mentioned that they were amazed that they had learned so much.”*

—Field-Test Teacher

*“I liked that I learned that mental illness is not something to look at negatively.”*

—Field-Test Student

*“The information was pretty clear. It was interesting and really made you think. I think it is because a lot of it was stuff that could happen to people our age.”*

—Field-Test Student

*“It teaches you that people that have mental illness are people just like the rest of society. They can be treated with help and medicine.”*

—Field-Test Student

*“It helped me understand mental diseases; it helped eliminate some of the myths about mental illness.”*

—Field-Test Student

## **What’s in It for the Teacher?**

*The Science of Mental Illness* 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. 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 heavily from the subjects of science, health, and language arts.
- The module has a Web-based **technology component**. Students use materials included on the accompanying Web site to improve their understanding.
- 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.<sup>16</sup> write that replacement modules such as this one “offer a window through which teachers 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.

# Implementing the Module

The lessons in this module are designed to be taught in sequence in middle school life science classes. This section offers general suggestions about using these materials in the classroom and information about the instructional model the module uses. You will find specific suggestions in the procedures provided for each lesson.

## What Are the Goals of the Module?

*The Science of Mental Illness* is designed to help students reach these major goals associated with scientific literacy:

- to understand a set of basic principles related to the study of mental illness;
- to understand that the brain regulates changes in thinking, feelings, and behavior;
- to experience the process of scientific inquiry and the nature and methods of science; and
- to recognize the role of science in society and the relationship between basic science and public health.

## What Are the Science Concepts and How Are They Connected?

The six lessons are designed to be taught in sequence so that students progress from an understanding of the basic functions of the brain (*The Brain: Control Central*) to more details about mental illnesses as diseases (*What's Wrong?*) to an understanding of the factors that influence whether a person becomes mentally ill (*Mental Illness: Could It Happen to Me?*). Students then develop the understanding that mental illnesses, like other diseases, can be treated effectively so that individuals who are mentally ill can usually function well in their daily lives (*Treatment*

*Works!*). Students then get a “real life” glimpse of how a person who has a mental illness is not so different from themselves and how the mental illness can disrupt many aspects of the person’s life (*In Their Own Words*). Finally, students will synthesize and communicate their new understanding about mental illness (*You’re the Expert Now*).

The chart on page 4, Conceptual Flow of the Lessons, displays the sequence of lessons and the major concepts that students will learn in each lesson.

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



*The Science of Mental Illness* supports teachers in their efforts

to reform science education in the spirit of the National Research Council’s 1996 National Science Education Standards (NSES).<sup>35</sup>

## Content Standards

The content of the module is explicitly standards based. Each time a standard is addressed in a lesson, an icon appears in the margin and the applicable standard is identified. The chart on page 5 lists the specific content standards that this module addresses.

## Teaching Standards

The suggested teaching strategies in the lessons support you as you work to meet the teaching standards outlined in the National Science Education Standards. The module helps teachers plan an inquiry-based science program by providing short-term objectives for students. It also includes planning tools such

### Conceptual Flow of the Lessons

Lesson	Learning Focus*	Major Concepts
Lesson 1 <i>The Brain: Control Central</i>	Engage	The brain is the body organ that controls feelings, behaviors, and thoughts. Changes in the brain's activity result in changes in each of these responses. These changes can be either short term or long term. A mental illness is a health condition that changes a person's thinking, feelings, or behavior (or all three) and that causes the person distress and difficulty in functioning.
Lesson 2 <i>What's Wrong?</i>	Explore/Explain	Mental illnesses, including depression, are illnesses of the brain. Like illnesses that affect other parts of the body, mental illnesses are diagnosed by identifying characteristic symptoms.
Lesson 3 <i>Mental Illness: Could It Happen to Me?</i>	Explain	Everyone has some risk for becoming mentally ill. Factors such as genetics, environment, and social influences interact to increase or decrease a person's risk for developing a mental illness.
Lesson 4 <i>Treatment Works!</i>	Elaborate	Most mental illnesses can be treated effectively. Treatments may include the use of medications and psychotherapies.
Lesson 5 <i>In Their Own Words</i>	Elaborate	Mental illnesses are diseases that affect many aspects of a person's life but that can be treated effectively so that the individual can function effectively in everyday life.
Lesson 6 <i>You're the Expert Now</i>	Evaluate	Learning the facts about mental illness can dispel misconceptions. The ability to evaluate scientific and health-related information is an important skill for students that they can apply throughout their lives.

\*See *How Does the BSCS 5E Instructional Model Promote Active, Collaborative, Inquiry-Based Learning?* on page 6.

as the Conceptual Flow of the Lessons chart and the Suggested Timeline for teaching the module. 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 the curiosity, openness to new ideas and data, and skepticism that characterize science.

## Content Standards: Grades 5–8

NSES Content Standard	Correlation to <i>The Science of Mental Illness</i>
<b>Standard A: Science as Inquiry</b> <b>As a result of activities in grades 5–8, all students should develop</b>	
<b>Abilities necessary to do scientific inquiry</b> <ul style="list-style-type: none"> <li>• Identify questions that can be answered through scientific investigations.</li> <li>• Develop descriptions, explanations, predictions, and models using evidence.</li> <li>• Think critically and logically to make the relationships between evidence and explanations.</li> <li>• Recognize and analyze alternative explanations and predictions.</li> <li>• Communicate scientific procedures and explanations.</li> </ul>	<p>Lessons 2, 3, 4</p> <p>Lessons 1, 2, 3, 4</p> <p>Lessons 1, 2, 3, 4, 6</p> <p>Lessons 1, 2, 3, 6</p> <p>Lessons 2, 3, 4, 6</p>
<b>Understandings about scientific inquiry</b> <ul style="list-style-type: none"> <li>• 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 phenomena; and some involve making models.</li> <li>• Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.</li> <li>• Science advances through legitimate skepticism. Asking questions and querying other scientists' explanations is part of scientific inquiry. Scientists evaluate the explanations proposed by other scientists by examining evidence, comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations.</li> </ul>	<p>Lessons 1, 2, 3, 4</p> <p>Lessons 1, 2, 4</p> <p>Lesson 6</p>
<b>Standard C: Life Science</b> <b>As a result of their activities in grades 5–8, all students should develop understanding of</b>	
<b>Structure and function in living systems</b> <ul style="list-style-type: none"> <li>• Living systems at all levels of organization demonstrate the complementary nature of structure and function. Important levels of organization for structure and function include cells, organs, tissues, organ systems, whole organisms, and ecosystems.</li> </ul>	<p>Lessons 1, 2</p>
<b>Standard F: Science in Personal and Social Perspectives</b> <b>As a result of activities in grades 5–8, all students should develop understanding of</b>	
<b>Risks and benefits</b> <ul style="list-style-type: none"> <li>• Important personal and social decisions are made based on perceptions of benefits and risks.</li> </ul>	<p>Lessons 2, 3, 4, 5</p>

### 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 in their lives outside the classroom or in which scientists participate. Annotations guide teachers to these opportunities for assessment and provide answers to questions that can help teachers analyze student feedback.

### How Does the Module Correlate with the National Health Education Standards?

Although this module is intended primarily for use in life science classes, it can also be used in health classes. Some schools may wish to have the science and health teachers collaborate to teach this module. Because of this applicability to health classes, the lessons are also correlated with the *National Health Education Standards*.<sup>15</sup> The standards listed in the table on this page link most directly to the lessons in this module.

### 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 understandings. 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 they do when they work alone in a competitive environment. When 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

### National Health Education Standards: Grades 5–8

Health Standard	Correlation to <i>The Science of Mental Illness</i>
<b>Standard 1:</b> Students will comprehend concepts related to health promotion and disease prevention.	Lessons 1, 2, 3, 4, 6
<b>Standard 3:</b> Students will demonstrate the ability to practice health-enhancing behaviors and reduce health risks.	Lessons 3, 4, 6
<b>Standard 5:</b> Students will demonstrate the ability to use interpersonal communication skills to enhance health.	Lesson 6
<b>Standard 7:</b> Students will demonstrate the ability to advocate for personal, family, and community health.	Lesson 6

new questions. These inquiry experiences include both those that involve students in direct experimentation and those in which students develop explanations through critical and logical thinking.

This view of students as 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 construct their understanding of a concept over time. The model takes 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 the goals for each *E*.

### **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 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 lesson in this module, Lesson 1, *The Brain: Control Central*, is designed to

- pique students' curiosity and generate interest in learning about mental illnesses and
- provide an opportunity for students and teachers to assess what each student currently thinks about mental illnesses.

### **Explore**

In the Explore phase of the module, students have experiences with objects, events, data, and ideas that relate directly to the concept to be developed. Students use the common experiences with phenomena and ideas as a foundation for thinking about the topic.

During the Explore phase of Lesson 2, *What's Wrong?*, and Lesson 3, *Mental Illness: Could It Happen to Me?*, students

- use their skills of observation, problem solving, and critical thinking to deduce that mental illnesses are similar to other types of illnesses and
- gain experience with factors that influence whether a person is at a greater or lesser risk for getting a mental illness.

### **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. During this phase, students are encouraged to explain concepts and ideas in their own words and to compare their thinking with that of their classmates. 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.

Parts of Lesson 2, *What's Wrong?*, and Lesson 3, *Mental Illness: Could It Happen to Me?*, serve as the Explain phase of the module. In these lessons, students

- use their experiences in the Explore phase to create and apply a formal definition of the word *illness* to mental illness and
- develop an understanding of the distinction between the risk for getting a mental illness and actually getting a mental illness.

### **Elaborate**

In the Elaborate phase, students apply or extend the concepts in new situations and relate their previous experiences to new ones.

The Elaborate lessons in this module, Lesson 4, *Treatment Works!*, and Lesson 5, *In Their Own Words*, build on students' new understanding that mental illnesses are similar to other diseases that affect the body. Students

- examine evidence that mental illnesses are treatable, similar to other diseases, and
- reinforce the ideas learned in previous lessons and see their application to real life by viewing videos of people who have experienced a mental illness.

### **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. 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. Equally important, the Evaluate lesson provides students with an opportunity to check and assess how what they are learning "fits" with their prior understanding. Research on learning is now informing us that this continued self-assessment that a learner does is important for gaining a deeper, lasting understanding of content.<sup>10</sup>

The Evaluate lesson in this module, Lesson 6, *You're the Expert Now*, gives students the opportunity to

- demonstrate what they believe are the main ideas that other people should know about mental illness,
- evaluate materials about mental illness for accuracy, and

- consider how their own understanding of mental illness has changed since beginning this module.

When a teacher uses the BSCS 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 9–10 outline these differences.

### **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 six lessons, rather than something that happens more formally just once at the end of the module. Accordingly, integrated within the module's lessons are specific assessment components. These embedded assessment opportunities include one or more of the following strategies:

- performance-based activities (for example, working collaboratively to develop informational brochures or participating in a discussion of health effects);
- oral presentations to the class (for example, presenting results of scientific modeling activity or participating in a class discussion); and
- written assignments (for example, answering questions or summarizing the major ideas conveyed by a lesson or activity).

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

## What the Teacher Does

Stage	That is <i>consistent</i> with the BSCS 5E Instructional Model	That is <i>inconsistent</i> with the BSCS 5E Instructional Model
Engage	<ul style="list-style-type: none"> <li>• Piques students' curiosity and generates interest</li> <li>• Determines students' current understanding (prior knowledge) of a concept or idea</li> <li>• Invites students to express what they think</li> <li>• Invites students to raise their own questions</li> </ul>	<ul style="list-style-type: none"> <li>• Introduces vocabulary</li> <li>• Explains concepts</li> <li>• Provides definitions and answers</li> <li>• Provides closure</li> <li>• Discourages students' ideas and questions</li> </ul>
Explore	<ul style="list-style-type: none"> <li>• Encourages student-to-student interaction</li> <li>• Observes and listens to the students as they interact</li> <li>• Asks probing questions to help students make sense of their experiences</li> <li>• Provides time for students to puzzle through problems</li> </ul>	<ul style="list-style-type: none"> <li>• Provides answers</li> <li>• Proceeds too rapidly for students to make sense of their experiences</li> <li>• Provides closure</li> <li>• Tells students that they are wrong</li> <li>• Gives information and facts that solve the problem</li> <li>• Leads students step-by-step to a solution</li> </ul>
Explain	<ul style="list-style-type: none"> <li>• Encourages students to use their common experiences and data from the Engage and Explore lessons to develop explanations</li> <li>• Asks questions that help students express understanding and explanations</li> <li>• Requests justification (evidence) for students' explanations</li> <li>• Provides time for students to compare their ideas with those of others and perhaps to revise their thinking</li> <li>• Introduces terminology and alternative explanations after students express their ideas</li> </ul>	<ul style="list-style-type: none"> <li>• Neglects to solicit students' explanations</li> <li>• Ignores data and information students gathered from previous lessons</li> <li>• Dismisses students' ideas</li> <li>• Accepts explanations that are not supported by evidence</li> <li>• Introduces unrelated concepts or skills</li> </ul>
Elaborate	<ul style="list-style-type: none"> <li>• Focuses students' attention on conceptual connections between new and former experiences</li> <li>• Encourages students to use what they have learned to explain a new event or idea</li> <li>• Reinforces students' use of scientific terms and descriptions previously introduced</li> <li>• Asks questions that help students draw reasonable conclusions from evidence and data</li> </ul>	<ul style="list-style-type: none"> <li>• Neglects to help students connect new and former experiences</li> <li>• Provides definitive answers</li> <li>• Tells students that they are wrong</li> <li>• Leads students step-by-step to a solution</li> </ul>
Evaluate	<ul style="list-style-type: none"> <li>• Observes and records as students demonstrate their understanding of concepts and performance of skills</li> <li>• Provides time for students to compare their ideas with those of others and perhaps to revise their thinking</li> <li>• Interviews students to assess their developing understanding</li> <li>• Encourages students to assess their own progress</li> </ul>	<ul style="list-style-type: none"> <li>• Tests vocabulary words, terms, and isolated facts</li> <li>• Introduces new ideas or concepts</li> <li>• Creates ambiguity</li> <li>• Promotes open-ended discussion unrelated to the concept or skill</li> </ul>

### What the Students Do

Stage	That is <i>consistent</i> with the BSCS 5E Instructional Model	That is <i>inconsistent</i> with the BSCS 5E Instructional Model
Engage	<ul style="list-style-type: none"> <li>• Become interested in and curious about the concept or topic</li> <li>• Express current understanding of a concept or idea</li> <li>• Raise questions such as, What do I already know about this? What do I want to know about this? How could I find out?</li> </ul>	<ul style="list-style-type: none"> <li>• Ask for the “right” answer</li> <li>• Offer the “right” answer</li> <li>• Insist on answers or explanations</li> <li>• Seek closure</li> </ul>
Explore	<ul style="list-style-type: none"> <li>• “Mess around” with materials and ideas</li> <li>• Conduct investigations in which they observe, describe, and record data</li> <li>• Try different ways to solve a problem or answer a question</li> <li>• Acquire a common set of experiences so they can compare results and ideas</li> <li>• Compare their ideas with those of others</li> </ul>	<ul style="list-style-type: none"> <li>• Let others do the thinking and exploring (passive involvement)</li> <li>• Work quietly with little or no interaction with others (only appropriate when exploring ideas or feelings)</li> <li>• Stop with one solution</li> <li>• Demand or seek closure</li> </ul>
Explain	<ul style="list-style-type: none"> <li>• Explain concepts and ideas in their own words</li> <li>• Base their explanations on evidence acquired during previous investigations</li> <li>• Record their ideas and current understanding</li> <li>• Reflect on and perhaps revise their ideas</li> <li>• Express their ideas using appropriate scientific language</li> <li>• Compare their ideas with what scientists know and understand</li> </ul>	<ul style="list-style-type: none"> <li>• Propose explanations from “thin air” with no relationship to previous experiences</li> <li>• Bring up irrelevant experiences and examples</li> <li>• Accept explanations without justification</li> <li>• Ignore or dismiss other plausible explanations</li> <li>• Propose explanations without evidence to support their ideas</li> </ul>
Elaborate	<ul style="list-style-type: none"> <li>• Make conceptual connections between new and former experiences</li> <li>• Use what they have learned to explain a new object, event, organism, or idea</li> <li>• Use scientific terms and descriptions</li> <li>• Draw reasonable conclusions from evidence and data</li> <li>• Communicate their understanding to others</li> </ul>	<ul style="list-style-type: none"> <li>• Ignore previous information or evidence</li> <li>• Draw conclusions from “thin air”</li> <li>• Use terminology inappropriately and without understanding</li> </ul>
Evaluate	<ul style="list-style-type: none"> <li>• Demonstrate what they understand about the concept(s) and how well they can implement a skill</li> <li>• Compare their current thinking with that of others and perhaps revise their ideas</li> <li>• Assess their own progress by comparing their current understanding with their prior knowledge</li> <li>• Ask new questions that take them deeper into a concept or topic area</li> </ul>	<ul style="list-style-type: none"> <li>• Disregard evidence or previously accepted explanations in drawing conclusions</li> <li>• Offer only yes-or-no answers or memorized definitions or explanations as answers</li> <li>• Fail to express satisfactory explanations in their own words</li> <li>• Introduce new, irrelevant topics</li> </ul>



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, technology, 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 the light of values and ethics. As students encounter issues about which they feel strongly, some discussions might become controversial. How much controversy develops 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 the 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 the 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 the 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 classroom lessons that allow students to discover important concepts related to mental illnesses—what they are, what influences whether a person gets one, and how they can be treated. To review the concepts in detail, refer to the Conceptual Flow of the Lessons chart on page 4.

## Format of the Lessons

As you review the lessons, you will find that each includes 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 derive from completing the lesson.
- **Teacher Background** specifies which sections of Information about Mental Illness and the Brain (pages 21–41) 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 Mental Illness* Web site as a component of the lesson's instructional strategies.
- **Photocopies** lists the paper copies and transparencies that need to be made from the masters provided after Lesson 6, at the end of the module.
- **Materials** lists all items other than photocopies needed for the activities in the lesson.
- **Preparation** outlines what you need to do to be ready to teach the lesson.

**Procedure** details the steps in each activity in the lesson. It includes implementation suggestions and answers to questions.

Within the Procedure section, annotations provide additional commentary.

- **Tip from the field test** includes actual field-test teachers' suggestions for teaching strategies, class management, and module implementation and is identified by a field-test icon (see page 14).
- **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 14).



- **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. Specific information about the Web site can be found in Using the Web Site (see page 17).



identifies an 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 in Lesson 5 the accompanying DVD might be used. The video on the DVD is the same as that on the Web site for Lesson 5, but in a format that may be more convenient for some classrooms.



identifies when 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 Wrap-Up** concludes each lesson by asking students to write a few sentences summarizing the main ideas conveyed in the lesson. These summaries will be useful when students begin working on Lesson 6, the Evaluate lesson. Spending a few minutes writing the summary can also serve as an opportunity for students to assess what they have learned and how their understanding has changed.

The **Lesson Organizer** provides a brief summary of the lesson. It outlines procedural steps for each activity and includes icons that denote where 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 at the end of the module, after Lesson 6.

### **Timeline for the Module**

The timeline on page 15 outlines the optimal plan for completing the lessons in this module. The 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. If you wish to save class time, you can ask students to write their responses to the Lesson Wrap-Ups as homework assignments.



## Suggested Timeline

Timeline	Activity
3 weeks ahead	Reserve computers Check performance of Web site. Be sure appropriate versions of the required plug-ins are installed on the computers.
7 days ahead	Make photocopies and transparencies Gather materials
Day 1	<b>Lesson 1</b> Activity 1: <i>Inducing a Response</i> Activity 2: <i>What Do I Know about Mental Illness?</i> Activity 3: <i>What Happens in the Brain?</i> Lesson Wrap-Up
Day 2	<b>Lesson 2</b> Activity 1: <i>What's the Health Problem?</i>
Day 3	<b>Lesson 2 (continued)</b> Activity 2: <i>Defining "Illness"</i> Activity 3: <i>Observing the Depressed Brain</i> Lesson Wrap-Up
Day 4	<b>Lesson 3</b> Activity 1: <i>What Are the Risks?</i>
Day 5	<b>Lesson 3 (continued)</b> Activity 1: continued Lesson Wrap-Up
Day 6	<b>Lesson 4</b> Activity 1: <i>Will It Get Better?</i> Lesson Wrap-Up
Day 7	<b>Lesson 5</b> Activity 1: <i>Like Any Other Kid</i> Lesson Wrap-Up
Day 8	<b>Lesson 6</b> Activity 1: <i>Spreading the Word—What Should People Know?</i>
Day 9	<b>Lesson 6 (continued)</b> Activity 1: continued Activity 2: <i>What Do You Think about Mental Illness Now?</i>

# Using the Web Site

The Web site for *The Science of Mental Illness* is a tool that can engage student interest in learning, enhance the student's learning experience, and orchestrate and individualize instruction. The Web site features simulations that articulate with several of this module's lessons. The Web site includes the following resources:

- activities, including animations and videos, that students use as part of the lessons to understand more about mental illness;
- an introduction to the National Institutes of Health and the National Institute of Mental Health; and
- an online version (both HTML and PDF formats) of the curriculum supplement, including the masters.

Text pertaining only to Web-based activities is lightly shaded.

## Hardware/Software Requirements

The Web site can be accessed from Apple Macintosh and IBM-compatible personal computers. Links to download the Macromedia Flash and QuickTime plug-ins are provided on the Web site's Getting Started page. These plug-ins are 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 those listed, the Web site may still be functional on your computer. The most important items in this list are current browsers and plug-ins; older versions may not work satisfactorily.

To access the Web site, type the following URL into your browser: <http://science.education.nih.gov/supplements/mental>.

## 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 newer; Mac OS 9 or newer
System memory (RAM)	256 MB or more
Screen display	800 × 600 pixels, 32 bit color
Browser	Microsoft Internet Explorer 6.0 or Netscape Communicator 7.1
Browser settings	JavaScript enabled
Free hard drive space	10 MB
Connection speed	High speed (cable, DSL, or T1)
Plug-ins	Macromedia Flash Player (version 6 or higher) and QuickTime Player (version 6 or higher)
Audio	Sound card with speakers

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

### **Getting the Most out of the Web Site**

Before you use the Web-based activities (or any other piece of instructional technology) with your students, it might be helpful to identify some of the benefits that you expect the materials to provide. The Web-based activities in this curriculum module can

- motivate students by helping them enjoy learning and stimulating them to learn more because it enlivens content that they might find uninteresting otherwise;
- offer unique instructional capabilities that allow students to explore topics in greater depth and in ways that are closer to actual field experience than printed resources can offer;
- support teachers as they experiment with new instructional approaches that allow students to work independently or in small teams; and
- give teachers increased credibility among today's technology-literate students.

The number of computers needed for optimal use of the Web site depends on the specific activity. For some activities (Activities 1 and 3 in Lesson 1, Activity 3 in Lesson 2, and Activity 1 in Lesson 4), we recommend that you use a projection system to display the material to the class. For other activities, the ideal situation would be to have one computer for each student team. Even for those activities, however, you can still use the Web site if you have only one computer available. For example, you can use a projection system to display the image for the whole class to view. Giving selected students 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 computer or Internet access, you can use the print-based alternative provided for each Web-based activity.

### **Collaborative Groups**

Many of the activities in the lessons are designed to be completed by teams of students working together. Although students working on their own can complete these activities, this strategy does not stimulate the student-student interactions that are one of the goals of active, collaborative, inquiry-based learning. We often recommend that students work in teams of three on both Web- and print-based activities. Depending on the number of computers available, organize students into teams of two to four. Students in teams larger than this have difficulty organizing student-computer interactions equitably. This can lead to one or two students assuming the primary responsibility for the Web-based work. Although larger teams can be efficient, team members do not experience the in-depth discovery and analysis that the Web site was designed to provide. 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 a lesson. This allows each team to develop a shared experience with the Web site and with the ideas and issues that the activities present. A shared experience also enhances your students' perceptions of the lesson as a conceptual whole.

If your student-to-computer ratio is greater than four to one, you should modify the way you teach the module from the procedures in the lessons. For example, you might want students to complete the Web-based work across an extended time period. You can do this several ways. One approach is to use available computers as centers for the Web-based work and, at the same time, establish separate centers at which students complete other activities in the module. In this approach, students rotate through the computer centers, eventually completing the Web-based work you have assigned.

## Web Activities for Students with Disabilities


The Office of Science Education (OSE) is committed to providing access to the 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 individuals who do not have disabilities. This online version complies with Section 508.



If you cannot access the information on the Web site using assistive technology (such as a Braille

reader or a screen reader) or if the format of any material interferes with your ability to access the information, please contact us by e-mail or mail for assistance. To enable us to respond in a manner most helpful to you, please indicate the nature of your accessibility problem, the format in which you would prefer to receive the material, the Web address of the requested material, and your contact information.

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## The Science of Mental Illness 508-Compliant Web Activities

Lesson, activity	For students with hearing impairment	For students with sight impairment
Lesson 1, Activity 1: <i>Inducing a Response</i>	This activity includes sound effects that may not be heard by students with a hearing impairment. A visual equivalent will also be displayed in conjunction with the sound effects.	This activity includes graphics that may not be seen by students with a sight impairment. An auditory equivalent will be available in conjunction with the graphics.
Lesson 1, Activity 3: <i>What Happens in the Brain?</i>	Students may click on the closed-captioning icon to view the captioning for the animations.  The icon is located in the top left corner of the animation after it begins playing. The text appears below the animation.	Students using a screen reader or screen magnifier will hear descriptions of the animation along with the original audio narration. The descriptions will help the students gain an understanding similar to that of other students.

<p>Lesson 2, Activity 1: <i>What's the Health Problem?</i></p>	<p>Students may click on the closed-captioning icon to view the captioning for the animations.</p>  <p>The icon is located in the top left corner of the animation after it begins playing. The text appears below the animation.</p>	<p>Students using a screen reader or screen magnifier will hear the original audio narration and, in some instances, a description of the animation.</p>
<p>Lesson 2, Activity 3: <i>Observing the Depressed Brain</i></p>	<p>No special considerations are required.</p>	<p>Students using a screen reader will hear a description of the PET images. The descriptions will help the students gain an understanding similar to that of other students.</p>
<p>Lesson 4, Activity 1: <i>Will It Get Better?</i></p>	<p>No special considerations are necessary.</p>	<p>Students using a screen reader will hear a description of the PET images. The descriptions will help the students gain an understanding similar to that of other students.</p>
<p>Lesson 5, Activity 1: <i>Like Any Other Kid</i></p>	<p>Students may click on the closed-captioning icon to view the captioning for the video interviews.</p>  <p>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.</p>	<p>Students using a screen reader or screen magnifier will hear the original audio narration and, in some instances, a description of the video.</p>

# Information about Mental Illness and the Brain

## 1 Defining Mental Illness\*

We can all be “sad” or “blue” at times in our lives. We have all seen movies about the madman and his crime spree, with the underlying cause of mental illness. We sometimes even make jokes about people being crazy or nuts, even though we know that we shouldn’t. We have all had some exposure to mental illness, but do we really understand it or know what it is? Many of our preconceptions are incorrect. **A mental illness can be defined as a health condition that changes a person’s thinking, feelings, or behavior (or all three) and that causes the person distress and difficulty in functioning.** As with many diseases, mental illness is severe in some cases and mild in others. Individuals who have a mental illness don’t necessarily look like they are sick, especially if their illness is mild. Other individuals may show more explicit symptoms such as confusion, agitation, or withdrawal. There are many different mental illnesses, including **depression, schizophrenia, attention deficit hyperactivity disorder (ADHD), autism, and obsessive-compulsive disorder.** Each illness alters a person’s thoughts, feelings, and/or behaviors in distinct ways. In this module, we will at times discuss mental illness in general terms and at other times, discuss specific mental illnesses. Depression, schizophrenia, and ADHD will be presented in greater detail than other mental illnesses.

Not all brain diseases are categorized as mental illnesses. Disorders such as epilepsy,

Parkinson’s disease, and multiple sclerosis are brain disorders, but they are considered neurological diseases rather than mental illnesses. Interestingly, the lines between mental illnesses and these other brain or neurological disorders is blurring somewhat. As scientists continue to investigate the brains of people who have mental illnesses, they are learning that mental illness is associated with changes in the brain’s structure, chemistry, and function and that mental illness does indeed have a biological basis. This ongoing research is, in some ways, causing scientists to minimize the distinctions between mental illnesses and these other brain disorders. In this curriculum supplement, we will restrict our discussion of mental illness to those illnesses that are traditionally classified as mental illnesses, as listed in the previous paragraph.

## 2 Mental Illness in the Population\*\*

Many people feel that mental illness is rare, something that only happens to people with life situations very different from their own, and that it will never affect them. Studies of the epidemiology of mental illness indicate that this belief is far from accurate. In fact, the surgeon general reports that mental illnesses are so common that few U.S. families are untouched by them.<sup>44</sup>

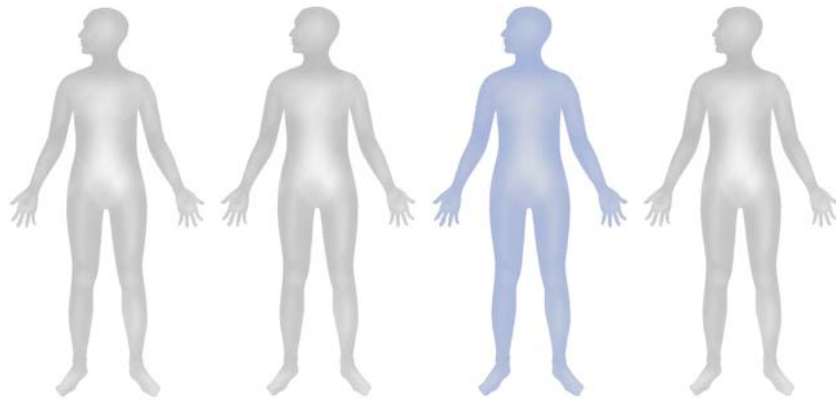
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*Few U.S. families are untouched by mental illness.*

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\* Relevant to Lessons 1, 2, and 5.

\*\* Relevant to Lesson 3.



*Figure 1. Scientists estimate that one of every four people is affected by mental illness either directly or indirectly.*

### 2.1 Mental Illness in Adults

Even if you or a family member has not experienced mental illness directly, it is very likely that you have known someone who has. Estimates are that at least one in four people is affected by mental illness either directly or indirectly. Consider the following statistics to get an idea of just how widespread the effects of mental illness are in society: <sup>4, 25, 44</sup>

- According to recent estimates, approximately 20 percent of Americans, or about one in five people over the age of 18, suffer from a diagnosable mental disorder in a given year.
- Four of the 10 leading causes of disability—major depression, **bipolar disorder**, schizophrenia, and obsessive-compulsive disorder—are mental illnesses.
- About 3 percent of the population have more than one mental illness at a time.
- About 5 percent of adults are affected so seriously by mental illness that it interferes with their ability to function in society. These severe and persistent mental illnesses include schizophrenia, bipolar disorder, other severe forms of depression, **panic disorder**, and obsessive-compulsive disorder.
- Approximately 20 percent of doctor's appointments are related to **anxiety disorders** such as panic attacks.
- Eight million people have depression each year.
- Two million Americans have schizophrenia disorders, and 300,000 new cases are diagnosed each year.

### 2.2 Mental Illness in Children and Adolescents

Mental illness is not uncommon among children and adolescents. Approximately 12 million children under the age of 18 have mental disorders.<sup>4</sup> The National Mental Health Association<sup>33</sup> has compiled some statistics about mental illness in children and adolescents:

- Mental health problems affect one in every five young people at any given time.
- An estimated two-thirds of all young people with mental health problems are not receiving the help they need.
- Less than one-third of the children under age 18 who have a serious mental health problem receive any mental health services.
- As many as 1 in every 33 children may be depressed. Depression in adolescents may be as high as 1 in 8.
- Suicide is the third leading cause of death for 15- to 24-years-olds and the sixth leading cause of death for 5- to 15-year-olds.
- Schizophrenia is rare in children under age 12, but it occurs in about 3 of every 1,000 adolescents.
- Between 118,700 and 186,600 youths in the juvenile justice system have at least one mental illness.
- Of the 100,000 teenagers in juvenile detention, an estimated 60 percent have behavioral, cognitive, or emotional problems.



### 3 Warning Signs for Mental Illness\*

Each mental illness has its own characteristic symptoms. (See Section 10 for information about some specific illnesses.) However, there are some general warning signs that might alert you that someone needs professional help.<sup>4</sup>

Some of these signs include

- marked personality change,
- inability to cope with problems and daily activities,
- strange or grandiose ideas,
- excessive **anxieties**,
- prolonged depression and apathy,
- marked changes in eating or sleeping patterns,
- thinking or talking about suicide or harming oneself,
- extreme mood swings—high or low,
- abuse of alcohol or drugs, and
- excessive anger, hostility, or violent behavior.

A person who shows any of these signs should seek help from a qualified health professional.

### 4 Diagnosing Mental Illness\*

#### 4.1 Mental Health Professionals

To be diagnosed with a mental illness, a person must be evaluated by a qualified professional who has expertise in mental health. Mental health professionals include **psychiatrists, psychologists**, psychiatric nurses, social workers, and mental health counselors. Family doctors, internists, and pediatricians are usually qualified to diagnose common mental disorders such as depression, anxiety disorders, and ADHD. In many cases, depending on the individual and his or her **symptoms**, a mental health professional who is not a psychiatrist will refer the patient to a psychiatrist. A psychiatrist is a medical doctor (M.D.) who has received additional training in the field of mental health and mental illnesses. Psychiatrists evaluate the person's mental condition in coordination with his or her physical condition and can prescribe medication. Only psychiatrists and other M.D.s can prescribe medications to treat mental illness.

\* **Relevant to Lessons 2, 3, 4, and 5.**

#### 4.2 Mental Illnesses are Diagnosed by Symptoms

Unlike some disease diagnoses, doctors can't do a blood test or culture some microorganisms to determine whether a person has a mental illness. Maybe scientists will develop discrete physiological tests for mental illnesses in the future; until then, however, mental health professionals will have to diagnose mental illnesses based on the symptoms that a person has. Basing a diagnosis on symptoms and not on a quantitative medical test, such as a blood chemistry test, a throat swab, X-rays, or urinalysis, is not unusual. Physicians diagnose many diseases, including migraines, Alzheimer's disease, and Parkinson's disease based on their symptoms alone. For other diseases, such as asthma or mononucleosis, doctors rely on analyzing symptoms to get a good idea of what the problem is and then use a physiological test to provide additional information or to confirm their diagnosis.

When a mental health professional works with a person who might have a mental illness, he or she will, along with the individual, determine what symptoms the individual has, how long the symptoms have persisted, and how his or her life is being affected. Mental health professionals often gather information through an interview during which they ask the patient about his or her symptoms, the length of time that the symptoms have occurred, and the severity of the symptoms. In many cases, the professional will also get information about the patient from family members to obtain a more comprehensive picture. A physician likely will conduct a physical exam and consult the patient's history to rule out other health problems.

Mental health professionals evaluate symptoms to make a diagnosis of mental illness. They rely on the criteria specified in the **Diagnostic and Statistical Manual of Mental Disorders** (DSM-IV; currently, the fourth edition),

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*Mental health professionals evaluate symptoms to make a diagnosis of mental illness.*

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published by the American Psychiatric Association, to diagnose a specific mental illness.<sup>5</sup> For each mental illness, the DSM-IV gives a general description of the disorder and a list of typical symptoms. Mental health professionals refer to the DSM-IV to confirm that the symptoms a patient exhibits match those of a specific mental illness. Although the DSM-IV provides valuable information that helps mental health professionals diagnose mental illness, these professionals realize that it is important to observe patients over a period of time to understand the individual's mental illness and its effects on his or her life. We present the DSM-IV criteria for the specific diseases discussed in this module in Section 10, *Information about Specific Mental Illnesses*.

## 5 Mental Illness and the Brain\*

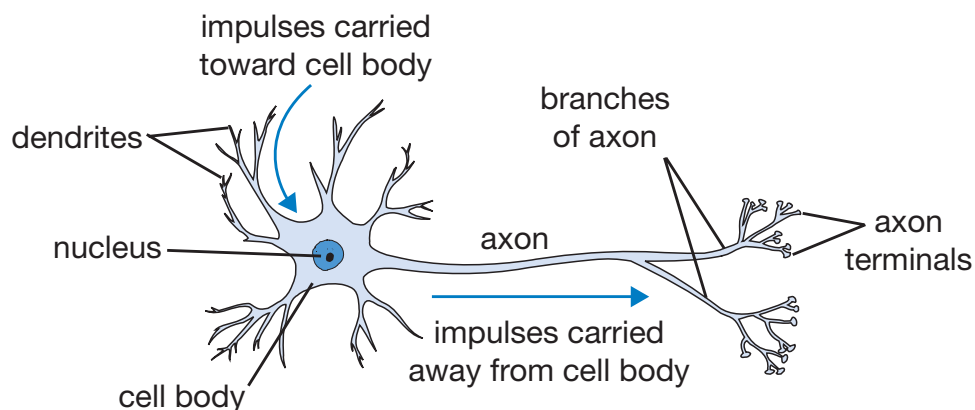
The term mental illness clearly indicates that there is a problem with the mind. But is it just the mind in an abstract sense, or is there a physical basis to mental illness? As scientists continue to investigate mental illnesses and their causes, they learn more and more about

how the biological processes that make the brain work are changed when a person has a mental illness.

### 5.1 The Basics of Brain Function

Before thinking about the problems that occur in the brain when someone has a mental illness, it is helpful to think about how the brain functions normally. The brain is an incredibly complex organ. It makes up only 2 percent of our body weight, but it consumes 20 percent of the oxygen we breathe and 20 percent of the energy we take in. It controls virtually everything we as humans experience, including movement, sensing our environment, regulating our involuntary body processes such as breathing, and controlling our emotions. Hundreds of thousands of chemical reactions occur every second in the brain; those reactions underlie the thoughts, actions, and behaviors with which we respond to environmental stimuli. In short, the brain dictates the internal processes and behaviors that allow us to survive.

How does the brain take in all this information, process it, and cause a response? The basic functional unit of the brain is the **neuron**. A neuron is a specialized cell that can produce different actions because of its precise



**Figure 2.** The neuron, or nerve cell, is the functional unit of the nervous system. The neuron has processes called dendrites that receive signals and an axon that transmits signals to another neuron.

\* Relevant to Lessons 1, 2, and 4.

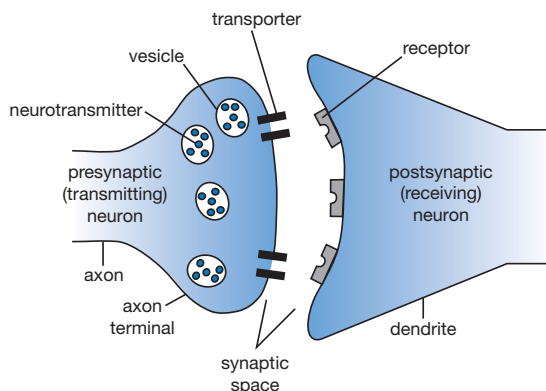
connections with other neurons, sensory receptors, and muscle cells. A typical neuron has four structurally and functionally defined regions: the cell body, **dendrites**, **axons**, and the axon terminals.

The cell body is the metabolic center of the neuron. The nucleus is located in the cell body and most of the cell's protein synthesis occurs here.

A neuron usually has multiple fibers called dendrites that extend from the cell body. These processes usually branch out somewhat like tree branches and serve as the main apparatus for receiving input from other nerve cells.

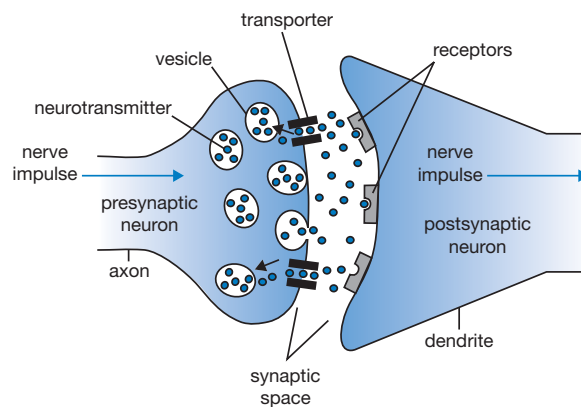
The cell body also gives rise to the axon. The axon is usually much longer than the dendrites; in some cases, an axon can be up to 1 meter long. The axon is the part of the neuron that is specialized to carry messages away from the cell body and to relay messages to other cells. Some large axons are surrounded by a fatty insulating material called **myelin**, which enables the electrical signals to travel down the axon at higher speeds.

Near its end, the axon divides into many fine branches that have specialized swellings called axon terminals or presynaptic terminals. The axon terminals end near the dendrites of another neuron. The dendrites of one neuron receive the message sent from the axon terminals of another neuron.



*Figure 3. Diagram of a synapse.*

The site where an axon terminal ends near a receiving dendrite is called the **synapse**. The cell that sends out information is called the **presynaptic neuron**, and the cell that receives the information is called the **postsynaptic neuron**. It is important to note that the synapse is *not* a physical connection between the two neurons; there is no cytoplasmic connection between the two neurons. The intercellular space between the presynaptic and postsynaptic neurons is called the **synaptic space** or synaptic cleft. An average neuron forms approximately 1,000 synapses with other neurons. It has been estimated that there are more synapses in the human brain than there are stars in our galaxy. Furthermore, synaptic connections are not static. Neurons form new synapses or strengthen synaptic connections in response to life experiences. This dynamic change in neuronal connections is the basis of learning.



*Figure 4. Neurons relay their information using both electrical signals and chemical messages in a process called neurotransmission.*

Neurons communicate using both electrical signals and chemical messages. Information in the form of an electrical impulse is carried away from the neuron's cell body along the axon of the presynaptic neuron toward the axon terminals. When the electrical signal reaches the presynaptic axon terminal, it cannot cross the synaptic space, or synaptic cleft. Instead, the electrical signal triggers chemical changes that *can* cross the synapse to

affect the postsynaptic cell. When the electrical impulse reaches the presynaptic axon terminal, membranous sacs called **vesicles** move toward the membrane of the axon terminal. When the vesicles reach the membrane, they fuse with the membrane and release their contents into the synaptic space. The molecules contained in the vesicles are chemical compounds called **neurotransmitters**. Each vesicle contains many molecules of a neurotransmitter. The released neurotransmitter molecules drift across the synaptic cleft and then bind to special proteins, called **receptors**, on the postsynaptic neuron. A neurotransmitter molecule will bind only to a specific kind of receptor.

The binding of neurotransmitters to their receptors causes that neuron to generate an electrical impulse. The electrical impulse then moves away from the dendrite ending toward the cell body. After the neurotransmitter stimulates an electrical impulse in the postsynaptic neuron, it releases from the receptor back into the synaptic space. Specific proteins called **transporters** or **reuptake pumps** carry the neurotransmitter back into the presynaptic neuron. When the neurotransmitter molecules are back in the presynaptic axon terminal, they can be repackaged into vesicles for release the next time an electrical impulse reaches the axon terminal. Enzymes present in the synaptic space degrade neurotransmitter molecules that are not taken back up into the presynaptic neuron.

The nervous system uses a variety of neurotransmitter molecules, but each neuron specializes in the synthesis and secretion of a single type of neurotransmitter. Some of the predominant neurotransmitters in the brain include glutamate, GABA, **serotonin**, dopamine, and norepinephrine. Each of these neurotransmitters has a specific distribution and function in the brain; the specifics of each are beyond the scope of this module, but

a few of the names will arise in reference to particular mental illnesses.

### **5.2 Investigating Brain Function**

Mental health professionals base their diagnosis and treatment of mental illness on the symptoms that a person exhibits. The goal for these professionals in treating a patient is to relieve the symptoms that are interfering with the person's life so that the person can function well. Research scientists, on the other hand, have a different goal. They want to learn about the chemical or structural changes that occur in the brain when someone has a mental illness. If scientists can determine what happens in the brain, they can use that knowledge to develop better treatments or find a cure.

The techniques that scientists use to investigate the brain depend on the questions they are asking. For some questions, scientists use molecular or biochemical methods to investigate specific genes or proteins in the neurons. For other questions, scientists want to visualize changes in the brain so that they can learn more about how the activity or structure of the brain changes. Historically, scientists could examine brains only after death, but new imaging procedures enable scientists to study the brain in living animals, including humans. It is important to realize that these brain imaging techniques are not used for diagnosing mental illness. Mental illnesses are diagnosed by the set of symptoms that an individual exhibits. The imaging techniques described in the following paragraphs would not enable the mental health professional to diagnose or treat the patient more effectively. Some of the techniques are also invasive and expose patients to small amounts of radiation. Research studies using these tests are generally not conducted with children or adolescents.

One extensively used technique to study brain activity and how mental illness changes the brain is **positron emission tomography** (PET).

PET measures the spatial distribution and movement of a radioactive chemical injected into the tissues of living subjects. Because the patient is awake, the technique can be used to investigate the relationship between behavioral and physiological effects and changes in brain activity. PET scans can detect very small (nanomolar) concentrations of tracer molecules and achieve spatial resolution of about 4 millimeters. In addition, computers can reconstruct images obtained from a PET scan in two or three dimensions.

PET requires the use of compounds that are labeled with positron-emitting isotopes. A **positron** has the same mass and spin as an electron but the opposite charge; an electron has a negative charge and a positron has a positive charge. A cyclotron accelerates protons into the nucleus of nitrogen, carbon, oxygen, or fluorine to generate these isotopes. The additional proton makes the isotope unstable. To become stable again, the proton must break down into a neutron and a positron. The unstable positron travels away from the site of generation and dissipates energy along the way. Eventually, the positron collides with an electron, leading to the emission of two gamma rays at 180 degrees from one another. The gamma rays reach a pair of detectors that record the event. Because the detectors respond only to simultaneous emissions, scientists can precisely map the location where the gamma rays were generated. The radioactive chemicals used for PET are very short lived. The half-life (the time for half of the radioactive label to disintegrate) of the commonly used radioisotopes ranges from approximately two minutes to less than two hours, depending on the specific compound. Because a PET scan requires only small amounts (a few micrograms) of short-lived radioisotopes, this technique can be used safely in humans.

PET scans can answer a variety of questions about brain function, including where the neurons are most active. Scientists use different radiolabeled compounds to investigate different

biological questions. For example, radiolabeled glucose can identify parts of the brain that become more active in response to a specific stimulus. Active neurons metabolize more glucose than inactive neurons. Active neurons emit more positrons, and this shows as red or yellow on PET scans compared with blue or purple in areas where the neurons are not highly active. (Different computer enhancement techniques may use a different color scheme, but the use of a spectrum with red indicating high activity and blue indicating low activity is common.) Scientists can use PET to measure changes in the activity of specific brain areas in a person who has a mental illness. Scientists can also investigate how the mentally ill brain changes after a person receives treatment.

PET imaging is not the only technique that researchers use to investigate how mental illness changes the brain. Different techniques provide different information to scientists. Another important technique is **magnetic resonance imaging** (MRI). Unlike PET, which reveals changes in activity level, MRI is used to look at structural changes in the brain. For example, MRI studies reveal that the **ventricles**, or spaces within the brain, are larger in individuals who have schizophrenia compared with those of healthy individuals.



*Figure 5. Scientists use a variety of imaging techniques to investigate brain structure and function.*



Other techniques that scientists use to investigate function in the living brain include **single photon emission computed tomography** (SPECT), functional magnetic resonance imaging (fMRI), and **electroencephalography** (EEG). Each technique has its own advantages, and each provides different information about brain structure and function. Scientists often use more than one technique when conducting their research.

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*Scientists believe that mental illnesses result from problems with the communication system in the brain.*

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## **6 The Causes of Mental Illnesses\***

At this time, scientists do not have a complete understanding of what causes mental illnesses. If you think about the structural and organizational complexity of the brain together with the complexity of effects that mental illnesses have on thoughts, feelings, and behaviors, it is hardly surprising that figuring out the causes of mental illnesses is a daunting task. The fields of neuroscience, psychiatry, and psychology address different aspects of the relationship between the biology of the brain and individuals' behaviors, thoughts, and feelings, and how their actions sometimes get out of control. Through this multidisciplinary research, scientists are trying to find the causes of mental illnesses. Once scientists can determine the causes of a mental illness, they can use that knowledge to develop new treatments or to find a cure.

### **6.1 The Biology of Mental Illnesses**

Most scientists believe that mental illnesses result from problems with the communication between neurons in the brain (**neurotransmission**). For example, the level of the neurotransmitter serotonin is lower in individuals who have depression. This finding led to the development of certain medications for the ill-

ness. **Selective serotonin reuptake inhibitors** (SSRIs) work by reducing the amount of serotonin that is taken back into the presynaptic neuron. This leads to an increase in the amount of serotonin available in the synaptic space for binding to the receptor on the postsynaptic neuron. Changes in other neurotransmitters (in addition to serotonin) may occur in depression, thus adding to the complexity of the cause underlying the disease.

Scientists believe that there may be disruptions in the neurotransmitters dopamine, glutamate, and norepinephrine in individuals who have schizophrenia. One indication that dopamine might be an important neurotransmitter in schizophrenia comes from the observation that cocaine addicts sometimes show symptoms similar to schizophrenia. Cocaine acts on dopamine-containing neurons in the brain to increase the amount of dopamine in the synapse.

### **6.2 Risk Factors for Mental Illnesses**

Although scientists at this time do not know the causes of mental illnesses, they have identified factors that put individuals at risk. Some of these factors are environmental, some are genetic, and some are social. In fact, all these factors most likely combine to influence whether someone becomes mentally ill.

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*Genetic, environmental, and social factors interact to influence whether someone becomes mentally ill.*

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Environmental factors such as head injury, poor nutrition, and exposure to toxins (including lead and tobacco smoke) can increase the likelihood of developing a mental illness.

Genes also play a role in determining whether someone develops a mental illness. The illnesses that are most likely to have a genetic component include autism, bipolar

\* Relevant to Lessons 2 and 3.

disorder, schizophrenia, and ADHD. For example, the observation that children with ADHD are much more likely to have a sibling or parent with ADHD supports a role for genetics in determining whether someone is at risk for ADHD. In studies of twins, ADHD is significantly more likely to be present in an identical twin than a fraternal twin. The same can be said for schizophrenia and

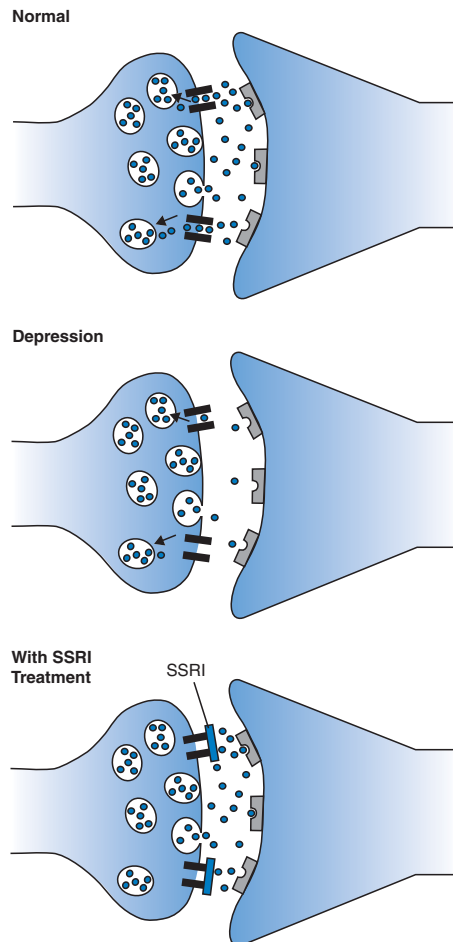
depression. Mental illnesses are not triggered by a change in a single gene; scientists believe that the interaction of several genes may trigger mental illness. Furthermore, the combination of genetic, environmental, and social factors might determine whether a case of mental illness is mild or severe.

Social factors also present risks and can harm an individual's, especially a child's, mental health. Social factors include

- severe parental discord,
- death of a family member or close friend,
- parent's mental illness,
- parent's criminality,
- overcrowding,
- economic hardship,
- abuse,
- neglect, and
- exposure to violence.

## 7 Treating Mental Illnesses\*

At this time, most mental illnesses cannot be cured, but they can usually be treated effectively to minimize the symptoms and allow the individual to function in work, school, or social environments. To begin treatment, an individual needs to see a qualified mental health professional. The first thing that the doctor or other mental health professional will do is speak with the individual to find out more about his or her symptoms, how long the symptoms have lasted, and how the person's life is being affected. The physician will also do a physical examination to determine whether there are other health problems. For example, some symptoms (such as emotional swings) can be caused by neurological or hormonal problems associated with chronic illnesses such as heart disease, or they can be a side effect of certain medications. After the individual's overall health is evaluated and the condition diagnosed, the doctor will develop a treatment plan. Treatment can involve both medications and psychotherapy, depending on the disease and its severity.



**Figure 6.** Scientists understand that mental illnesses are associated with changes in neurochemicals. For example, in people who have depression, less of the neurotransmitter serotonin (small circles) is released into the synaptic space than in people who do not have depression. Certain medications called selective serotonin reuptake inhibitors (SSRIs) relieve symptoms of depression by causing an increase in the amount of serotonin in the synaptic space.

\* Relevant to Lessons 4 and 5.



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*At this time, most mental illnesses cannot be cured, but they can usually be treated effectively to minimize the symptoms and allow the individual to function in work, school, or social environments.*

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### 7.1 Medications

Medications are often used to treat mental illnesses. Through television commercials and magazine advertisements, we are becoming more aware of those medications. To become fully effective, medications for treating mental illness must be taken for a few days or a few weeks. When a patient begins taking medication, it is important for a doctor to monitor the patient's health. If the medication causes undesirable side effects, the doctor may change the dose or switch to a different medication that produces fewer side effects. If the medication does not relieve the symptoms, the doctor may prescribe a different medication.<sup>2</sup>



*Figure 7. Medicines are one part of an effective treatment plan for mental illnesses.*

Sometimes, individuals who have a mental illness do not want to take their medications because of the side effects. It is important to remember that all medications have both positive and negative effects. For example,

antibiotics have revolutionized treatment for some bacterial diseases. However, antibiotics often affect beneficial bacteria in the human body, leading to side effects such as nausea and diarrhea. Psychiatric drugs, like other medications, can alleviate symptoms of mental illness but can also produce unwanted side effects. People who take a medication to treat an illness, whether it is a mental illness or another disease, should work with their doctors to understand what medication they are taking, why they are taking it, how to take it, and what side effects to watch for.

Occasionally, the media reports stories in which the side effects of a psychiatric medication are tied to a potentially serious consequence, such as suicide. In these cases, it is usually very difficult to determine how much suicidal behavior was due to the mental disorder and what the role of the medication might have been. Medications for treating mental illness can, like other medications, have side effects. The psychiatrist or physician can usually adjust the dose or change the medication to alleviate side effects.

### 7.2 Psychotherapy

**Psychotherapy** is a treatment method in which a mental health professional (psychiatrist, psychologist, or other mental health professional) and the patient discuss problems and feelings. This discussion helps patients understand the basis of their problems and find solutions. Psychotherapy may take different forms. The therapy can help patients

- change thought or behavior patterns,
- understand how past experiences influence current behaviors,
- solve other problems in specific ways, or
- learn illness self-management skills.

Psychotherapy may occur between a therapist and an individual; a therapist and an individual and his or her family members; or a therapist and a group. Often, treatment for mental illness is most successful when psychotherapy

is used in combination with medications. For severe mental illnesses, medication relieves the symptoms and psychotherapy helps individuals cope with their illness.<sup>3</sup>

Just as there are no medications that can instantly cure mental illnesses, psychotherapy is not a one-time event. The amount of time a person spends in psychotherapy can range from a few visits to a few years, depending on the nature of the illness or problem. In general, the more severe the problem, the more lengthy the psychotherapy should be.<sup>3</sup>

### 8 The Stigma of Mental Illness\*

*“The last great stigma of the twentieth century is the stigma of mental illness.”*

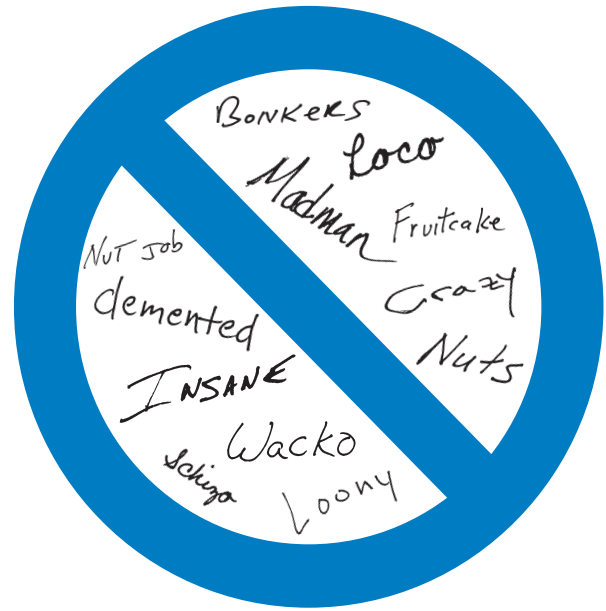
—Tipper Gore, wife of the former U.S. Vice President<sup>37</sup>

“Mentally ill people are nuts, crazy, wacko.”  
“Mentally ill people are morally bad.” “Mentally ill people are dangerous and should be locked in an asylum forever.” “Mentally ill people need somebody to take care of them.” How often have we heard comments like these or seen these types of portrayals in movies, television shows, or books? We may even be guilty of making comments like them ourselves. Is there any truth behind these portrayals, or is that negative view based on our ignorance and fear?

**Stigmas** are negative stereotypes about groups of people. Common stigmas about people who are mentally ill are

- Individuals who have a mental illness are dangerous.
- Individuals who have a mental illness are irresponsible and can't make life decisions for themselves.
- People who have a mental illness are childlike and must be taken care of by parents or guardians.
- People who have a mental illness should just get over it.<sup>11</sup>

\* Relevant to Lessons 1, 2, 3, 4, and 5.



**Figure 8.** Words can hurt. Many derogatory words and phrases are used in relation to mental illness. However, these words maintain the stereotyped image and not the reality about mental illness. Try not to use these words, and encourage students not to use them. It is more appropriate to refer to “a person who has a mental illness” when speaking about someone.

Each of those preconceptions about people who have a mental illness is based on false information. Very few people who have a mental illness are dangerous to society. Most can hold jobs, attend school, and live independently. A person who has a mental illness cannot simply decide to get over it any more than someone who has a different **chronic** disease such as diabetes, asthma, or heart disease can. A mental illness, like those other diseases, is caused by a physical problem in the body.

Stigmas against individuals who have a mental illness lead to injustices, including discriminatory decisions regarding housing, employment, and education. Overcoming the stigmas commonly associated with mental illness is yet one more challenge that people who have a mental illness must face. Indeed, many people who successfully manage their

mental illness report that the stigma they face is in many ways more disabling than the illness itself. The stigmatizing attitudes toward mental illness held by both the public and those who have a mental illness lead to feelings of shame and guilt, loss of self-esteem, social dependence, and a sense of isolation and hopelessness.<sup>11, 44</sup> One of the worst consequences of stigma is that people who are struggling with a mental illness may be reluctant to seek treatment that, in most cases, would significantly relieve their symptoms.

Providing accurate information is one way to reduce stigmas about mental illness. Advocacy groups protest stereotypes imposed upon those who are mentally ill. They demand that the media stop presenting inaccurate views of mental illness and that the public stop believing these negative views. A powerful way of countering stereotypes about mental illness occurs when members of the public meet people who are effectively managing a serious mental illness: holding jobs, providing for themselves, and living as good neighbors in a community. Interaction with people who have mental illnesses challenges a person's assumptions and changes a person's attitudes about mental illness.

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*Providing accurate information is one way to reduce stigmas about mental illness.*

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Attitudes about mental illness are changing, although there is a long way to go before people accept that mental illness is a disease with a biological basis. A survey by the National Mental Health Association found that 55 percent of people who have never been diagnosed with depression recognize that depression is a disease and not something people should "snap out of."<sup>34</sup> This is a substantial increase over the 38 percent of survey respondents in 1991 who recognized depression as a disease.

**\* Relevant to Lessons 4 and 5.**

## **9 The Consequences of Not Treating Mental Illness\***

Most people don't think twice before going to a doctor if they have an illness such as bronchitis, asthma, diabetes, or heart disease. However, many people who have a mental illness don't get the treatment that would alleviate their suffering. Studies estimate that two-thirds of all young people with mental health problems are not receiving the help they need and that less than one-third of the children under age 18 who have a serious mental health problem receive any mental health services. Mental illness in adults often goes untreated, too. What are the consequences of letting mental illness go untreated?

In September 2000, the U.S. surgeon general held a conference on children's mental health. The former surgeon general, Dr. David Satcher, emphasized the importance of mental health in children by stating, "Children and families are suffering because of missed opportunities for prevention and early identification, fragmented services, and low priorities for resources. Overriding all of this is the issue of stigma, which continues to surround mental illness."<sup>45</sup>

The consequences of mental illness in children and adolescents can be substantial. Many mental health professionals speak of **accrued deficits** that occur when mental illness in children is not treated. To begin with, mental illness can impair a student's ability to learn. Adolescents whose mental illness is not treated rapidly and aggressively tend to fall further and further behind in school. They are more likely to drop out of school and are less likely to be fully functional members of society when they reach adulthood.<sup>45</sup> We also now know that depressive disorders in young people confer a higher risk for illness and interpersonal and psychosocial difficulties that persist after the depressive episode is over. Furthermore, many adults who suffer from mental disorders have problems that originated in childhood.<sup>44</sup> Depression in youth may predict more

severe illness in adult life.<sup>27</sup> Attention deficit hyperactivity disorder, once thought to affect children and adolescents only, may persist into adulthood and may be associated with social, legal, and occupational problems.<sup>14</sup>

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*Mental illness impairs a student's ability to learn. Adolescents whose mental illness is not treated rapidly and aggressively tend to fall further and further behind in school.*

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The high incidence of mental illness has a great impact on society. Depression alone causes employers to lose over \$23 billion each year due to decreased productivity and absenteeism of employees.<sup>46</sup> The Global Burden of Disease Study, conducted by the World Health Organization, assessed the burden of all diseases in units that measure lost years of healthy life due to premature death or disability (disability-adjusted life years, or DALYs). Over 15 percent of the total DALYs were due to mental illness.<sup>26</sup> In 1996, the United States spent more than \$69 billion for the direct treatment of mental illnesses. Indirect costs of mental illness due to lost productivity in the workplace, schools, or homes represented a \$79 billion loss for the U.S. economy in 1990.<sup>44</sup>

Treatment, including psychotherapy and medication management, is cost-effective for patients, their families, and society. The benefits include fewer visits to other doctors' offices, diagnostic laboratories, and hospitals for physical ailments that are based in psychological distress; reduced need for psychiatric hospitalization; fewer sick days and disability claims; and increased job stability. Conversely, the costs of not treating mental disorders can be seen in ruined relationships, job loss or poor job performance, personal anguish, substance abuse, unnecessary medical procedures, psychiatric hospitalization, and suicide.<sup>3</sup>

**\* Relevant to Lessons 2, 3, 4, 5, and 6.**

\*\*In this module, the term depression refers to major depressive disorder. We will use the terms dysthymia and bipolar disorder specifically when we are referring to those types of depressive disorders.

## **10 Information about Specific Mental Illnesses\***

A diagnosis of mental illness is rarely simple and straightforward. There are no infallible physiological tests that determine whether a person has a mental illness. Diagnosis requires that qualified healthcare professionals identify several specific symptoms that the person exhibits. Each mental illness has characteristic signs and symptoms that are related to the underlying biological dysfunction. The following sections describe the symptoms and outcomes of three mental illnesses that are highlighted in this curriculum supplement: depression, attention deficit hyperactivity disorder, and schizophrenia.

### **10.1 Depression**

Depression, or depressive disorders, is a leading cause of disability in the United States as well as worldwide. It affects an estimated 9.5 percent of American adults in a given year.<sup>28</sup> Nearly twice as many women as men have depression.<sup>25</sup> Epidemiological studies have reported that up to 2.5 percent of children and 8.3 percent of adolescents in the United States suffer from depression.<sup>22</sup>

**10.1.1 The symptoms of depression.** Depression is more than just being in a bad mood or feeling sad. Everyone experiences these feelings on occasion, but that does not constitute depression. Depression is actually not a single disease; there are three main types of depressive disorders.<sup>23, 27</sup> They are

- **major depressive disorder,\*\***
- **dysthymia,** and
- **bipolar disorder (manic-depression).**

While some of the symptoms of depression are common during a passing "blue mood," major depressive disorder is diagnosed when a person has five or more of the symptoms nearly every day during a two-week period.<sup>27</sup> Symptoms of depression include

- a sad mood,
- a loss of interest in activities that one used to enjoy,
- a change in appetite or weight,
- oversleeping or difficulty sleeping,
- physical slowing or agitation,
- energy loss,
- feelings of worthlessness or inappropriate guilt,
- difficulty concentrating, and
- recurrent thoughts of death or suicide.

When people have depression, their lives are affected severely: they have trouble performing at work or school, and they aren't interested in normal family and social activities. In adults, an untreated major depressive episode lasts an average of nine months. At least half of the people who experience an episode of major depression will have another episode of depression at some point.<sup>44</sup>

In children, depression lasts an average of seven to nine months with symptoms similar to those in adults.<sup>44</sup> Symptoms in children may include

- sadness,
- loss of interest in activities they used to enjoy,
- self-criticism,
- feelings that they are unloved,
- hopelessness about the future,
- thoughts of suicide,
- irritability,
- indecisiveness,
- trouble concentrating, and
- lack of energy.

Children and adolescents with depression are more likely than adults to have anxiety symptoms and general aches and pains, stomachaches, and headaches. The majority of children and adolescents who have a major depressive disorder also have another mental illness such as an anxiety disorder, disruptive or antisocial behavior, or a substance-abuse disorder. Children and adolescents who suffer

from depression are more likely to commit suicide than are other youths. As in adults, episodes of depression are likely to recur.<sup>44</sup>

Dysthymia is less severe than major depressive disorder, but it is more chronic. In dysthymia, a depressed mood along with at least two other symptoms of depression persist for at least two years in adults, or one year in children or adolescents.<sup>22</sup> These symptoms may not be as disabling, but they do keep affected people from functioning well or feeling good. Dysthymia often begins in childhood, adolescence, or early adulthood.<sup>25</sup> On average, untreated dysthymia lasts four years in children and adolescents.<sup>44</sup>

A third type of depressive disorder is bipolar disorder, also called manic-depression. A person who has bipolar disorder alternates between episodes of major depression and mania (periods of abnormally and persistently elevated mood or irritability). During manic periods, the person will also have three or more of the following symptoms:

- overly inflated self-esteem,
- decreased need for sleep,
- increased talkativeness,
- racing thoughts,
- distractibility,
- increased goal-directed activity or physical agitation, and
- excessive involvement in pleasurable activities that have a high potential for painful consequences.<sup>27</sup>

While in a manic phase, adolescents may engage in risky or reckless behaviors such as fast driving and unsafe sex.

Bipolar disorder frequently begins during adolescence or young adulthood. Adults with bipolar disorder often have clearly defined episodes of mania and depression, with periods of mania every two to four years. Children and adolescents with bipolar disorder, however, may cycle rapidly between depression and



mania many times within a day.<sup>29</sup> Bipolar disorder in youths may be difficult to distinguish from other mental illnesses because the symptoms often overlap with those of other mental illnesses such as ADHD, conduct disorder, or oppositional defiant disorder.

**10.1.2 The causes of depression (depressive disorders).** Depression, like other mental illnesses, is probably caused by a combination of biological, environmental, and social factors, but the exact causes are not yet known. For years, scientists thought that low levels of certain neurotransmitters (such as serotonin, dopamine, or norepinephrine) in the brain caused depression. However, scientists now believe that the interplay of factors leading to depression is much more complex. Genetic causes have been suggested from family studies that have shown that between 20 and 50 percent of children and adolescents with depression have a family history of depression and that children of depressed parents are more than three times as likely as children with nondepressed parents to experience a depressive disorder.<sup>44</sup> Abnormal endocrine function, specifically of the **hypothalamus** or **pituitary**, may play a role in causing depression. Other **risk factors** for depressive disorders in youths include

- stress,
- cigarette smoking,
- loss of a parent,
- the breakup of a romantic relationship,
- attention disorders,
- learning disorders,
- abuse,
- neglect, and
- other trauma including experiencing a natural disaster.<sup>22</sup>

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*Depression, like other mental illnesses, is probably caused by a combination of biological, environmental, and social factors, but the exact causes are not yet known.*

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Scientists have studied changes in the brain associated with depressive disorders. Imaging studies using PET have shown that brain activity in certain areas is substantially decreased in a depressed individual whereas activity in other brain regions is increased compared with the same individual after successful treatment.<sup>13</sup> PET imaging has also shown that depressed patients have lower neurotransmitter receptor binding potential in some areas of the brain.<sup>48</sup> Scientists looking at changes in the brains of bipolar patients found decreases in the size of the cerebellum (the part of the brain that regulates balance and controlled movements), changes in the metabolism of some chemical compounds, and a decrease in the activity of specific brain regions (prefrontal cortex) during the depression phase.<sup>42</sup>

**10.1.3 Treating depression.** A variety of antidepressant medications and psychotherapies are used to treat depression. The most effective treatment for most people is a combination of medication and psychotherapy.<sup>23</sup>

Many of us are aware that medications are available to treat depressive disorders—we see the ads on television and in magazines. Up to 70 percent of people with depression can be treated effectively with medication.<sup>44</sup> Medications used to treat depressive disorders usually act on the neurotransmission pathway. For example, some medications affect the activity of certain neurotransmitters, such as serotonin or norepinephrine. Different depressive disorders require different medication therapies. For example, individuals who have bipolar disorder are often treated with a mood-stabilizing drug, such as lithium, during their manic phase and a combination of mood-stabilizer and **antidepressant** medications during their depressive phase.

Medications usually lead to relief from the symptoms of depression within six to eight

weeks. If one drug doesn't relieve symptoms, doctors can prescribe a different antidepressant drug. As with drugs to treat other mental illnesses, patients are monitored closely by their doctor for symptoms of depression and for side effects. Patients who continue to take their medication for at least six months after recovery from major depression are 70 percent less likely to experience a relapse.<sup>1</sup>

Psychotherapy helps patients learn more effective ways to deal with the problems in their lives. These therapies usually involve 6 to 20 weekly meetings. These treatment plans should be revised if there is no improvement of symptoms within three or four months.<sup>44</sup>

The combination of medications and psychotherapy is effective in the majority of cases and represents the standard care; however, doctors can employ other methods. One therapy that is highly effective when antidepressants and psychotherapy are not effective is **electroconvulsive therapy** (ECT), or **electroshock therapy**.<sup>23</sup> ECT is not commonly used in children and adolescents. When ECT is performed, the individual is anesthetized and receives an electrical shock in specific parts of the brain. The patient does not consciously experience the shock. ECT can provide dramatic and rapid relief, but the effects usually last a fairly short time. After ECT, individuals usually take antidepressant medications.

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*The combination of medications and psychotherapy is effective in the majority of cases.*

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A few years ago, the herbal supplement **St. John's wort** received great attention in the media as an over-the-counter treatment for mild to moderate depression. However, many of the claims did not have good scientific evidence to back them up. The effectiveness and safety of St. John's wort remain uncertain, and its use is generally not recommended.<sup>31</sup>

**10.1.4 Coping with depression.** People who have depression (or another depressive disorder) feel exhausted, worthless, helpless, and hopeless. These negative thoughts and feelings that are part of depression make some people feel like giving up. As treatment takes effect, these thoughts begin to go away. Some strategies that can help a person waiting for treatment to take effect include

- setting realistic goals in light of the depression and assuming a reasonable amount of responsibility;
- breaking large tasks into small ones, setting some priorities, and doing what one can as one can;
- trying to be with other people and to confide in someone—it is usually better than being alone and secretive;
- participating in activities that may make one feel better;
- getting some mild exercise, going to a movie or a ball game, or participating in religious, social, or other activities;
- expecting one's mood to improve gradually, not immediately (feeling better takes time);
- postponing important decisions until the depression has lifted and discussing big decisions with family or friends who have a more objective view of the situation;
- remembering that positive thinking will replace the negative thinking that is part of the depression as one's depression responds to treatment; and
- letting one's family and friends help.<sup>23</sup>

**10.1.5 Suicide.** A potential, tragic consequence of untreated depression is suicide. In 1997, over 30,000 people in the United States died from suicide, and suicide was the third leading cause of death among 10- to 24-year-olds.<sup>22, 25</sup> Over 90 percent of these people had a mental illness, typically either a depressive disorder or a substance-abuse disorder.<sup>25</sup> Research from the National Institute of Mental Health estimates that as many as seven percent of adolescents who develop a major depressive disorder become victims of suicide.<sup>22</sup>



Danger signs that a teen may be considering suicide include

- undergoing dramatic personality change;
- giving away prized possessions;
- writing notes or poems about death;
- talking about suicide, even jokingly;
- making comments such as, “I can’t take it anymore” or “I won’t be a problem for you much longer”;
- previously attempting suicide;
- running away from home; and
- having other symptoms or risk factors for depression, such as difficulty getting along with parents and friends, difficulty in school, or acting bored or withdrawn.

Children and adolescents who are suicidal report feelings of depression, anger, anxiety, hopelessness, and worthlessness. They feel helpless to change frustrating circumstances or to find a solution for their problems. In addition to depression, family conflicts and suicidal death of a relative, friend, or acquaintance are risk factors for suicide among children and adolescents.<sup>44</sup> In the case of another person’s suicide, children or teens may need intervention to prevent feelings of guilt, trauma, or social isolation. Programs offered by school professionals that address these concerns can be extremely helpful for identifying grieving youths who may need help.

Public health approaches to preventing suicide include establishing telephone crisis hot lines, restricting access to suicide methods (for example, firearms), counseling media to reduce “copycat” suicides, screening teens for risk factors of suicide, and training professionals to improve recognition and treatment of mood disorders. Research about the effectiveness of these methods indicates that the screening and training strategies are more helpful for preventing suicides among young people than the other methods are.<sup>44</sup>

## **10.2 Attention Deficit Hyperactivity Disorder (ADHD)**

Attention deficit hyperactivity disorder (ADHD) is the most commonly diagnosed behavioral disorder of childhood. In any six-month period, ADHD affects an estimated 4.1 percent of youths ages 9 to 17. Boys are two to three times more likely than girls to develop ADHD.<sup>25</sup> Although ADHD is usually associated with children, the disorder can persist into adulthood.<sup>19</sup> One researcher<sup>6</sup> estimated that as many as two-thirds of the children he evaluated with ADHD continued to have the disorder in their twenties, and that many of those who no longer fit the clinical description of ADHD nonetheless had significant problems at work or in other social settings.

**10.2.1 The symptoms of ADHD.** The three predominant symptoms of ADHD are impaired ability to regulate activity level (hyperactivity), to attend to tasks (inattention), and to inhibit behavior (impulsivity).<sup>19</sup> Individuals who have ADHD may display predominantly hyperactive/impulsive behavior, predominately inattentive behavior, or a combination of both. Children and adolescents with ADHD

- are often unpopular among their peers,
- have trouble in school,
- have higher injury rates than their peers,
- have difficulty paying attention to details,
- are easily distracted,
- find it difficult and unpleasant to finish their schoolwork,
- put off things that require continued mental effort,
- make careless mistakes,
- are disorganized,
- appear not to listen when spoken to, and
- fail to follow through on tasks.<sup>18, 30, 44</sup>

The DSM-IV<sup>5</sup> specifies several conditions in addition to the symptoms listed above before making a diagnosis of ADHD. For a diagnosis of ADHD, the behaviors must

- appear before age seven,
- continue for at least six months,
- be more frequent or severe than in other children of the same age, and
- cause dysfunction in at least two areas of life, such as school, home, work, or social settings.<sup>19</sup>

The diagnosis of ADHD can be made reliably using well-tested diagnostic interview methods. However, as of yet, there is no independent valid test for ADHD.

Among children, ADHD frequently occurs along with other learning, behavior, or mood problems such as learning disabilities, **oppositional defiant disorder**, anxiety disorders, and depression.

**10.2.2 The causes of ADHD.** The exact causes of ADHD are unknown; however, research has demonstrated that factors that many people associate with the development of ADHD do not cause the disorder. For example, ADHD is not caused by minor head injuries, damage to the brain from complications during birth, food allergies, excess sugar intake, too much television, poor schools, or poor parenting.<sup>7, 19</sup> No single cause of ADHD has been discovered. Rather, a number of significant risk factors affecting neurodevelopment and behavior expression have been implicated. Events such as maternal alcohol and tobacco use that affect the development of the fetal brain can increase the risk for ADHD. Injuries to the brain from environmental toxins such as lack of iron have also been implicated.

Scientists have investigated the role of the neurotransmitter dopamine in the development of ADHD because this neurotransmitter plays a key role in regulating movement, increasing motivation and alertness, and inducing insomnia. The observation that ADHD tends to run in families strongly suggests that the disease has a genetic component. Children

who have ADHD usually have at least one close relative who also has the disorder.<sup>24</sup> One group of researchers found that a child whose identical twin has ADHD is 11 to 18 times more likely to develop the disorder than a nontwin sibling.

Investigations of particular genes involved in ADHD have focused on a dopamine receptor gene (DRD) on chromosome 11 and the dopamine transporter gene (DAT1) on chromosome 5.<sup>44</sup> Ongoing studies continue to examine these genes and others as factors in ADHD. Most likely, a combination of several genes and environmental factors determines whether a person has ADHD.

Imaging studies have shown differences in the brains of boys with ADHD compared with boys who do not have ADHD. Researchers found that certain parts of the brain are, on average, smaller in boys with ADHD.<sup>8</sup> Other studies found that the total brain volume is smaller in girls who have ADHD than in control subjects; these results match similar findings about the brains of boys with ADHD.<sup>9</sup> Scientists have speculated that the changes in the particular brain regions may be involved in the inability to inhibit thoughts, which is a symptom of ADHD.

**10.2.3 Treating ADHD.** A variety of medications and behavioral interventions are used to treat ADHD. The most widely used medications are methylphenidate (Ritalin), D-amphetamine, and other amphetamines. These drugs are stimulants that affect the level of the neurotransmitter dopamine at the synapse.<sup>40</sup> Nine out of 10 children improve while taking one of these drugs.<sup>19</sup>

When used as prescribed by qualified physicians, these drugs are considered quite safe. Side effects associated with moderate doses are decreased appetite and insomnia. These side effects generally occur early in

treatment and often decrease with time. Some studies have shown that the stimulants used to treat ADHD decrease growth rate, but ultimate height is not affected.

Interventions used to treat ADHD include several forms of psychotherapy, such as cognitive-behavioral therapy, social skills training, support groups, and parent and educator skills training. A combination of medication and psychotherapy is more effective than either treatment alone in improving social skills, parent-child relations, reading achievement, and aggressive symptoms.<sup>24</sup>

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*Treating ADHD with a combination of medication and psychotherapy is more effective than either treatment alone in improving social skills, parent-child relations, reading achievement, and aggressive symptoms.*

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In addition to the well-established treatments described above, some parents and therapists have tried a variety of nutritional interventions to treat ADHD. A few studies have found that some children benefit from such treatments. Nevertheless, no well-established nutritional interventions have consistently been shown to be effective for treating ADHD.<sup>24</sup>

**10.2.4 Coping with ADHD.** As the symptoms indicate, ADHD interferes with a person's daily life. Treatment is available to help individuals and relieve the symptoms, but some simple strategies — including those listed below — can also help.

- Asking the teacher or boss to repeat instructions (rather than guessing what they were).
- Breaking large assignments or job tasks into small, simple tasks. Set a deadline for each task and give a reward as each one is completed.

- Making a list of what needs to be done each day. Plan the best order for doing each task. Then make a schedule for doing them. Use a calendar or daily planner to keep on track.
- Working in a quiet area. Do one thing at a time. Take short breaks.
- Writing things that need to be remembered in a notebook with dividers. Carry the book at all times.
- Posting notes as reminders of things to do.
- Storing similar things together.
- Creating a routine. Get ready for school or work at the same time, in the same way, every day.
- Exercising, eating a balanced diet, and getting enough sleep.

### **10.3 Schizophrenia**

Schizophrenia affects approximately 1 percent of the population, or 2.2 million U.S. adults. Men and women are equally affected.<sup>25, 32</sup> The illness usually emerges in young people in their teens or twenties. Although children over the age of five can develop schizophrenia, it is rare before adolescence.<sup>21</sup> In children, the disease usually develops gradually and is often preceded by developmental delays in motor or speech development. Childhood-onset schizophrenia tends to be harder to treat and has a less favorable prognosis than does the adult-onset form.

**10.3.1 The symptoms of schizophrenia.** There are many myths and misconceptions about schizophrenia. Schizophrenia is not a multiple or split personality, nor are individuals who have this illness constantly incoherent or psychotic. Although the media often portray individuals with schizophrenia as violent, in reality, very few affected people are dangerous to others.<sup>32</sup> In fact, individuals with schizophrenia are more likely to be victims of violence than violent themselves.

Schizophrenia has severe symptoms. A diagnosis of schizophrenia requires that at least

two of the symptoms below be present during a significant portion of a one-month period:

- delusions (false beliefs such as conspiracies, mind control, or persecution);
- hallucinations (usually voices criticizing or commenting on the person's behavior);
- disorganized speech (incomprehensible or difficult to understand);
- grossly disorganized or catatonic behavior; and
- negative symptoms such as flat emotions, lack of facial expressions, and inattention to basic self-care needs such as bathing and eating.<sup>5</sup>

However, the presence of either one of the first two symptoms is sufficient to diagnose schizophrenia if the delusions are especially bizarre or if the hallucinations consist of one or more voices that keep a running commentary on the person's behavior or thoughts.<sup>5</sup>

The DSM-IV specifies additional criteria for a diagnosis of schizophrenia:

- social or occupational dysfunction,
- persistence of the disturbance for at least six months,
- exclusion of a mood disorder,
- exclusion of a substance-abuse or medical condition that causes similar symptoms, and
- consideration of a possible pervasive developmental disorder.<sup>44</sup>

The course of schizophrenia varies considerably from one individual to the next. Most people who have schizophrenia experience at least one, and usually more, relapses after their first psychotic episode.<sup>32</sup> Relapses are periods of more intense symptoms of illness (hallucinations and delusions). During remissions, the negative symptoms related to emotion or personal care are usually still present. About 10 percent of patients remain severely ill for long periods of time and do not return to their previous state of mental functioning. Several long-term studies found that as many as one-third to one-half of people

with schizophrenia improve significantly or even recover completely from their illness.<sup>44</sup>

**10.3.2 The causes of schizophrenia.** Like the other mental illnesses discussed here, scientists are still working to determine what causes schizophrenia. Also like the other mental illnesses, genetic and environmental factors most likely interact to cause the disease. Several studies suggest that an imbalance of chemical neurotransmitter systems of the brain, including the dopamine, GABA, glutamate, and norepinephrine neurotransmitter systems, are involved in the development of schizophrenia.<sup>20, 36</sup>

Family, twin, and adoption studies support the idea that genetics plays an important role in the illness. For example, children of people with schizophrenia are 13 times more likely, and identical twins are 48 times more likely, to develop the illness than are people in the general population.<sup>44</sup> Scientists continue to look at genes that may play a role in causing schizophrenia. One gene of interest to scientists who study schizophrenia codes for an enzyme that breaks down dopamine in the synapse.<sup>12</sup> Investigations to confirm the role of this and other genes are ongoing.

Imaging studies have revealed differences in brain structure and function in individuals with schizophrenia compared with control individuals. Brain imaging studies show that young people who have schizophrenia have structural differences in their brains compared with individuals who do not have schizophrenia. These changes include a reduced total volume of the **cerebrum** (the upper portion of the brain, which is divided into halves), a reduced amount of **gray matter** (the tissue that makes up a majority of the brain and consists mainly of neuron cell bodies and dendrites), enlarged brain ventricles (the cavities, or spaces, in the brain that are filled with cerebrospinal fluid), and other abnormalities.<sup>38, 39, 41</sup> PET scans of identical

twins have revealed that the twin with schizophrenia has lower brain activity in the frontal lobes (the front section of the cerebral lobes) than does the twin who does not have schizophrenia.<sup>47</sup> One group of researchers used MRI to periodically scan the brains of teens with childhood-onset schizophrenia and an age-matched control group over a five-year period. They found that teens with schizophrenia lose four times the amount of neurons in a specific region of the brain that teens in the control group lose.<sup>43</sup>

**10.3.3 Treating schizophrenia.** There is no cure for schizophrenia; however, effective treatments that make the illness manageable for most affected people are available. The optimal treatment includes antipsychotic medication combined with a variety of psychotherapeutic interventions.<sup>44</sup>

Since the 1950s, doctors have used antipsychotic drugs, such as chlorpromazine and haloperidol, to relieve the hallucinations and delusions typical of schizophrenia. Recently, newer (also called atypical) antipsychotic drugs such as risperidone and clozapine have proven to be more effective. Early and sustained treatment that includes antipsychotic medication is important for long-term improvement of the course of the disease. Patients who discontinue medication are likely to experience a **relapse** of their illness.<sup>32</sup>

People who manage schizophrenia best combine medication with psychosocial rehabilitation (life-skills training).<sup>17</sup> Therapies that combine family and community support, education, and behavioral and cognitive skills to address specific challenges help schizophrenic patients improve their functioning and the quality of their lives.

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*The optimal treatment for schizophrenia includes antipsychotic medication and psychotherapy.*

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## **11 Finding Help for Someone with Mental Illness\***

As a teacher, you may occasionally have students who show symptoms of or who have significant risk factors for a mental illness. A first step for helping these students is to contact the school nurse or guidance counselor. These individuals should know the appropriate next steps to take, including directing the student's parents or guardians to contact their physician or their city or county mental health services.

If you think a friend or colleague might have a mental illness, encourage him or her to see a physician. Physicians can make referrals to mental health specialists in the community. In addition, your state or county health departments may offer services for people struggling with a mental illness. The National Mental Health Association has an affiliate network throughout the country. The programs offered by the NMHA affiliates include support groups, public education and advocacy campaigns, rehabilitation, and housing services. You can access the NMHA's affiliate network through its Web site: <http://www.nmha.org/nav/section/affiliate.cfm>.

The Additional Resources for Teachers section describes other online resources about mental illnesses (page 53).

\* Relevant to Lessons 1, 2, 3, 4, 5, and 6.

# Glossary

**accrued deficits:** The delays or lack of development in emotional, social, academic, or behavioral skills that a child or adolescent experiences because of untreated mental illness. The mental illness keeps the individual from developing these life skills at the usual stage of life. An individual may never fully make up for these deficiencies.

**acute:** Refers to a disease or condition that has a rapid onset, marked intensity, and short duration.

**antidepressant:** A medication used to treat depression.

**anxiety:** An abnormal sense of fear, nervousness, and apprehension about something that might happen in the future.

**anxiety disorder:** Any of a group of illnesses that fill people's lives with overwhelming anxieties and fears that are chronic and unremitting. Anxiety disorders include panic disorder, obsessive-compulsive disorder, post-traumatic stress disorder, phobias, and generalized anxiety disorder.

**attention deficit disorder (ADD):**  
See attention deficit hyperactivity disorder.

**attention deficit hyperactivity disorder (ADHD):** A mental illness characterized by an impaired ability to regulate activity level (hyperactivity), attend to tasks (inattention), and inhibit behavior (impulsivity). For a diagnosis of ADHD, the behaviors must appear before an individual reaches age seven, continue

for at least six months, be more frequent than in other children of the same age, and cause impairment in at least two areas of life (school, home, work, or social function).

**autism:** A mental illness that typically affects a person's ability to communicate, form relationships with others, and respond appropriately to the environment. Some people with autism have few problems with speech and intelligence and are able to function relatively well in society. Others are mentally retarded or mute or have serious language delays. Autism makes some people seem closed off and shut down; others seem locked into repetitive behaviors and rigid patterns of thinking.

**axon:** The long, fiberlike part of a neuron by which the cell carries information to target cells.

**bipolar disorder:** A depressive disorder in which a person alternates between episodes of major depression and mania (periods of abnormally and persistently elevated mood). Also referred to as manic-depression.

**cerebrum:** The upper part of the brain that consists of the left and right hemispheres.

**chronic:** Refers to a disease or condition that persists over a long period of time.

**cognition:** Conscious mental activity that informs a person about his or her environment. Cognitive actions include perceiving, thinking, reasoning, judging, problem solving, and remembering.



**conduct disorder:** A personality disorder of children and adolescents involving persistent antisocial behavior. Individuals with conduct disorder frequently participate in activities such as stealing, lying, truancy, vandalism, and substance abuse.

**delusion:** A false belief that persists even when a person has evidence that the belief is not true.

**dendrite:** The specialized fibers that extend from a neuron's cell body and receive messages from other neurons.

**depression (depressive disorders):** A group of diseases including major depressive disorder (commonly referred to as depression), dysthymia, and bipolar disorder (manic-depression). See bipolar disorder, dysthymia, and major depressive disorder.

**Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV):** A book published by the American Psychiatric Association that gives general descriptions and characteristic symptoms of different mental illnesses. Physicians and other mental health professionals use the DSM-IV to confirm diagnoses for mental illnesses.

**disease:** A synonym for illness. See illness.

**disorder:** An abnormality in mental or physical health. In this module, disorder is used as a synonym for illness.

**dysthymia:** A depressive disorder that is less severe than major depressive disorder but is more persistent. In children and adolescents, dysthymia lasts for an average of four years.

**electroconvulsive therapy (ECT):** A treatment for severe depression that is usually used only when people do not respond to medications and psychotherapy. ECT involves passing a low-voltage electric current through the brain.

The person is under anesthesia at the time of treatment. ECT is not commonly used in children and adolescents.

**electroencephalography (EEG):** A method of recording the electrical activity in the brain through electrodes attached to the scalp.

**electroshock therapy:** See electroconvulsive therapy.

**frontal lobe:** One of the four divisions of each cerebral hemisphere. The frontal lobe is important for controlling movement and associating the functions of other cortical areas.

**gray matter:** The portion of brain tissue that is dark in color. The gray matter consists primarily of nerve cell bodies, dendrites, and axon endings.

**hallucination:** The perception of something, such as a sound or visual image, that is not actually present other than in the mind.

**hypothalamus:** The part of the brain that controls several body functions, including feeding, breathing, drinking, temperature, and the release of many hormones.

**illness:** A problem in which some part or parts of the body do not function normally, in a way that interferes with a person's life. For the purpose of this module, other terms considered to be synonyms for illness include disease, disorder, condition, and syndrome.

**magnetic resonance imaging (MRI):** An imaging technique that uses magnetic fields to take pictures of the structure of the brain.

**major depressive disorder:** A depressive disorder commonly referred to as depression. Depression is more than simply being sad; to be diagnosed with depression, a person must have five or more characteristic symptoms nearly every day for a two-week period.



**mania:** Feelings of intense mental and physical hyperactivity, elevated mood, and agitation.

**manic-depression:** See bipolar disorder.

**mental illness:** A health condition that changes a person's thinking, feelings, or behavior (or all three) and that causes the person distress and difficulty in functioning.

**mental retardation:** A condition in which a person has an IQ that is below average and that affects an individual's learning, behavior, and development. This condition is present from birth.

**myelin:** A fatty material that surrounds and insulates the axons of some neurons.

**neuron (nerve cell):** A unique type of cell found in the brain and body that processes and transmits information.

**neurosis:** A term no longer used medically as a diagnosis for a relatively mild mental or emotional disorder that may involve anxiety or phobias but does not involve losing touch with reality.

**neurotransmission:** The process that occurs when a neuron releases neurotransmitters that relay a signal to another neuron across the synapse.

**neurotransmitter:** A chemical produced by neurons that carries messages to other neurons.

**obsessive-compulsive disorder (OCD):** An anxiety disorder in which a person experiences recurrent unwanted thoughts or rituals that the individual cannot control. A person who has OCD may be plagued by persistent, unwelcome thoughts or images or by the urgent need to engage in certain rituals, such as hand washing or checking.

**oppositional defiant disorder:** A disruptive pattern of behavior of children and adolescents that is characterized by defiant, disobedient, and hostile behaviors directed toward adults in positions of authority. The behavior pattern must persist for at least six months.

**panic disorder:** An anxiety disorder in which people have feelings of terror, rapid heart beat, and rapid breathing that strike suddenly and repeatedly with no warning. A person who has panic disorder cannot predict when an attack will occur and may develop intense anxiety between episodes, worrying when and where the next one will strike.

**phobia:** An intense fear of something that poses little or no actual danger. Examples of phobias include fear of closed-in places, heights, escalators, tunnels, highway driving, water, flying, dogs, and injuries involving blood.

**pituitary gland:** An endocrine organ closely linked with the hypothalamus. The pituitary secretes a number of hormones that regulate the activity of other endocrine organs in the human body.

**positron:** A positively charged particle that has the same mass and spin as—but the opposite charge of—an electron.

**positron emission tomography (PET):** An imaging technique for measuring brain function in living subjects by detecting the location and concentration of small amounts of radioactive chemicals.

**postsynaptic neuron:** The neuron that receives messages from other neurons.

**presynaptic neuron:** The neuron that sends messages to other neurons by releasing neurotransmitters into the synapse.

**psychiatrist:** A medical doctor (M.D.) who specializes in treating mental diseases. A psychiatrist evaluates a person's mental health along with his or her physical health and can prescribe medications.

**psychiatry:** The branch of medicine that deals with identifying, studying, and treating mental, emotional, and behavioral disorders.

**psychologist:** A mental health professional who has received specialized training in the study of the mind and emotions. A psychologist usually has an advanced degree such as a Ph.D.

**psychosis:** A serious mental disorder in which a person loses contact with reality and experiences hallucinations or delusions.

**psychotherapy:** A treatment method for mental illness in which a mental health professional (psychiatrist, psychologist, counselor) and a patient discuss problems and feelings to find solutions. Psychotherapy can help individuals change their thought or behavior patterns or understand how past experiences affect current behaviors.

**receptor:** A molecule that recognizes specific chemicals, including neurotransmitters and hormones, and transmits the message into the cell on which the receptor resides.

**relapse:** The reoccurrence of symptoms of a disease.

**reuptake pump:** The large molecule that carries neurotransmitter molecules back into the presynaptic neuron from which they were released. Also referred to as a transporter.

**risk:** The chance or possibility of experiencing harm or loss.

**risk factor:** Something that increases a person's risk or susceptibility to harm.

**schizophrenia:** A chronic, severe, and disabling brain disease. People with schizophrenia often suffer terrifying symptoms such as hearing internal voices or believing that other people are reading their minds, controlling their thoughts, or plotting to harm them. These symptoms may leave them fearful and withdrawn. Their speech and behavior can be so disorganized that they may be incomprehensible or frightening to others.

**selective serotonin reuptake inhibitors (SSRIs):** A group of medications used to treat depression. These medications cause an increase in the amount of the neurotransmitter serotonin in the brain.

**serotonin:** A neurotransmitter that regulates many functions, including mood, appetite, and sensory perception.

**single photon emission computed tomography (SPECT):** A brain imaging process that measures the emission of single photons of a given energy from radioactive tracers in the human body.

**stigma:** A negative stereotype about a group of people.

**St. John's wort:** An herb sometimes used to treat mild cases of depression. Although the popular media have reported successes using St. John's wort, it is not a recommended treatment. The scientific evidence for its effectiveness and safety is not conclusive.

**symptom:** Something that indicates the presence of a disease.

**synapse:** The site where presynaptic and postsynaptic neurons communicate with each other.

**synaptic space:** The intercellular space between a presynaptic and postsynaptic neuron. Also referred to as the synaptic cleft.

**syndrome:** A group of symptoms or signs that are characteristic of a disease. In this module, the word syndrome is used as a synonym for illness.

**transporter:** A large protein on the cell membrane of axon terminals. It removes neurotransmitter molecules from the synaptic space by carrying them back into the axon terminal that released them. Also referred to as the reuptake pump.

**ventricle:** One of the cavities or spaces in the brain that are filled with cerebrospinal fluid.

**vesicle:** A membranous sac within an axon terminal that stores and releases neurotransmitters.

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## Figure Credits

### Teacher Background

5: digitalStock; 7: Corbis.

### Lesson 1

1.2a: Eyewire; 1.2b, c: Corbis; Master 1.3: Daniel Weinberger, M.D.; E. Fuller Torrey, M.D.; Karen Berman, M.D.; NIMH Clinical Brain Disorders Branch, Division of Intramural Research Programs, NIMH, 1990.

### Lesson 2

Opener: PhotoDisc; Master 2.8: Vastag, B. 2002. Decade of work shows depression is physical. *Journal of the American Medical Association*, 287(14): 1787–1793. Copyright © 2002. American Medical Association. All rights reserved.

### Lesson 4

Master 4.2: *Archives of General Psychiatry*, July 2001, 58: 638. Copyright © 2001. American Medical Association. All rights reserved.

# Additional Resources for Teachers

The following organizations have developed materials about mental illnesses and their treatment that may be useful to you or your students. Much of the information is available on the World Wide Web. Phone numbers are also provided here for your reference.

## **American Academy of Child and Adolescent Psychiatry (AACAP)**

<http://www.aacap.org>

1-202-966-7300

The AACAP is the leading national professional medical association dedicated to treating and improving the quality of life of children, adolescents, and families affected by mental, behavioral, or developmental disorders. The organization includes over 6,500 child and adolescent psychiatrists and other interested physicians. This site provides information about child and adolescent psychiatry, fact sheets for parents and caregivers, updates on current research on children's mental health, and information on managed care. It also includes guidelines for seeking a child or adolescent psychiatrist and a referral directory.

## **American Psychiatric Association (APA)**

<http://www.psych.org>

1-703-907-7300

Over 38,000 U.S. and international physicians are members of the APA making it the world's largest psychiatric organization. The vision of the organization is to ensure that high-quality psychiatric diagnosis and treatment is available and accessible for all people who have a mental disorder. The Web site includes information about mental illnesses for the public, advice for choosing a psychiatrist, breaking news about mental illnesses, advocacy information to reduce stigma associated with mental illness, and books and other publications related to mental illness.

## **Attention Deficit Information Network Inc. (AD-IN)**

<http://www.addinfonetwork.com>

1-781-455-9895

AD-IN is a nonprofit, volunteer organization that offers support and information to families of children with ADD, adults with ADD, and mental health professionals. The AD-IN network of parent and adult support chapters throughout the United States provides information on training programs and speakers. AD-IN also presents conferences and workshops for parents and professionals on current issues, research, and treatments for ADD.

## **Center for Mental Health Services (CMHS)**

<http://www.mentalhealth.org/cmhs/>

1-800-789-2647

The CMHS, a component of the U.S. Department of Health and Human Services, is charged with leading the national system that delivers mental health services. The mission of the center is to provide treatment and support services needed by adults and children with mental disorders and serious emotional problems.

## **Children and Adults with Attention-Deficit/Hyperactivity Disorder (CHADD)**

<http://www.chadd.org>

1-800-233-4050

CHADD is a major advocate and key information source for people dealing with attention disorders. The organization sponsors support groups and publishes two newsletters concerning attention disorders for parents and professionals. In addition to providing general information on ADHD, the organization offers referrals to CHADD chapters, branches, and other organizations that serve people with ADHD.

**Depression and Bipolar Support Alliance (DBSA)**

<http://www.DBSAAlliance.org>  
1-800-826-3632

The mission of DBSA is to improve the lives of people living with mood disorders. The organization seeks to educate patients, families, and the public concerning the nature of depressive illnesses. DBSA maintains an extensive catalog of helpful books, as well as a list of support groups throughout the United States.

**National Alliance for the Mentally Ill (NAMI)**

<http://www.nami.org>  
HelpLine: 1-800-950-NAMI (6264)

NAMI is a nonprofit, grassroots, self-help support and advocacy organization of families and friends of people with severe mental illnesses such as schizophrenia, major depression, bipolar disorder, obsessive-compulsive disorder, and anxiety disorders. This site includes links to local affiliates and support groups, an 800-number help line, information about mental illnesses and their treatment, and brief articles describing the results of research studies on mental illnesses and their treatment.

**National Alliance for Research on Schizophrenia and Depression (NARSAD)**

<http://www.narsad.org>  
1-800-829-8289

NARSAD is an organization of concerned families linked with professionals to raise and distribute funds for scientific research into the causes, cures, treatments, and prevention of brain disorders, especially schizophrenia, depression, and bipolar disorder.

**National Institute of Mental Health (NIMH)**

<http://www.nimh.nih.gov>  
1-301-443-4513  
1-866-615-NIMH (6464)

The mission of the NIMH is to diminish the burden of mental illness through research. This site provides current and authoritative information about the latest research on mental illness.

**National Mental Health Association (NMHA)**

<http://www.nmha.org>  
1-800-969-NMHA (6642)

The NMHA is the oldest and largest nonprofit organization in the United States that addresses all aspects of mental health and mental illness. This site provides information about a variety of mental illnesses and their treatments, as well as a directory of local NMHA affiliates. The directory will help you locate mental health resources that are relatively near your school. This site also includes news regarding the advocacy efforts of the NMHA and a list of additional mental health resources.

**National Mental Health Consumers' Self-Help Clearinghouse**

<http://www.mhselfhelp.org>  
1-800-553-4key (4539)

The National Mental Health Consumers' Self-Help Clearinghouse is a consumer-run, national technical-assistance center that helps connect individuals with self-help and advocacy resources. The organization also provides expertise to self-help groups and other peer-run services for mental health consumers.

**Suicide Prevention: United States National Suicide and Crisis Hotlines**

<http://suicidelines.com/national.html>  
National Suicide Prevention Hotline  
1-800-SUICIDE/1-800-784-2433

Learning about mental illnesses, especially depression, may raise concerns that a student, parent, or coworker is having suicidal thoughts. The Web site and phone numbers help users find information about risk factors for and danger signs of suicide and, most importantly, resources that help prevent suicide. The Web site includes a link to the Crisis Call Chart, which lists the 800 number for the National Suicide Prevention Hotline and provides links to additional hotlines, organized by state and city.

# A Special Note: Teaching about Mental Illness in the Classroom

This curriculum supplement, *The Science of Mental Illness*, offers an opportunity to provide accurate information to students about a subject that many people don't understand and about which they have inaccurate beliefs. However, because of the potentially sensitive nature of the subject, it is important to be well prepared to deal with situations that may arise related to an individual's experiences. We recommend that before starting this unit, you contact the school's guidance counselor and school nurse to let them know that you will be teaching students about mental illness. Those individuals can help provide support to students who might need it or inform you of support services in your community that help people who have a mental illness. Identifying these community services or resources before you start teaching the supplement will be important if a student comes to you about a problem. If a student approaches you about a personal or family situation involving mental illness, work with these school professionals to encourage that student (and his or her family) to seek help from a family doctor or community mental health service.

Also, you might find that some students are apprehensive about studying mental illness. In some cases, students may be uncomfortable because they or a family member or friend has experienced mental illness directly. In other cases, the feelings may arise from cultural factors; some cultures do not speak openly about this topic. You can reassure these students that they will not be asked to discuss any personal situations or experiences with

mental illness. Help the students understand that the goal of the module is to help students understand the facts about mental illnesses and the biology underlying them.

The Additional Resources for Teachers section lists some organizations that provide information about mental illness or referrals to state or local resources. The section also lists a suicide-prevention hotline. Your state, city, or county health department may also be able to provide information to you about services within your community.

Our society often attaches a variety of labels to mental illness—psycho, nuts, crazy, wacko, and so forth. These terms reinforce the stigma associated with mental illness. In class, it is more appropriate to use the term “person with mental illness.” Encourage your students to avoid the slang terms.

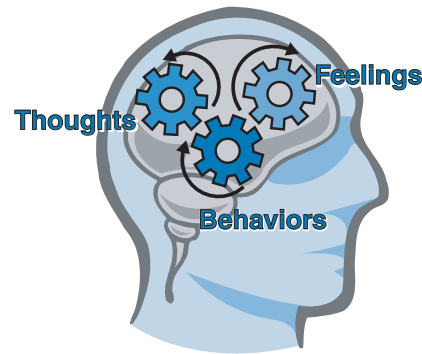
In everyday language, we often use terms related to mental illness in ways that don't really fit their true meaning. For example, we often say that we are depressed when really we are just sad. We also refer to people as hyper—not necessarily because they really have ADHD, but just in reference to a person's temperament. In this module, students will learn that mental illnesses such as depression and ADHD are specific illnesses with specific symptoms that define them. They are different from just sadness or inappropriate behavior. In the classroom, you should be careful about using terms such as depression in a way that does not fit the formal definition. Making this

change can be a challenge because it is a habit, but using the terms incorrectly could confuse students.

Depending on your school's policies and practices, you might wish to send a notice home to parents and guardians about the

material that this module presents so that they are aware of what might be discussed. Reinforce the idea that this module is not intended to be used for diagnosing or treating a mental illness. The focus is on providing scientific information to students about a topic that is often misunderstood.

# The Brain: Control Central



## Overview

Students experience a surprise event and think about their physical, emotional, and cognitive responses to it. They then determine that the brain is the organ that regulates all of their responses. Students respond to a series of questions that allow them to express their current understanding of mental illness. Students view PET images to consider how some changes in the brain are short term while other changes are long term. This knowledge introduces them to the concept of mental illness.

## At a Glance

## Major Concepts

The brain is the body organ that controls thinking, feelings, and behavior. Changes in the brain's activity result in changes in each of these responses. These changes can be either short term or long term. A mental illness is a health condition that changes a person's thinking, feelings, or behavior (or all three) and that causes the person distress and difficulty in functioning.

## Objectives

After completing this lesson, students will

- be able to explain that the brain is the part of the body that controls thinking (thoughts), feelings, and behaviors;
- realize that some changes in brain function cause changes in thoughts, feelings, and behavior that can last a short or a long time; and
- recognize that mental illnesses are associated with differences in brain activity.

## Teacher Background

Consult the following sections in *Information about Mental Illness and the Brain*:

- 1 *Defining Mental Illness* (page 21)
- 5 *Mental Illness and the Brain* (pages 24–28)
  - 5.1 *The basics of brain function* (pages 24–26)
  - 5.2 *Investigating brain function* (pages 26–28)



## In Advance

### Web-Based Activities

Activity	Web Component?
1	Yes
2	No
3	Yes

### Photocopies

Activity	Master	Number of copies
1 (Web version)	None	
1 (print version)	Master 1.1, <i>Find the Mistakes</i>	1 copy per student
2	Master 1.2, <i>What Do You Think?</i>	1 copy per student
3 (Web version)	None	
3 (print version)	Master 1.3, <i>What's Happening in the Brain?</i>	1 color transparency*

\*Alternatively, you could make color copies and laminate them. Make enough copies so each team has 1 copy.

### Materials

Activity	Materials
1 (Web version)	<ul style="list-style-type: none"> <li>computer with an Internet connection and speakers (see Preparation below)</li> </ul>
1 (print version)	<ul style="list-style-type: none"> <li>1 balloon*</li> <li>1 pin</li> </ul>
2	no materials needed
3 (Web version)	<ul style="list-style-type: none"> <li>computer with an Internet connection</li> </ul>
3 (print version)	<ul style="list-style-type: none"> <li>overhead projector</li> <li>transparency pens</li> </ul>

\*See suggestions on page 63 in the procedure for alternate ideas for this activity.

### Preparation

Refer to the section Using the Web Site, on page 17, for details about hardware and software requirements for using the Web site. All computers should have an appropriate version of Macromedia Flash Player.

If using the Web-based versions of Activities 1 and 3, make sure that the Internet connection is working properly. Also, for Activity 1, set the volume at maximum.

If using the print-based version of Activity 1, blow up the balloon and hide it in the classroom away from students but where you can reach it easily without students noticing. If you use another “surprise” technique, make sure it is ready beforehand.

**Note to teachers:** Do not inform students before beginning this module that they will be studying mental illness. The first activity will be most effective if there is an element of surprise.

## Activity 1: *Inducing a Response*

## Procedure

This activity should be completed quickly. The responses that students give to the questions (Steps 4–8) don't need to be covered exhaustively, but it is important that students respond with the key points. The main ideas that students need to get from this exercise are that 1) the brain controls a person's thoughts, feelings, and behaviors and 2) if something such as a mental illness changes a person's thoughts, feelings, and behaviors, the individual probably cannot function normally or effectively in daily life. Once students mention the key idea at the appropriate point, you don't need to continue that line of questioning. In some cases, additional questions are included to prompt students if they don't respond in the desired way to the initial question.

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



1. Prepare for this activity by logging onto the student activities section of the Web site at <http://science.education.nih.gov/supplements/mental/student>. First, click on “Lesson 1—The Brain: Control Central.” Then select “The E-mail.”

The goal of this activity is to induce a brief anxiety response in students. To accomplish this successfully, you need to maintain an element of surprise. Make sure that you have the Web site opened to the appropriate page and the volume turned up prior to the beginning of class. You may wish to have the projector turned off until you are ready to show the video to the class.

2. Begin the activity by telling students that you received an interesting e-mail that you want to share with them before beginning the class. Read the e-mail message to the students.

You might find it more convenient to read the e-mail to them or to just tell them the premise in your own words. It isn't necessary for students to read the e-mail themselves; it is on the Web site simply to add realism to the scenario.

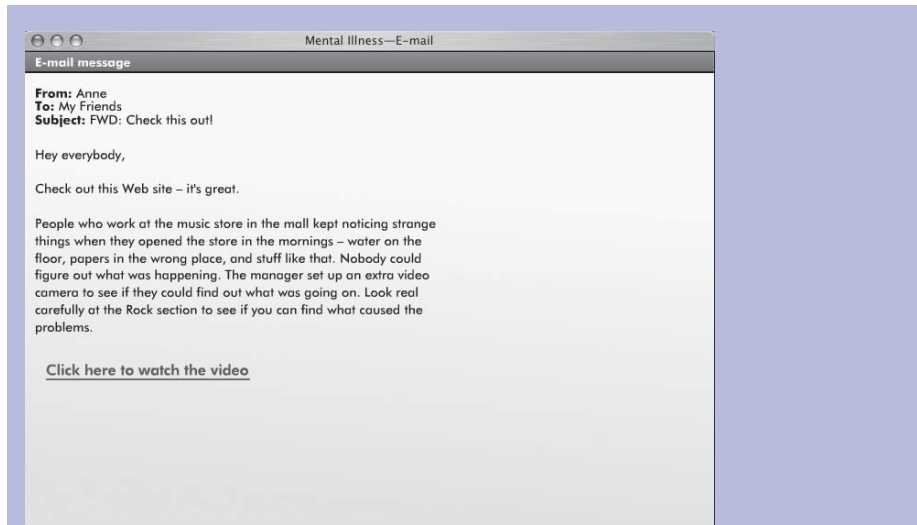


Figure 1.1. The e-mail.

3. Click on the link given in the e-mail to watch the video.

The amount of time before something happens on the video will vary each time it is played. Let the video continue to play until students have experienced the surprise event at least twice. Click on the X in the upper right corner of the window to stop the video and close that window.

4. After the class watches the video, discuss their reactions. Ask, “How did you react to the video?”

List the responses on the board or a transparency. Try to elicit a wide range of responses from students. Their responses will likely be quite varied. The fact that different individuals respond differently to the same information (stimulus) will be an important point for students to remember in later lessons. Not only do people respond to information differently, their brains differ in susceptibility to illness.

Some representative answers for how individuals reacted to the video include

- jumped
- increased heart rate
- screamed
- increased breathing rate
- nervous
- laughed
- wondered
- yelled
- concentrated
- afraid
- scared
- anxious

In the next step, students will group their responses into three categories. As you write their responses on the board, make sure that some of the responses will fit into each of the categories. If there are no student responses for a specific category, you might prompt them by asking questions such as, “Did anyone jump during the video?” or “Was anyone nervous during the video?” or “Did anyone wonder what was going to happen next?” Add the appropriate words to the list of responses.



**Tip from the field test:** Although this video worked well in most field-test situations, a few classes did not find the video scary or anxiety provoking. The teachers who had that experience simply asked students to recall a situation that they have experienced, such as giving an oral presentation to the class, performing in front of an audience, or watching a scary movie. Most students can remember some situation during which they felt nervous, anxious, or scared. Some teachers found the video more effective if students gathered around a computer screen to view it rather than watching it projected onto a screen.

5. Ask students if they can place the responses into categories. Do some of the responses share similarities?

If students have difficulty thinking of categories, you can start by writing the words “behaviors (or actions)” on the board. Which of the responses belong in this category? Ask students if they can think of another category. Again, if students have difficulty, you can prompt them by pointing out a specific response such as “scared” or “nervous” and then ask, “What are these?” When students respond that they are feelings, write “emotions or feelings” on the board as a category.

The goal for these questions is for students to realize that their responses can be grouped into three categories:

- behaviors or actions,
- feelings or emotions, and
- thoughts.

Examples of responses that would fit into each category are shown in the table below.

### Response categories

Behaviors (actions)	Feelings (emotions)	Thoughts
jumped screamed yelled laughed	scared nervous anxious afraid	concentrated wondered curious

6. Ask students what part of the body regulates their responses.

The conclusion that students should reach is that the brain regulates all of these responses. Students might name a number of body systems that are involved in controlling their responses. For example, they might say their muscles control their jumping or that their voice box (larynx) controls their screaming. If students do not conclude that the brain is the control center for all of these responses, you can help them by asking questions such as

- Do your muscles make you jump for no reason? What controls whether your muscles cause you to jump?
- What caused your voice box to become active and make you scream?

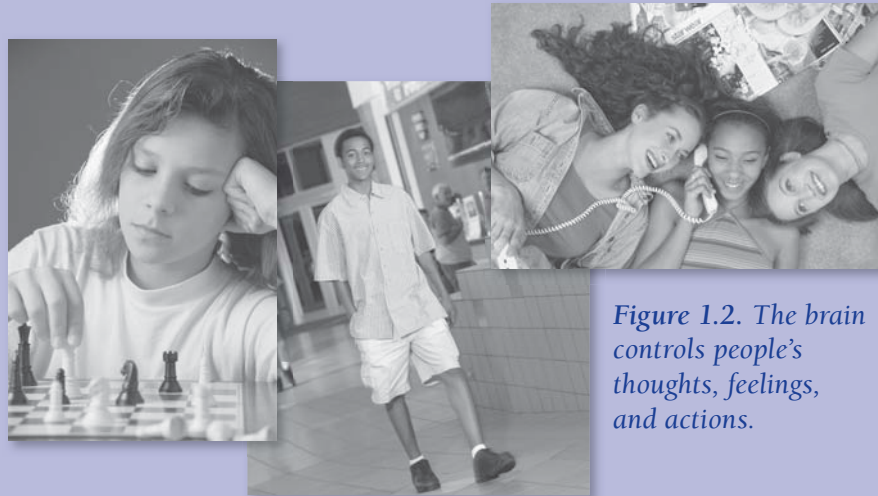


Figure 1.2. The brain controls people's thoughts, feelings, and actions.

7. Ask students how they feel now that the video is over. Are they still having the same responses that they had during the video? Are they feeling, thinking, or behaving the same now as they did when the surprise occurred during the video? Do they feel more like they did before the video?

Students likely will respond that they do not behave, feel, or think the same as they did at the exact moment of the surprise during the video. This points out that their responses to the video were short term, lasting anywhere from a few seconds to a few minutes.

8. Discuss with students that the video is something that caused them to behave, feel, and think differently for a short time. Ask them if there are things that might cause the brain to work differently for a long period of time (hours, weeks, months, or years).

This discussion is a good opportunity to reinforce the fact that the brain regulates our behavior, emotions, and thoughts. Students may give examples of things that would cause the brain to change over



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

a long period of time, such as learning. Students may also suggest illness. At this point, accept all reasonable answers. If students give mental illness as a response, tell them that they will investigate this in the upcoming lessons. If students do not mention mental illness, suggest it as a possibility.

9. Challenge students to keep this activity a secret from their friends so that students in later class periods will also be surprised.

Keeping this secret will definitely be a challenge. However, because the timing of the surprise is somewhat random, the anticipation that students experience even if they know what will happen can produce some surprise. If you choose, you could do the Web version of the activity with some classes and the print version with others.

**Alternate version of Activity 1 for classes without access to the Internet:**



1. Give each student a copy of Master 1.1, *Find the Mistakes*. Tell students that the picture illustrates mistakes being made in a scientific lab and that they need to identify all the problems they see. Tell them that they have three minutes to complete the task.

The goal of this activity is to induce a brief anxiety response in students. To increase the intensity level, you might periodically call out the time remaining. If students ask how many mistakes they should find in the drawing, you might want to give a vague response to keep them looking and concentrating on finding more errors.

2. After about 30 seconds to a minute and while students are concentrating on finding the mistakes in the picture, pop the balloon that you have hidden in the classroom.

The element of surprise is important for this activity. You may wish to hide the balloon at the back of the classroom so most students will not notice it while they concentrate on their task.

Field-test teachers used different techniques to create the surprise noise. Examples included blowing a whistle, sounding an air horn, dropping a heavy book loudly on the floor, and playing a cassette tape of someone screaming from a hidden tape recorder. Other anxiety-inducing events could include giving a pop quiz over material they haven't covered or asking students to turn in research papers that were not actually assigned. Make sure whatever surprise you select is appropriate for your school setting. The goal is for students to experience feelings of apprehension, anxiety, or fear and a physiological response, such as increased heart rate or jumpiness, for a brief period of time.



3. **After students have experienced the surprise, ask them to discuss their reactions. Ask, “How did you react when the balloon popped?”**

Write the responses on the board or on a transparency. Try to elicit a wide range of responses from students. Their responses likely will be quite varied. The fact that different individuals respond differently to the same information (stimulus) will be an important point for students to remember in later lessons. Not only do people respond to information differently, their brains (like other parts of the body) differ in susceptibility to illness.

Some representative answers for how individuals reacted to the surprise event include

- jumped
- increased heart rate
- screamed
- increased breathing
- nervous
- laughed
- wondered
- yelled
- concentrated
- afraid
- scared
- anxious

In the next step students will group their responses into three categories. As you write their responses on the board, make sure that some of the responses fit into each of the categories. If there are no student responses for a specific category, you might prompt them by asking questions such as, “Did anyone jump when the balloon popped?” or “Was anyone nervous when the balloon popped?” or “Did anyone wonder what was going to happen next?” Add the appropriate words to the list of responses.

4. **Ask students if they can place the responses into categories. Do some of the responses share similarities?**

If students have difficulty thinking of categories, you can start by writing the words “behaviors (or actions)” on the board. Which of the responses belong in this category? Ask students if they can think of another category. Again, if students have difficulty, you can prompt them by pointing out a specific response such as “scared” or “nervous” and then ask, “What are these?” When students respond that they are feelings, write “emotions or feelings” on the board as a category.

The goal for these questions is for students to realize that their responses can be grouped into three categories:

- behaviors or actions,
- feelings or emotions, and
- thoughts.

Examples of responses that would fit into each category are shown in the table below.

### Response categories

Behaviors (actions)	Feelings (emotions)	Thoughts
jumped screamed yelled laughed	scared nervous anxious afraid	concentrated wondered curious

5. Ask students what part of the body regulates their responses.

Students might name a number of body systems that are involved in controlling their responses. For example, they might say their muscles control their jumping or that their voice box (larynx) controls their screaming. The conclusion that students should reach is that the brain regulates all of these responses. If students do not conclude that the brain is the control center for all these responses, you can help them by asking questions such as

- Do your muscles make you jump for no reason? What controls whether your muscles cause you to jump?
- What caused your voice box to become active and make you scream?

6. Ask students how they feel now that the balloon pop is over. Are they still having the same responses that they had when the balloon popped? Are they feeling, thinking, or behaving the same way now as they did when the balloon popped? Do they feel more like they did before the balloon popped?

Encourage students to focus on their responses at that instant in time when the balloon popped. Students likely will respond that they do not behave, feel, or think the same as they did at the exact moment when the balloon popped. This points out that their responses to the balloon pop were short term, lasting anywhere from a few seconds to a few minutes.

7. Discuss with students that the balloon pop is something that caused them to behave, feel, and think differently for a short time. Ask them if there are things that might cause the brain to work differently for a long period of time (hours, days, weeks, months, or years).

This discussion is a good opportunity to reinforce the fact that the brain regulates our behavior, emotions, and thoughts. Students may give examples of things that would cause the brain to change over a long period of time, such as learning. Students may also suggest illness. At this point, accept all reasonable answers. If students give



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



**Assessment:** Research about learning shows that learners need to assess their prior knowledge so that they can have a framework for the new knowledge they are adding.

mental illness as a response, tell them that they will investigate this in the upcoming lessons. If students do not mention mental illness, suggest it as a possibility.

8. Challenge students to keep this activity a secret from their friends so that the students in later class periods will also be surprised.

Keeping this secret will definitely be a challenge. However, because the timing or nature of the surprise is somewhat random, the anticipation that students experience even if they know something will happen can produce some surprise and anxiety. If you choose, you might want to do different surprise events with different classes.

### **Activity 2: What Do I Know about Mental Illness?**

1. Give each student one copy of Master 1.2, *What Do You Think?* Ask each student to write their answers to each question.

Tell students that their responses to these questions will *not* be graded and that the questions do not have a single correct answer. These open-ended questions provide an opportunity for students to express what they already know about mental illness before experiencing the materials in this curriculum supplement. Many students, as well as many adults, carry misconceptions about mental illness, and this exercise will draw their previous conceptions to the surface. At the end of Lesson 6, students will respond to these questions again and then compare their answers to what they wrote at the beginning of the module.

**Note to teachers:** If students have trouble with Question 3 on Master 1.2, *What Do You Think?*, you might want to remind them what adjectives are and have the class list some on the board. Make sure the list includes adjectives with positive and negative connotations (although it is not necessary to identify the connotations for students). Students can select from a variety of words that most closely align with their ideas.

2. Instruct students to fold their completed copies of Master 1.2, *What Do You Think?*, in half. Have them write their names on the outside and staple the papers closed.

At this time, do not provide answers to questions or make judgments about students' responses.

3. Collect the students' papers and save them until needed for Lesson 6.

Students will respond to these questions again at the end of Lesson 6. At that time, they will compare their responses from the beginning of the module with those at the end to see how their understanding has changed. Inform them that no one will look at their answers until they do so at the end of the module.

### **Activity 3: What Happens in the Brain?**

This activity reinforces the idea that a mental illness, which is a health condition that changes the way a person thinks, feels, or behaves, is tied to changes in the way the brain works. This should be a fairly fast-paced discussion. Students do not need to know specific changes in specific regions of the brain.

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



1. Prompt students to recall that the changes they experienced from the surprise were short-term ones involving the brain.

Students should recall that their responses generally lasted only a few seconds.

2. Encourage students to think carefully about how they responded at the exact instant of the surprise. Ask, “What would it be like if you were thinking, feeling, or acting like you did during the surprise event for weeks, months, or years instead of just a few seconds or minutes? Would you be able to live your life as you normally do?”

The key for answering this question is for students to remember the instant of the surprise—not the seconds before or after. Students' responses should reveal that they would not like to experience the changes in their thoughts, feelings, and behaviors all the time. They could not function normally if they were constantly feeling anxious, apprehensive, nervous, worried, or jumpy.

Recognizing that a person's life would be negatively affected by constantly (or regularly) experiencing these changes in behaviors, emotions, and thoughts will be an important transition for students. The surprise that they experienced earlier gives them a way to think about how the brain regulates our responses to events in the environment in the short term. These questions now begin to help students relate to changes that are both more negative and longer term.



**Content Standard A:**  
Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.

3. Remind students that mental illness could be one type of long-term change in the functioning of the brain. Provide them with the definition for mental illness as follows:

*A mental illness is a health condition that changes a person's thinking, feelings, or behavior (or all three) and that causes the person distress and difficulty in functioning.*

This definition does not explicitly indicate that mental illnesses are long-term conditions. However, a short-term, instantaneous event that changes a person's thinking, feelings, and behaviors (such as the surprise experienced earlier) probably doesn't cause distress that would cause a problem for an individual in living his or her life.

4. Ask students to think about ways that scientists might investigate changes in the brain that happen when a person has a mental illness.

Students might mention a variety of things, including the use of electrodes to measure electrical activity in the brain or the use of imaging techniques such as MRI or CT scans. These techniques can be used on living individuals, whereas techniques such as operating to look at the brain's structure would only be used on dead bodies. If students mention surgery, you might want to make this distinction clear.

This step asks students to consider how *scientists* might investigate changes in the brain that occur with mental illness. That is different than the way a physician diagnoses a person with a mental illness. Lesson 2 focuses primarily on the role of the *physician*. For now, ask students to restrict their ideas to what scientists might do when they research what happens in the brain of someone with a mental illness.

5. Introduce students to the idea that scientists can use specialized imaging techniques to learn some things about how the brain works. One technique is called positron emission tomography, or PET. Inform students that they will be looking at PET images to learn about the brain.

For this module, students do not need to know the science that underlies PET imaging. It is more important that they understand what a PET image can tell a scientist about brain activity.

**Note to teachers:** Although students don't need to learn this now, be aware that physicians do *not* use PET or other imaging techniques to diagnose mental illness and that research scientists generally do *not* use these techniques with children.

6. Go to the Web site’s student activities page, <http://science.education.nih.gov/supplements/mental/student>. Click on “Lesson 1—The Brain: Control Central,” then click on “What Happens in the Brain?” Students will first view a short animation to see how PET images are taken.

The animation should help students understand that each PET image is an “optical slice” through the brain and should give them an understanding of how the images correlate to the human body. Through this animation, students should be able to visualize that each image is a picture of a single level of the brain. The person’s face would be at the top of the picture, and the back of the head would be at the bottom. It can be difficult to understand how these images relate to a person’s anatomy. You may need to emphasize that the image is only a virtual “slice” in the computer’s memory; there is no actual, physical cutting of brain tissue.

For this activity, the prompts for moving through the activity are provided onscreen. Steps 7–10 that follow also go through each phase of the activity to provide the teacher with additional information.

7. After watching the animation, click on “Continue” to view a PET image. Ask students to list a few observations of the PET image.

Students will notice that different parts of the brain have different levels of activity. Some areas of the brain have higher levels of activity than other areas.

Be aware that students may conclude incorrectly that the different parts of their brains actually change colors based on activity. If students have this misconception, explain that the color is added to the images when the computer enhances the image. The color isn’t real, it just makes the images easier for scientists to interpret. In this respect, PET images are somewhat analogous to weather-radar images seen on the evening news. The weather-radar images use computer enhancement to depict rain or snow showers in different colors.



**Tip from the field test:** A common misconception about PET images is that an area that is black (very dark purple) represents no brain activity. In fact, there is brain activity, but it is at a low level.

Another misconception noted among students in the field test was that the PET images showed changes that happened in the brain over a period of time. Inform students that the images show only



what is happening in the brain at a particular *instant*. In other words, they are more like a photograph than a video.

8. By clicking “Continue” again, students see a screen with a question about how a PET image of someone’s brain might look if it were taken during the surprise they experienced earlier.

Students likely will propose correctly that the activity levels in the brain of a person experiencing a short-term, anxiety-inducing event would be different from those of a person who is simply resting. Although students likely will suggest that the activity in the brain increases, ask them to think about whether activity could decrease in some parts of the brain. The important part is not whether the activity in the brain increases or decreases, but rather that it changes.

9. Click on the “Continue” button again. Students will now see two images: Image 1 and Image 2. Ask students to identify differences between the two PET images.

Students should notice that Images 1 and 2 differ in color distribution and pattern. Compared with Image 1, some areas of the brain in Image 2 increase in activity and other areas decrease in activity.

Students will notice that the changes occur in specific parts of the brain and not the brain as a whole. For this curriculum supplement, it is not important for students to know the names of the specific parts of the brain that change in activity level (many parts of the brain change).

10. After students have made their observations about the differences between Image 1 and Image 2, click “Continue.” This will reveal that Image 1 shows a healthy brain at rest and that the brain in Image 2 is of a different brain. At this point, students do not know what specifically is different about the brain in Image 2. Ask students if they can determine what is happening in Image 2 simply by looking at the PET image. Can they tell whether the person is experiencing a short-term or long-term change in brain function?

Students should respond that they could not determine whether a short-term or long-term change is occurring simply by viewing a PET image.

11. By clicking “Continue” again, students will learn that Image 2 is a PET image of the brain of someone who has schizophrenia, a mental illness. That individual, like the individual in Image 1, was resting when the PET image was taken. Given this new

information, ask students what they can conclude about the brain and mental illness.

The primary conclusion that students should reach is that mental illness actually changes something about how the brain works. PET images of a person who has a mental illness show that the activity in the brain is different from that of a person who does not have a mental illness. The level of activity in some parts of the brain of a person who has a mental illness may be lower than in a person who does not have a mental illness. In other areas, the level of brain activity may be higher in the person who has a mental illness.

The examination of PET images in this lesson reinforces the idea that changes in a person's thoughts, feelings, or behaviors correlate with changes that happen in the brain. These images also serve as a brief introduction to one way scientists investigate what happens in the brain when someone has a mental illness.

The PET images in this activity (and others in this module) are from adults who volunteered to be part of a research study.

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



1. Prompt students to recall that the changes they experienced from the surprise were short-term ones involving the brain.

Students should recall that their responses generally lasted only a few seconds.

2. Encourage students to think carefully about how they responded at the exact instant of the surprise. Ask, “What would it be like if you were thinking, feeling, or acting like you did during the surprise event for weeks, months, or years instead of just a few seconds? Would you be able to live your life as you normally do?”

The key for answering this question is for students to remember the instant of the surprise (the scream or balloon pop)—not the seconds before or after. Students' responses will reveal that they would not like to experience the changes in their thoughts, feelings, and behaviors all the time. They could not function normally if they were constantly feeling anxious, apprehensive, nervous, worried, or jumpy.

Recognizing that a person's life would be negatively affected by constantly (or regularly) experiencing these changes in behaviors, emotions, and thoughts will be an important transition for students. The surprise that they experienced earlier gives them a way to think about how the brain regulates our responses to events in the

environment in the short term. These questions now begin to help students relate to changes that are both more negative and longer term.

3. Remind students that mental illness could be one type of long-term change in the functioning of the brain. Provide them with the definition for mental illness as follows:

*A mental illness is a health condition that changes a person's thinking, feelings, or behavior (or all three) and that causes the person distress and difficulty in functioning.*

This definition does not explicitly indicate that mental illnesses are long-term conditions. However, a short-term, instantaneous event that changes a person's thinking, feelings, and behaviors (such as the surprise event experienced earlier) probably doesn't cause distress that would cause a problem for an individual in living his or her life.

4. Ask students to think about ways that scientists might investigate changes in the brain that happen when a person has a mental illness.

Students might mention a variety of things, including the use of electrodes to measure electrical activity in the brain or the use of imaging techniques such as MRI or CT scans. These techniques can be used on living individuals, whereas techniques such as operating to look at the brain's structure would only be used on dead bodies. If students mention surgery, you might want to make this distinction clear.

This step asks students to consider how *scientists* might investigate changes in the brain that occur with mental illness. That is different than the way a *physician* diagnoses a person with a mental illness. Lesson 2 focuses primarily on the role of the physician. For now, ask students to restrict their ideas to what scientists might do when they research what happens in the brain of someone with a mental illness.

5. Introduce students to the idea that scientists can use specialized imaging techniques to learn about how the brain works. One technique is called positron emission tomography, or PET. PET allows scientists to find out what parts of the brain are most active. Computers add color to the images to make the areas that the scientists are interested in stand out. Inform students that they will be looking at PET images to learn about changes that occur in the brain.

For this module, students do not need to know the science that underlies PET imaging. It is more important that they understand what a PET image can tell a scientist about brain activity.

**Note to teachers:** Although students don't need to learn this now, be aware that physicians do *not* use PET or other imaging techniques to diagnose mental illness and that research scientists do *not* use these techniques with children.

6. Display a transparency of Master 1.3, *What's Happening in the Brain?* Reveal only Image 1 and the scale bar at this time. Point out to students that in these images, the brain areas that are most active appear in red, and the parts of the brain that are least active appear in dark blue or purple.

Help students understand that each PET image is an “optical slice” through the brain. In other words, the image is a picture of a single level of the brain. The person's face would be at the top of the picture, and the back of the head would be at the bottom. It can be difficult to understand how these images relate to a person's anatomy. You may need to emphasize that the image is only a “slice” in the computer's memory; there is no actual, physical cutting of brain tissue.

If students need additional help visualizing how the PET image correlates to an individual's anatomy, you can use the example of putting a rubber band around the head—the rubber band would be on the forehead and the back of the head. The PET image would correspond to the “slice” of the brain within the rubber band.

7. Ask students to list a few observations about the PET image.

Students will notice that different parts of the brain have different levels of activity. Some areas of the brain have higher levels of activity than other areas.

Be aware that students may conclude incorrectly that the different parts of their brains actually change colors based on activity. If students have this misconception, explain that the color is added to the images when the computer enhances the image. The color isn't real, it just makes the images easier for scientists to interpret. In this respect, PET images are somewhat analogous to weather-radar images seen on the evening news. The weather-radar images use computer enhancement to depict rain or snow showers in different colors.



**Content Standard A:** Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.



**Tip from the field test:** A common misconception about PET images is that an area that is black (very dark purple) represents no brain activity. In fact, there is brain activity, but it is at a low level.

8. Ask students to propose how a PET image of someone's brain would look different if it were taken during the surprise they experienced earlier.

Students likely will propose correctly that the activity levels in the brain of a person experiencing a short-term, anxiety-inducing event would be different from those of a person who is simply resting. Although students likely will suggest that the activity in the brain increases, ask them to think about whether activity could decrease in some parts of the brain. The important part is not whether the activity in the brain increases or decreases, but rather that it changes.

Another misconception noted among students in the field test was that the PET images showed changes that happened in the brain over a period of time. Inform students that the images show only what is happening in the brain at a particular *instant*. In other words, they are more like a photograph than a video.

9. Now reveal Image 2. Ask students to identify differences between the two PET images.

Students should notice that Images 1 and 2 differ somewhat in color distribution and pattern. Compared with Image 1, some areas of the brain in Image 2 increase in activity and other areas decrease in activity.

Students will notice that the changes occur in specific parts of the brain and not the brain as a whole. For this curriculum supplement, it is not important for students to know the names of the specific parts of the brain that change in activity level (many parts of the brain change).

10. Reveal to students that Image 1 shows a healthy brain at rest and that Image 2 is of a different brain. At this point, students do not know what specifically is different about the brain in Image 2. Ask students whether they can determine what is happening in Image 2 simply by looking at the PET image. Can they tell whether the person is experiencing a short-term or long-term change in brain function?

Students should respond that they could not determine whether a short-term or long-term change is occurring simply by viewing a PET image.

11. Reveal to students that Image 2 is a PET image of the brain of someone who has schizophrenia, a mental illness. That individual, like the individual in Image 1, was resting when the PET image was taken. Given this new information, ask students what they can conclude about the brain and mental illness.

The primary conclusion that students should reach is that mental illness actually changes something about how the brain works. PET images of a person who has a mental illness show that the activity in the brain is different from that of a person who does not have a mental illness. The level of activity in some parts of the brain of a person who has a mental illness may be lower than in a person who does not have a mental illness. In other areas, the level of brain activity may be higher in the person who has a mental illness.

The examination of PET images in this lesson reinforces the idea that changes in a person's thoughts, feelings, or behaviors correlate with changes that happen in the brain. These images also serve as a brief introduction to one way scientists investigate what happens in the brain when someone has a mental illness.

The PET images in this activity (and others in this module) are from adults who volunteered to be part of a research study.

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Ask students to write a few sentences to summarize what they believe are the major ideas conveyed in the activities in this lesson. If students regularly use a science journal, they can record their summaries there, or they can simply record their summaries on notebook paper. For this first lesson, you might find it useful to facilitate this beginning with a class discussion followed by time for students to write. For later lessons, students can complete this wrap-up independently. The summaries that students write at the conclusion of each lesson will help them when they do the Evaluate lesson (Lesson 6) at the end of the module.

## Lesson Wrap-Up






**Assessment:** Asking students to record what they believe are the “big ideas” for each lesson can help them realize what they have learned and reinforce the concepts in their minds.



# Lesson 1 Organizer: Web Version



What the Teacher Does	Procedure Reference
<b>Activity 1: Inducing a Response</b>	
Log onto the Web site and access Lesson 1—The Brain: Control Central. Select “The E-mail.” Read the e-mail message with students and click on indicated link to show the video.	Page 59 Steps 1–3 
List students’ responses on the board. Sort responses into categories: behaviors, feelings, thoughts.	Page 60 Steps 4–5
Prompt students to reach the conclusion that the brain regulates a person’s behaviors, feelings, and thoughts.	Page 62 Step 6
Ask students to think about their feelings now as compared with the instant of the surprise.	Page 62 Step 7
Ask students to consider and distinguish between short-term and long-term events. Ask students to suggest things (including mental illness) that could result from long-term changes in the brain.	Page 62 Step 8
Challenge students to keep the surprise secret from other students.	Page 63 Step 9
<b>Activity 2: What Do I Know about Mental Illness?</b>	
Give each student 1 copy of Master 1.2, <i>What Do You Think?</i> Ask students to write responses to each of the questions.	Page 66 Step 1 
Ask student to fold their papers in half, staple them closed, and write their names on the outside.	Page 66 Step 2
Collect the papers and save them until needed in Lesson 6.	Page 67 Step 3
<b>Activity 3: What Happens in the Brain?</b>	
Prompt students to remember their short-term responses at the instant of the surprise in Activity 1. Ask students to consider how whether they could live their lives normally if they were experiencing these responses all the time.	Page 67 Steps 1–2
Remind students that mental illness is one thing that results from a long-term change in how the brain works. Provide the definition for mental illness as follows: <i>A mental illness is a health condition that changes a person’s thinking, feelings, or behavior (or all three) and that causes the person distress and difficulty in functioning.</i>	Page 68 Step 3

What the Teacher Does	Procedure Reference
Ask students to think about ways that scientists might investigate changes in the brain that happen when a person has a mental illness.	Page 68 Step 4
Introduce the idea that PET imaging is one way that scientists can learn about how the brain works. Inform students that they will be examining PET images.	Page 68 Step 5
Open the Web site for Lesson 1. Click on "What Happens in the Brain?" Show the short animation that provides a background on PET imaging.	Page 69 Step 6 
Show Image 1. Ask students to make observations.	Page 69 Step 7
Ask students to consider what a PET image might look like if it was taken at the instant of the surprise in Activity 1.	Page 70 Step 8
Click "Continue" to view both Image 1 (a healthy brain) and Image 2 (a different brain). Can students tell whether a person is experiencing a short-term or a long-term event simply by looking at the image?	Page 70 Steps 9–10
By clicking "Continue" again, students learn that Image 2 is the brain of an individual who has schizophrenia. Ask students what they can conclude about the brain and mental illness.	Page 70 Step 11
<b>Lesson Wrap-Up</b>	
Ask students to summarize the main ideas of this lesson by writing a few sentences in their journal.	Page 75





= Involves using the Internet.





= Involves copying a master.

# Lesson 1 Organizer: Print Version



What the Teacher Does	Procedure Reference
<b>Activity 1: <i>Inducing a Response</i></b>	
Distribute 1 copy of Master 1.1, <i>Find the Mistakes</i> , to each student. Instruct students to identify all the mistakes being made in the laboratory. While students are concentrating on their task, pop a balloon that you have hidden in the classroom.	Page 63 Steps 1–2 
List students' responses to the balloon pop on the board. Sort responses into categories: behaviors, feelings, thoughts.	Page 64 Steps 3–4
Prompt students to reach the conclusion that the brain regulates a person's behaviors, feelings, and thoughts.	Page 65 Step 5
Ask students to think about their feeling now as compared with the instant of the surprise.	Page 65 Step 6
Ask students to consider and distinguish between short-term and long-term events. Ask students to suggest things (including mental illness) that could result from long-term changes in the brain.	Page 65 Step 7
Challenge students to keep the surprise secret from other students.	Page 66 Step 8
<b>Activity 2: <i>What Do I Know about Mental Illness?</i></b>	
Give each student 1 copy of Master 1.2, <i>What Do You Think?</i> Ask students to write responses to each of the questions.	Page 66 Step 1 
Ask student to fold their papers in half, staple them closed, and write their names on the outside.	Page 66 Step 2
Collect the papers and save them until needed in Lesson 6.	Page 67 Step 3
<b>Activity 3: <i>What Happens in the Brain?</i></b>	
Prompt students to remember their short-term responses at the instant of the surprise in Activity 1. Ask students to consider how whether they could live their lives normally if they were experiencing these responses all the time.	Page 71 Steps 1–2

 = Involves copying a master.

Remind students that mental illness is one thing that results from a long-term change in how the brain works. Provide the definition for mental illness as follows: A mental illness is a health condition that changes a person's thinking, feelings, or behavior (or all three) and that causes the person distress and difficulty in functioning.	Page 72 Step 3	
Ask students to think about ways that scientists might investigate changes in the brain that happen when a person has a mental illness.	Page 72 Step 4	
Introduce the idea that PET imaging is one way that scientists can learn about how the brain works. Inform students that they will be examining PET images.	Page 72 Step 5	
Display a transparency of Master 1.3, <i>What's Happening in the Brain?</i> Reveal only Image 1 and the scale bar. Point out that different colors represent different levels of brain activity.	Page 73 Step 6	
Ask students to make observations about Image 1.	Page 73 Step 7	
Ask students to propose how a PET image might look if it was taken at the instant of the surprise they experienced earlier.	Page 74 Step 8	
Reveal Image 2. Ask students to identify differences between Image 1 and Image 2.	Page 74 Step 9	
Inform students that Image 1 is of a healthy brain at rest and that Image 2 is of a different brain. Ask students if they can tell if the person is experiencing a short-term or long-term change in how the brain functions.	Page 74 Step 10	
Inform students that Image 2 is the brain of an individual who has schizophrenia. Ask students what they can conclude about the brain and mental illness.	Page 75 Step 11	
<b>Lesson Wrap-Up</b>		
Ask students to summarize the main ideas of this lesson by writing a few sentences in their journal.	Page 75	

 = Involves making a transparency.

# What's Wrong?



**Lesson 2**  
**Explore/  
Explain**

## Overview

Students analyze case studies to explore similarities and differences among illnesses. They use this knowledge to develop a definition for illness and consider why depression is an illness of the brain. Finally, students explore how scientists investigate the changes in the way the brain functions during depression by evaluating PET images.

## At a Glance

## Major Concepts

Mental illnesses, including depression, are illnesses of the brain. Like illnesses that affect other parts of the body, mental illnesses are diagnosed by identifying characteristic symptoms.

## Objectives

After completing this lesson, students will

- be able to explain that doctors diagnose illnesses based on a set of characteristic symptoms,
- be able to define illness,
- identify common symptoms of depression, and
- understand that changes in brain activity are associated with depression.

## Teacher Background

Consult the following sections in Information about Mental Illness and the Brain:

- 4 *Diagnosing Mental Illness* (pages 23–24)
- 5.2 *Investigating brain function* (pages 26–28)
- 10.1 *Depression* (pages 33–37)

## Web-Based Activities

Activity	Web Component?
1	Yes
2	No
3	Yes

## In Advance

## Photocopies

Activity	Master	Number of copies
1 (Web version)	Master 2.1, <i>Analyzing the Cases</i> Master 2.4, <i>Comparing the Cases: A and B</i> Master 2.5, <i>Comparing the Cases: C and D</i> Master 2.6, <i>Comparing the Cases: E and F</i>	1 copy per team 1 transparency  1 transparency  1 transparency
1 (print version)	Master 2.1, <i>Analyzing the Cases</i> Master 2.2a, <i>Medical Chart A</i> Master 2.2b, <i>Medical Chart B</i> Master 2.2c, <i>Medical Chart C</i> Master 2.2d, <i>Medical Chart D</i> Master 2.2e, <i>Medical Chart E</i> Master 2.2f, <i>Medical Chart F</i> Master 2.3a–k, <i>Doctors' Reference Manual</i> Master 2.4, <i>Comparing the Cases: A and B</i> Master 2.5, <i>Comparing the Cases: C and D</i> Master 2.6, <i>Comparing the Cases: E and F</i>	1 copy per team 6 copies* 6 copies* 6 copies* 6 copies* 12 copies* 12 copies* 2–3 sets per class  1 transparency  1 transparency  1 transparency
2	Master 2.7, <i>Is It an Illness?</i>	1 transparency
3 (Web version)	None	
3 (print version)	Master 2.8, <i>Looking Inside the Brain</i>	1 color transparency <sup>†</sup>

\*These numbers are based on a class of 24 students working in 8 teams of 3 students. Adjust the numbers for your class size. Each student in a team will need a copy of each of the two medical charts.

<sup>†</sup>Alternatively, you could make color photocopies and laminate them. Make enough so each team has one copy.

## Materials

Activity	Materials
1 (Web version)	<ul style="list-style-type: none"> <li>• computer with an Internet connection and speakers (see Preparation below)</li> <li>• transparency pens for each team</li> </ul>
1 (print version)	no materials needed
2	<ul style="list-style-type: none"> <li>• overhead projector</li> <li>• transparency pen</li> </ul>
3 (Web version)	<ul style="list-style-type: none"> <li>• computer with an Internet connection (see Preparation below)</li> </ul>
3 (print version)	<ul style="list-style-type: none"> <li>• overhead projector</li> <li>• transparency pen</li> </ul>



## Preparation

### Activity 1

For classrooms using the Web-based version of Activity 1, verify that the computer lab is reserved for your classes or that the classroom computers are set up for the activities.

Refer to Using the Web Site, on page 17, for details about hardware and software requirements for the Web site. All computers should have a sound card and Macromedia Flash Player. Check that the Internet connection is working properly.

Set the computers to the opening screen for the activity. Log on to the student activities section of the Web site by entering the following URL: <http://science.education.nih.gov/supplements/mental/student>. Select “Lesson 2—What’s Wrong?” This allows students to begin the activity directly.

For classrooms using the print-based version of Activity 1, cut each medical chart into three parts as indicated. Place the three parts of each medical chart on a table where students can collect them one at a time as needed. Teams will analyze one of Medical Charts A through D first; when they complete that analysis, each team will analyze either Chart E or F. See Steps 3 to 5 in the procedure. Place the copies of Master 2.3, *Doctors’ Reference Manual*, at stations around the classroom.

### Activity 2

No preparation is necessary.

### Activity 3

For classrooms using the Web-based version of Activity 3, verify that the computer lab is reserved for your classes or that the classroom computers are set up for the activities.

Refer to Using the Web Site, on page 17, for details about hardware and software requirements for the Web site. All computers used with this module need to have a sound card and Macromedia Flash Player. Check that the Internet connection is working properly.

If using the Web-based version of this activity, set the computers to the opening screen for the activity. Log on to the student activities section of the Web site by entering the following URL into your browser: <http://science.education.nih.gov/supplements/mental/student>. Select “Lesson 2—What’s Wrong?” Click on “Looking Inside the Brain.” This allows students to begin the activity directly.

## Procedure

### Activity 1: What's the Health Problem?

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



1. Explain to students that they will play the role of medical interns who are completing a clinical experience with a doctor.

You may want to explain to students that case studies similar to those in this lesson are an important part of doctors' professional lives. Analyzing cases helps physicians learn about the process of diagnosing and treating patients as well as the characteristics of various diseases.

2. Organize the class into teams of two to three students. Number the teams 1 through 8 and explain that each team will analyze two cases. Distribute 1 copy of Master 2.1, *Analyzing the Cases*, to each team and tell students they will work with their team members to complete the chart for each of their cases.

There are six different cases in this activity. The Web program selects two cases for each team to analyze according to the team's number. Teams will analyze one of Cases A through D first, and then either Case E or F. As long as you have at least four teams, each of the six cases will be viewed by at least one team.

3. Tell students that when they get to the computers, they will click on their assigned team number and then begin to review the first of their two cases. Inform students that they can get more information following Part 2 and during Part 3 by clicking on the button "Doctors' Reference Manual."

Be sure all of the computers have loaded the page for Lesson 2 that includes links for "The Cases" and "Looking Inside the Brain." See Preparation for Activity 1 on page 83. The "Doctors' Reference Manual" will not be available for Part 1, but it will appear when students get to Parts 2 and 3. After students complete a part of the case, they can watch it or a previous part again. The programming does not permit students to watch parts out of sequence. They must watch Part 1 before they can watch Part 2, for example.

4. Direct teams to computer stations. Circulate around the room to make sure that all groups understand their task.
5. As teams complete their work, distribute transparency pens and transparencies made from Masters 2.4, 2.5, and 2.6, *Comparing the Cases*, to the appropriate teams. Ask teams to complete the column for *one* of the cases they analyzed.

Rotate the transparencies among the teams in round-robin fashion. Teams that receive a transparency with a column already completed by another team should make check marks beside the symptoms, information, and health problems they agree with and add any additional information they have.

If you have more than six teams, some teams (for example, those that take longer to complete their analysis) may not complete any of the columns on the transparencies. They can add their information during the class discussion in Step 6.



**Tip from the field test:** An alternative to rotating the transparencies among the teams may save time. Make two copies of each transparency so that one team can fill in its information for one of the columns at the same time another team fills in the information for the other column. In Step 6, layer the matching transparencies so that you can display all the information at once.

Some teams are likely to finish analyzing their two cases before other teams are finished. If they have time after completing this step, ask them to view and analyze one to four more cases. Tell them to click on “Next Case” again.

6. **Display the completed transparencies (Masters 2.4, 2.5, and 2.6, *Comparing the Cases*) one by one and hold a class discussion about each one, during which students respond to the following discussion questions:**

- What was the first symptom (or health complaint)?
- What possible health problems did you list after Part 1?
- After watching Part 2, did you rule out any of the possible problems? Why or why not?
- Did you add any other possibilities? Why or why not?
- After watching Part 3, what did you decide the health problem was?
- How did you rule out the other possibilities?
- What part of the body is directly affected by this problem?
- How much time passed between Part 1, when symptoms were first noticed, and Part 3, when the doctor was ready to diagnose the problem?



**Tip from the field test:** Don't let this discussion drag. It isn't really necessary to record every symptom in the charts. Move on as soon as students recognize that a patient's symptoms help them narrow down the possible health problems to the most likely problem. The important result of the questioning is that students recognize that doctors use

symptoms to determine what a patient’s health problem is and that knowing more information also helps doctors rule out other problems.

The following are examples of how the completed transparencies might appear:

**Master 2.4, Comparing the Cases: A and B**

Part		Case: Alex A.	Case: Alex B.
1	<b>Symptoms and other information</b>	Sore throat	Sore throat
	<b>Possible health problem(s)</b>	Cold; history test	Cold; history test
2	<b>New symptoms and information in Part 2</b>	Stuffy, runny nose; slightly red throat; very low fever	Red and white patches on tonsils; fever; swollen lymph nodes
	<b>Possible health problem(s)</b>	Cold; allergies	Cold; strep throat
3	<b>Time passed since Part 1 (when symptoms first appear)</b>	1 day	1 day
	<b>Probable health problem</b>	Cold	Strep throat
	<b>Part(s) of the body affected</b>	Throat, nose	Throat

**Master 2.5, Comparing the Cases: C and D**

Part		Case: Abby C.	Case: Abby D.
1	<b>Symptoms and other information</b>	Sore chest; can’t breathe	Sore chest; can’t breathe
	<b>Possible health problem(s)</b>	Cold; allergies; asthma	Cold; allergies; asthma
2	<b>New symptoms and information in Part 2</b>	Wheezing in lungs; coughing up mucous; low fever	Wheezing in lungs; mom has allergies and uncle has asthma; had bronchitis 4 times in past year
	<b>Possible health problem(s)</b>	Cold; bronchitis; pneumonia; asthma	Cold; allergies; bronchitis; asthma

3	<b>Time passed since Part 1 (when symptoms first appeared)</b>	2 nights	2 nights
	<b>Probable health problem</b>	Bronchitis	Asthma
	<b>Part(s) of the body affected</b>	Lungs; bronchial tubes	Lungs; bronchial tubes

### Master 2.6, Comparing the Cases: E and F

Part		Case: Jenna E.	Case: Jenna F.
1	<b>Symptoms and other information</b>	Not interested in usual activities; sad; poor appetite; grades went down	Not interested in usual activities; sad; poor appetite; grades went down
	<b>Possible health problem(s)</b>	Nothing; depression; sadness	Nothing; depression; sadness
2	<b>New symptoms and information in Part 2</b>	Grandpa died 2 months ago; grades back up; more interested in usual activities	Grandpa died 2 months ago; not sleeping well; no confidence; often angry at parents; quit band
	<b>Possible health problem(s)</b>	Nothing; sadness	Depression; sadness
3	<b>Time passed since Part 1 (when symptoms first appeared)</b>	6 weeks	6 weeks
	<b>Probable health problem</b>	Nothing OR sadness* (but it's over now)	Depression*
	<b>Part(s) of the body affected</b>	Brain	Brain

\* Students may feel that both Cases E and F are examples of sadness, or that both are examples of depression. Either determination is acceptable at this time. In Activity 2, students will compare the cases more carefully using the definition of depression. That exercise will establish that Case E is an example of sadness and Case F is an example of depression.



**Content Standard A:**  
Develop descriptions, explanations, predictions, and models using evidence. Recognize and analyze alternative explanations and predictions.

In the discussion, emphasize to students that they determined the health problem based on the patients' *symptoms*. As the cases progressed, the patients displayed additional symptoms that helped the teams rule out some possibilities. The availability of the "Doctors' Reference Manual" following Parts 2 and 3 also may have led them to suggest other possible health problems that were consistent with the symptoms. Also point out that the time course for each problem varied.

The cases are organized in pairs: A and B, C and D, and E and F. You may want to point out to students that the first scene is identical for each pair. This emphasizes that the same symptoms are often characteristic of more than one illness, at least initially. As doctors continue to gather information about an individual's symptoms, they can be more sure of their diagnosis.

7. After all teams report their findings, emphasize again to students that they narrowed down and decided on the probable health problems based on the symptoms that the individuals displayed.

Note that for a few cases, doctors could use distinct medical tests (such as strep tests, blood tests, chest X-ray, or pulmonary function tests) to confirm their diagnoses. But the doctors could be fairly certain of their diagnoses for all of the health problems simply by analyzing the symptoms.

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



1. Explain to students that they will play the role of medical interns who are completing a clinical experience with a doctor. They will review medical charts from two of the doctor's cases.

You may want to explain to students that case studies similar to those in this lesson are an important part of doctors' professional lives. Analyzing cases helps physicians learn about the process of diagnosing and treating patients as well as the characteristics of various diseases.

2. Organize the class into teams of two to three students. Number the teams 1 through 8 and explain that each team will analyze two medical charts. Distribute one copy of Master 2.1, *Analyzing the Cases*, to each team and tell students that they will work with their team members to complete the chart for each of their cases.

There are six different cases in this activity. Each team analyzes two of the six cases, as indicated in the tables following Steps 3 and 5. Teams will analyze one of Cases A through D first, and then either

Case E or F. As long as you have at least four teams, each of the six cases will be analyzed by at least one team.

- Write the team numbers and the medical charts for the first cases assigned to them on the board or a transparency, as indicated in the following table. Point out the location of the medical charts. Make sure students understand that they should collect and analyze just one part of their chart at a time (Part 1, then Part 2, then Part 3).

### Team Assignments

Team	Medical chart for first case
1	A
2	B
3	D
4	C

Team	Medical chart for first case
5	B
6	D
7	C
8	A

- Tell students that after they collect Part 1 of their medical chart, they should work with their team members to complete the first part of the table on Master 2.1, *Analyzing the Cases*. After teams finish each part, they should collect the next part and complete the appropriate section of the table.

After students complete Part 1, tell them they can get more information about specific illnesses from Master 2.3, *Doctors' Reference Manual*, and indicate where they can find those pages.

- As the teams are finishing their analyses of their first cases, write the team numbers and the medical charts for the second cases assigned to them on the board or on a transparency, as indicated in the following table. Make Parts 1, 2, and 3 of the medical charts for the second cases available to students. Tell the teams to complete the other column on Master 2.1, *Analyzing the Cases*, for this case as they did for their first case. Again, students should collect and analyze one part of the chart at a time.

### Team Assignments

Team	Medical chart for second case
1	E
2	F
3	F
4	E

Team	Medical chart for second case
5	E
6	E
7	F
8	F



6. As teams complete their work, distribute transparency pens and transparencies made from Masters 2.4, 2.5, and 2.6, *Comparing the Cases*, to the appropriate teams. Ask teams to complete the column for one of the cases they analyzed.

Rotate the transparencies among the teams in round-robin fashion. Teams that receive a transparency with a column already completed by another team should make check marks beside the symptoms, information, and health problems they agree with and add additional information they have.

If you have more than six teams, some teams (for example, those that take longer to complete their analysis) may not complete any of the columns on the transparencies. They can add their information during the class discussion in Step 7.



**Tip from the field test:** An alternative to rotating the transparencies among the teams may save time. Make two copies of each transparency so that one team can fill in their information for one of the columns at the same time that another team fills in the information for the other column. In Step 7, layer the matching transparencies so that you can display all the information at once.

Some teams are likely to finish analyzing their two cases before other teams are done. If they have time after completing Step 6, ask them to read and analyze another case. Give them either Medical Chart E or F, depending on which one they already analyzed.

7. Display the completed transparencies (Masters 2.4, 2.5, and 2.6, *Comparing the Cases*) one by one and hold a class discussion about each one, during which students respond to the following discussion questions:
  - What was the first symptom (or health complaint)?
  - What possible health problems did you list after Part 1?
  - After reading Part 2, did you rule out any of the possible problems? Why or why not?
  - Did you add any other possibilities? Why or why not?
  - After reading Part 3, what did you decide the health problem was?
  - How did you rule out the other possibilities?
  - What part of the body is directly affected by this problem?
  - How much time passed between Part 1, when symptoms were first noticed, and Part 3, when the doctor was ready to diagnose the problem?



**Tip from the field test:** Don't let this discussion drag. It isn't really necessary that every symptom is recorded in the charts. Move on as soon as students recognize that a patient's symptoms help them narrow down the possible health problems to the most likely problem. The important result of the questioning is that students recognize that doctors use symptoms to determine what a patient's health problem is and that knowing more information also helps doctors rule out other problems.

The following are examples of how the completed transparencies might appear:

**Master 2.4, Comparing the Cases: A and B**

Part		Case: Alex A.	Case: Alex B.
1	<b>Symptoms and other information</b>	Sore throat	Sore throat
	<b>Possible health problem(s)</b>	Cold; history test	Cold; history test
2	<b>New symptoms and information in Part 2</b>	Stuffy, runny nose; slightly red throat; very low fever	Red and white patches on tonsils; fever; swollen lymph nodes
	<b>Possible health problem(s)</b>	Cold; allergies	Cold; strep throat
3	<b>Time passed since Part 1 (when symptoms first appeared)</b>	1 day	1 day
	<b>Probable health problem</b>	Cold	Strep throat
	<b>Part(s) of the body affected</b>	Throat, nose	Throat

**Master 2.5, Comparing the Cases: C and D**

Part		Case: Abby C.	Case: Abby D.
1	<b>Symptoms and other information</b>	Sore chest; can't breathe	Sore chest; can't breathe
	<b>Possible health problem(s)</b>	Cold; allergies; asthma	Cold; allergies; asthma

2	<b>New symptoms and information in Part 2</b>	Wheezing in lungs; coughing up mucus; low fever; mom has allergies	Wheezing in lungs; mom has allergies and uncle has asthma; had bronchitis 4 times in past year
	<b>Possible health problem(s)</b>	Cold; bronchitis; pneumonia; asthma	Cold; allergies; bronchitis; asthma
3	<b>Time passed since Part 1 (when symptoms first appeared)</b>	2 nights	2 nights
	<b>Probable health problem</b>	Bronchitis	Asthma
	<b>Part(s) of the body affected</b>	Lungs; bronchial tubes	Lungs; bronchial tubes

**Master 2.6, Comparing the Cases: E and F**

Part		Case: Jenna E.	Case: Jenna F.
1	<b>Symptoms and other information</b>	Not interested in usual activities; sad; poor appetite; grades went down	Not interested in usual activities; sad; poor appetite; grades went down
	<b>Possible health problem(s)</b>	Nothing; depression; sadness	Nothing; depression; sadness
2	<b>New symptoms and information in Part 2</b>	Grandpa died 2 months ago; grades back up; interested in volleyball again	Grandpa died 2 months ago; not sleeping well; no confidence; often angry at parents; quit band
	<b>Possible health problem(s)</b>	Nothing; sadness	Depression; sadness
3	<b>Time passed since Part 1 (when symptoms first appeared)</b>	6 weeks	6 weeks
	<b>Probable health problem</b>	Nothing OR sadness* (but it's over now)	Depression*
	<b>Part(s) of the body affected</b>	Brain	Brain

\*Students may feel that both Cases E and F are examples of sadness, or that both are examples of depression. Either determination is acceptable at this time. In Activity 2, students will compare the cases more carefully using the definition of depression. That exercise will establish that Case E is an example of sadness and Case F is an example of depression.

In the discussion, emphasize to students that they determined the health problem based on the patients' *symptoms*. As the cases progressed, the patients displayed additional symptoms that helped the teams rule out some possibilities. The availability of Master 2.3, *Doctors' Reference Manual*, following Parts 2 and 3 also may have led them to suggest other possible health problems that were consistent with the symptoms. Also point out that the time courses for each problem varied.

The cases are organized in pairs: A and B, C and D, and E and F. You may want to point out to students that the first part of the medical chart is identical for each pair. This emphasizes that the same symptoms are often characteristic of more than one illness, at least initially. As doctors continue to gather information about an individual's symptoms, they can be more sure of their diagnosis.

8. After all teams report their findings, emphasize again to students that they narrowed down and decided on the health problems based on the symptoms that the individuals displayed.

Note that for a few cases, doctors could use distinct medical tests (such as strep tests, blood tests, chest X-ray, or pulmonary function tests) to confirm their diagnoses. But the doctors could be fairly certain of their diagnoses for all of the health problems simply by analyzing the symptoms.

## Activity 2: Defining "Illness"

1. Remind students that they diagnosed the health problems of two individuals in Activity 1. Ask students if they can think of other words for "health problem."

Students may suggest words such as sickness, illness, disease, syndrome, or disorder. Try to get students to introduce the term *illness* instead of supplying it yourself. Use probes such as, "If somebody is sick, you could say they have an . . ." or "Asthma, bronchitis, strep throat, and depression are . . . ." In the next step, students will develop a definition for *illness*.

**Note to teachers:** If students ask about the difference between the various terms, explain that for this module, the terms *illness*, *disease*, *sickness*, *disorder*, and *syndrome* should be considered the same. For this unit, try to use the word *illness* consistently because of its relation to mental illness.

2. After students have used the term *illness*, ask them to use what they learned in the previous activity to develop a definition for *illness*. Write the students' definition on a transparency.



**Content Standard A:**  
Develop descriptions, explanations, predictions, and models using evidence. Recognize and analyze alternative explanations and predictions.

This is likely to be challenging for students. Use questions such as, “Did the six characters have a health problem?” and “What part of their body was causing their problem?” to lead students to the following key points about illness:

- Illness affects a specific part or parts of the body.
- Illness causes that part of the body to function outside normal ranges.
- Illness interferes with a person’s life.

Students may not express the idea of usual or normal ranges of function. Give them the example of body temperature. A normal body temperature is considered 98.6°F, but the temperature of a healthy person may vary several tenths of a degree (for example, from 98.3 to 99.1) throughout the day. This person’s temperature would still be considered normal. A temperature of 101°F, however, would be considered abnormally high because it is outside the normal range.

Students will likely explain that an illness prevents a person from engaging in his or her usual activities, such as going to school or playing sports. Affirm this idea by saying, “Yes, an illness interferes with a person’s life.” This is a good time to emphasize the importance of considering the *time course* of an illness. In all six of the cases, the parents initially took a wait-and-see approach. They recognized that an illness would continue to disrupt their child’s life over the following days or weeks, while brief disruptions are not likely due to an illness. As students learned in Cases E and F, the length of time that symptoms are exhibited is a key factor in distinguishing sadness from depression.

Many students may think that all illnesses are caused by an infectious agent, such as a bacteria or a virus. Others may think that illness applies only to long-term and potentially fatal health problems. You can help students by pointing out that illness can refer to a broad range of health problems, from minor illnesses such as colds to a short-term health problem such as a broken leg to a long-term, more serious condition such as diabetes.

At the end of the discussion, make sure that the class has reached a consensus on what illness is. The definition should be something like the following:

*An illness is a problem in which some part or parts of the body do not function normally in a way that interferes with a person’s life.*

3. Direct students' attention to the cases again. Ask, "Are all of the cases examples of an illness?" Prompt students to use their definition of illness to justify their opinions.

Students likely will all agree that colds, strep throat, bronchitis, and asthma are illnesses. They should recognize that some part (or parts) of the body are not functioning normally and this is causing problems with the individual's life. Students probably will have different opinions about whether sadness and depression are illnesses. For now, let students disagree about this idea. The next step asks students to think about this again.

4. Ask students to sit with their team members from Activity 1 and refer to their completed copy of Master 2.1, *Analyzing the Cases*, for either Case E (sadness) or Case F (depression). Display a transparency of Master 2.7, *Is It an Illness?* Complete the table using input from the teams.

You may want to replay the animations or redistribute the medical charts for these cases, especially if it has been a few days since students completed that part of Activity 1.

Completing the table has several functions. First, students who analyzed Case E (sadness) will become familiar with the symptoms of depression. Second, comparing the two cases will help clarify their differences. Students should recognize that while sadness and depression have similar symptoms, depression has more symptoms and the symptoms last longer than for sadness. Third, this comparison should help students determine that depression should be classified as an illness and sadness should not. The completed table should look similar to the table on page 96.

If students are not convinced that a part of the body is affected by sadness or depression, remind them of their experience in Lesson 1 and the conclusion that the brain controls how we feel, how we behave, and how we think. Feelings, behavior, and thinking are all affected by depression.

5. Ask students to use their definition of illness and the completed master to decide whether depression and sadness are illnesses. After they have come to the consensus that depression is an illness, write the criteria for depression on the bottom of the transparency:

*A diagnosis of depression is based on having five or more symptoms of depression nearly every day for more than two weeks.*

**Master 2.7, Is It an Illness?**

Analysis question	Sadness (Case E)	Depression (Case F)
What are the symptoms (effect on life)?	Sad Not interested in usual activities (e.g., volleyball) Not hungry Annoyed (irritable)	Sad Not interested in usual activities (volleyball, music) Not hungry Not sleeping well Unconfident Spends most of time in room Can't get along with parents
What part of the body is affected?	Brain	Brain
How long did the symptoms last?	A few days to one week	Six weeks
Are the symptoms outside the normal range?	No—because it's normal to be sad, not hungry, or not interested in usual things for short periods of time	Yes—because this is not Jenna's usual behavior

Students should decide that depression is an illness and that the symptoms of the patient in Case F fit the criteria for depression. If they are still confused about this, point out that in Case E, sadness affected the patient's life for only a few days, whereas in Case F, depression caused changes in the character's social activities, eating habits, sleeping patterns, and school performance for six weeks. The time course is actually a critical factor in the diagnosis of depression. See page 21 in Information about Mental Illness and the Brain for further details.

**Note to teachers:** Students may become concerned if they recognize symptoms of depression in themselves, a friend, or a family member. Emphasize that a diagnosis of depression can only be made by a qualified mental healthcare professional. Encourage them, however, to talk with the school counselor or their parents, or to ask their parents to schedule an appointment with their physician to discuss their concerns.



### Activity 3: Observing the Depressed Brain

In this activity, students examine one way that *scientists* study what happens to the brain in depression. Emphasize to students that neuroscientists use imaging techniques such as PET in research studies that are conducted with adult volunteers. These techniques are *not* used clinically to diagnose depression or other mental illnesses, nor are they used with children, even in research settings. For more information about the use of PET and other imaging techniques, see page 27 in Information about Mental Illness and the Brain. As necessary during this activity, remind students that PET and other imaging tests are used for scientific research and *not* for clinical diagnosis or treatment.

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



1. Ask students to recall how doctors diagnose depression.

This step emphasizes that doctors diagnose depression (and other mental illnesses) by evaluating an individual's symptoms. There is currently no physiological test for depression. Qualified mental health professionals can accurately diagnose depression based on a person's symptoms. One of the goals of ongoing scientific research is to develop a clinical test for depression.

2. Remind students that the brain is the part of the body affected in depression. Inform them that scientists don't know what causes depression. Ask, "How could scientists study this?"

Scientists could find out more about what is happening in the brain of someone who has depression or another mental illness by doing imaging studies. Students should recall the PET images that they saw in Lesson 1.

3. Tell students that they will examine PET images of the brains of one adult volunteer who has depression and one who does not. Ask students to predict what they will observe on the images and to explain their reasoning.

On the basis of previous activities in this lesson and the images they examined in Lesson 1, students should predict that the brain images will be different. Students should recall that the brain controls feelings, actions, and thoughts. Depression is an illness of feeling, so the brain of someone who is depressed will most likely be different from that of someone who does not have depression.



**Content Standard A:**  
Different kinds of questions suggest different kinds of scientific investigations.

4. Organize students into their teams and direct them to the computer stations. Instruct them to click on “Looking Inside the Brain.” Ask students to write three observations of the PET images they observe.

Alternatively, project the images from “Looking Inside the Brain” for the whole class to view together. The important aspect of these PET images is that they clearly show that the brains of people with depression are different from those of people who do not have depression. These differences are biological; that is, they are changes in the chemical workings of the brain.

The PET images here show different information from those in Lesson 1. Unlike the previous images, which showed differences in the activity levels in the brain, these PET images show changes in receptors in the brain. The scientists in this study used a radioactively labeled chemical that binds to a group of receptors for serotonin. In the brains of people without depression, the labeled chemical binds to the receptors, and this shows clearly as bright yellow in the PET images. Notice that the binding occurs in specific areas in the brain. In the brains of people with depression, the serotonin receptors don’t bind the chemical and the PET images reflect this.

5. Reconvene the class and ask several teams to share their observations about the PET scans.

Students should have noticed that there are differences among the PET scans in the amount of different colors and in where individual colors are located. Specifically, the brain scan from a depressed person showed less binding activity than the brain scan from a person who is not depressed.

At this point in the activity, students may ask whether PET scans are used as a diagnostic test for depression. Scientists use neuroimaging techniques, such as PET, to study the activity and chemicals present in the brain and to understand how treatments for mental illness affect the brain. Doctors (physicians) do *not* use neuroimaging techniques as a test to diagnose mental illness or to assess the outcome of treatment. As the students learned in Activity 1, doctors diagnose depression and other mental illnesses by finding out what symptoms a person has. Specific symptoms are characteristic of each mental illness.

6. Present the following situation to students: people who have strep, asthma, or diabetes usually go to the doctor for treatment, but many people who think they might have a mental illness don’t see a doctor. Ask students to decide whether people who might have a

mental illness should go to the doctor. Tell them that their answer should include information from their definition of illness.

Students should respond that people who might have a mental illness should see a doctor to get help. Students should know at this stage that a mental illness, such as depression, is a problem with the way the brain is working and that it affects a person's life in a negative way (as seen in the cases). You might wish to review with the class the definition of illness that they developed in Activity 2 in this lesson.

This situation portrays a very common event. People who think they might have a mental illness often avoid going to a doctor because they feel that they will be stigmatized or thought of as inferior to others.



**Assessment:**

Step 6 is an opportunity for an informal assessment of what students have learned in this lesson. You can also determine whether they can apply their knowledge to a specific situation.

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



1. Ask students to recall how doctors diagnose depression.

This step emphasizes that doctors diagnose depression (and other mental illnesses) by evaluating an individual's symptoms. There is currently no physiological test for depression. Qualified mental health professionals can accurately diagnose depression based on a person's symptoms. One of the goals of ongoing scientific research is to develop a clinical test for depression.

2. Remind students that the brain is the part of the body affected in depression. Inform them that scientists don't know what causes depression. Ask, "How could scientists study this?"

Scientists could find out more about what is happening in the brain of someone who has depression or another mental illness by doing imaging studies. Students should recall the PET images that they saw in Lesson 1.

3. Tell students that they will examine PET images of the brains of one adult volunteer who has depression and one who does not. Ask students to predict what they will observe on the images and to explain their reasoning.

On the basis of previous activities in this lesson and the images they examined in Lesson 1, students should predict that the brain images will be different. Students should recall that the brain controls feelings, actions, and thoughts. Depression is an illness of feeling, so the brain of someone who is depressed will most likely be different from that of someone who does not have depression.



**Content Standard A:**

Different kinds of questions suggest different kinds of scientific investigations.

4. Ask students to work in their teams. Display a transparency made from Master 2.8, *Looking Inside the Brain*. Ask students to write three observations of the PET images they observe.

The important aspect of these PET images is that they clearly show differences between the brains of people with depression and those of people who do not have depression. These differences are biological; that is, they are changes in the chemical workings of the brain.

The PET images here show different information from those in Lesson 1. Unlike the previous images, which showed differences in the activity levels in the brain, these PET images show changes in receptors in the brain. The scientists in this study used a radioactively labeled chemical that binds to a group of receptors for serotonin. In the brains of people *without* depression, the labeled chemical binds to the receptors, and this shows clearly as bright yellow in the PET images. Notice that the binding occurs in specific areas in the brain. In the brains of people *with* depression, the serotonin receptors don't bind the chemical and the PET images reflect this.

5. Reconvene the class and ask several teams to share their observations about the PET scans.

Students should have noticed that there are differences among the PET scans in the amount of different colors and in where individual colors are located. Specifically, the brain scan from a depressed person showed less binding activity than the brain scan from a person who is not depressed.

At this point in the activity, students may ask whether PET scans are used as a diagnostic test for depression. Scientists use neuroimaging techniques, such as PET, to study the activity and chemicals present in the brain and to understand how treatments for mental illness affect the brain. Doctors (physicians) do *not* use neuroimaging techniques as a test to diagnose mental illness or to assess the outcome of treatment. As the students learned in Activity 1, doctors diagnose depression and other mental illnesses by finding out what symptoms a person has. Specific symptoms are characteristic of each mental illness.

6. Present the following situation to students: people who have strep, asthma, or diabetes usually go to the doctor for treatment, but many people who think they might have a mental illness don't see a doctor. Ask students to decide whether people who might have a mental illness should go to the doctor. Tell them that their answer should include information from their definition of illness.

Students should respond that people who might have a mental illness should see a doctor to get help. Students should know at this stage that a mental illness, such as depression, is a problem with the way the brain is working and that it affects a person's life in a negative way (as seen in the cases). You might wish to review with the class the definition of illness that they developed in Activity 2 in this lesson.

This situation portrays a very common event. People who think they might have a mental illness often avoid going to a doctor because they feel that they will be stigmatized or thought of as inferior to others.

Ask students to write a few sentences in their journals to summarize what they believe are the big ideas that are important to remember from this lesson. As with the previous summary students wrote, this information will help them when they do the Evaluate lesson (Lesson 6) at the end of this module.



**Assessment:**

Step 6 is an opportunity for an informal assessment of what students have learned in this lesson. You can also determine whether they can apply their knowledge to a specific situation.

## Lesson Wrap-Up






**Assessment:**

Students summarize the big ideas from this lesson.





# Lesson 2 Organizer: Web Version



What the Teacher Does	Procedure Reference
<b>Activity 1: What's the Health Problem?</b>	
Introduce activity by explaining to students that they will play the role of medical interns to learn about diagnosing patients.	Page 84 Step 1
Organize the class into teams of two to three students and number the teams 1 through 8. Give each team 1 copy of Master 2.1, <i>Analyzing the Cases</i> .	Page 84 Step 2 
Access the Web site for Lesson 2 and have students click on the link "The Cases." After selecting their team number, they will view cases and complete Master 2.1. They can access additional information after Part 2 and during Part 3 by referring to the "Doctors' Reference Manual."	Page 84 Steps 3–4 
Ask teams to complete the appropriate columns related to one of their cases on transparencies made from Masters 2 .4, 2.5, and 2.6, <i>Comparing the Cases</i> .	Pages 84–85 Step 5 
<p>Display completed transparencies and hold a class discussion by asking the following questions:</p> <ul style="list-style-type: none"> <li>• What was the first symptom (or health complaint)?</li> <li>• What possible health problems did you list after Part 1?</li> <li>• After watching Part 2, did you rule out any of the possible problems? Why or why not?</li> <li>• Did you add any other possibilities? Why or why not?</li> <li>• After watching Part 3, what did you decide the health problem was?</li> <li>• How did you rule out the other possibilities?</li> <li>• What part of the body is directly affected by this problem?</li> <li>• How much time passed between Part 1, when symptoms were first noticed, and Part 3, when the doctor was ready to diagnose the problem?</li> </ul>	Pages 84–88 Step 6
Make sure students understand that they based their diagnoses on the individual's symptoms.	Page 88 Step 7

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

 = Involves using the Internet.

<b>Activity 2: Defining “Illness”</b>	
Ask students to recall their diagnoses of health problems in Activity 1. Challenge them to think of other words for “health problem.”	Page 93 Step 1
After students suggest the word illness, ask them to use what they learned in Activity 1 to develop a definition for illness. Write their definition on a transparency. Compare their definition to the following one and make sure the three key ideas indicated are included: <i>An illness is a problem in which some part or parts of the body do not function normally in a way that interferes with a person’s life.</i>	Pages 93–94 Step 2 
Remind students of the cases in Activity 1 and ask if all of the cases are examples of illness. Ask the students to use the definition of illness to justify their responses.	Page 95 Step 3
Organize the class into the same teams as in Activity 1. Ask students to refer to their completed copy of Master 2.1, <i>Analyzing the Cases</i> , for either Case E or Case F. Display a transparency of Master 2.7, <i>Is It an Illness?</i> , and complete the table using input from the teams.	Page 95 Step 4  
Ask students to use the definition of illness developed earlier to decide whether depression and sadness are illnesses. After reaching the consensus that depression is an illness, write the criteria for depression on the bottom of the transparency: <i>A diagnosis of depression is based on having five or more symptoms of depression nearly every day for more than two weeks.</i>	Pages 95–96 Step 5
<b>Activity 3: Observing the Depressed Brain</b>	
Ask students to remember again how doctors diagnose depression.	Page 97 Step 1
Remind students that the brain is the part of the body affected in depression and that scientists don’t know what causes depression. Ask how scientists might investigate the causes of depression.	Page 97 Step 2
Tell students that they will look at PET images of the brains of one person who has depression and one who does not. Ask students to predict what they will observe on the images.	Pages 97–98 Step 3
Reorganize students into their teams and direct them to the computers. After accessing the Web site for Lesson 2, instruct them to click on “Looking Inside the Brain.” Ask students to write three observations of the PET images.	Page 98 Step 4 
Reconvene the class and ask groups to share their observations of the PET images.	Pages 98–99 Step 5



Present the following situation to students: People who have strep, asthma, or diabetes usually go to the doctor for treatment, but many people who think they might have a mental illness don't see a doctor. Ask students to decide whether people who might have a mental illness should go to the doctor. Instruct students to include information from the definition of illness in their answer.

Page 99  
Step 6




### **Lesson Wrap-Up**

Ask students to summarize the main ideas of this lesson by writing a few sentences in their journal.

Page 101

# Lesson 2 Organizer: Print Version



What the Teacher Does	Procedure Reference
<b>Activity 1: What's the Health Problem?</b>	
Introduce activity by explaining to students that they will play the role of medical interns to learn about diagnosing patients. They will review two medical cases.	Page 88 Step 1 
Organize the class into teams of two to three students and number the teams 1 through 8. Give each team 1 copy of Master 2.1, <i>Analyzing the Cases</i> .	Pages 88–89 Step 2 
Write the team numbers and the first medical case letter on the board so each team knows which case it should analyze first. Point out where students will pick up their information. Make sure students understand that they will only analyze one part of the case at a time (Part 1, then Part 2, and then Part 3). As students review each part, they should complete the appropriate section on Master 2.1. Students can review relevant sections of Master 2.3, <i>Doctors' Reference Manual</i> , as they complete Part 2 and Part 3.	Page 89 Steps 3–4
Write the letters for the second case for each team on the board. Make Parts 1, 2, and 3 of the medical cases for each team's second case available. Tell the teams to analyze the second case in the same way they did the first case and complete the table on Master 2.1.	Page 89 Step 5 
Ask teams to complete the appropriate column related to one of their cases on transparencies made from Masters 2.4, 2.5, and 2.6, <i>Comparing the Cases</i> .	Page 90 Step 6
Display completed transparencies and hold a class discussion by asking the following questions: <ul style="list-style-type: none"> <li>• What was the first symptom (or health complaint)?</li> <li>• What possible health problems did you list after Part 1?</li> <li>• After reading Part 2, did you rule out any of the possible problems? Why or why not?</li> <li>• Did you add any other possibilities? Why or why not?</li> <li>• After reading Part 3, what did you decide the health problem was?</li> <li>• How did you rule out the other possibilities?</li> <li>• What part of the body is directly affected by this problem?</li> <li>• How much time passed between Part 1, when symptoms were first noticed, and Part 3, when the doctor was ready to diagnose the problem?</li> </ul>	Pages 90–93 Step 7

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

Make sure students understand that they based their diagnoses on the individual's symptoms.	Page 93 Step 8
<b>Activity 2: Defining "Illness"</b>	
Ask students to recall their diagnoses of health problems in Activity 1. Challenge them to think of other words for "health problem."	Page 93 Step 1
After students suggest the word illness, have them use what they learned in Activity 1 to develop a definition for illness. Write their definition on a transparency. Compare their definition to the following one and make sure all the important ideas are included: <i>An illness is a problem in which some part or parts of the body do not function normally in a way that interferes with a person's life.</i>	Pages 93–94 Step 2
Remind students of the cases in Activity 1 and ask if all of the cases are examples of illness. Ask the students to use the definition of illness to justify their responses.	Page 95 Step 3
Organize the class into the same teams as in Activity 1. Ask students to refer to their completed copy of Master 2.1, <i>Analyzing the Cases</i> , for either Case E or Case F. Display a transparency of Master 2.7, <i>Is It an Illness?</i> , and complete the table using input from the teams.	Page 95 Step 4
Ask students to use the definition of illness developed earlier to decide whether depression and sadness are illnesses. After reaching the consensus that depression is an illness, write the criteria for depression on the bottom of the transparency: <i>A diagnosis of depression is based on having five or more symptoms of depression nearly every day for more than two weeks.</i>	Pages 95–96 Step 5
<b>Activity 3: Observing the Depressed Brain</b>	
Ask students to remember again how doctors diagnose depression.	Page 99 Step 1
Remind students that the brain is the part of the body affected in depression and that scientists don't know what causes depression. Ask how scientists might investigate the causes of depression.	Page 99 Step 2
Tell students that they will look at PET images of the brains of one person who has depression and one who does not. Ask students to predict what they will observe on the images.	Pages 99–100 Step 3
Reorganize students into their teams. Display a transparency of Master 2.8, <i>Looking Inside the Brain</i> . Ask students to write three observations of the PET images.	Page 100 Step 4
Reconvene the class and ask teams to share their observations of the PET images.	Page 100 Step 5



Present the following situation to students: People who have strep, asthma, or diabetes usually go to the doctor for treatment, but many people who think they might have a mental illness don't see a doctor. Ask students to decide whether people who might have a mental illness should go to the doctor. Instruct students to include information from their definition of illness in their answer.

Page 101  
Step 6

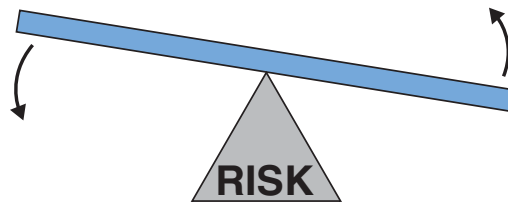
### **Lesson Wrap-Up**

Ask students to summarize the main ideas of this lesson by writing a few sentences in their journal.

Page 101

# Mental Illness: Could It Happen to Me?

Lesson 3  
Explain/  
Elaborate



## Overview

Students build on their understanding of mental illness as a disease of the brain by modeling the factors that influence whether a person develops depression. They then read about other mental illnesses to determine the risk factors that contribute to those illnesses.

## At a Glance

## Major Concepts

Everyone has some risk for becoming mentally ill. Factors such as genetics, environment, and social influences interact to increase or decrease a person's risk for developing a mental illness.

## Objectives

After completing this lesson, students will

- recognize that mental illness is something that could happen to anyone,
- be able to identify factors that influence a person's risk for developing a mental illness, and
- be able to explain that some factors increase a person's risk for mental illness and other factors decrease a person's risk for mental illness.

## Teacher Background

Consult the following sections in *Information about Mental Illness and the Brain*:

- 2 *Mental Illness in the Population* (pages 21–22)
- 2.1 *Mental illness in adults* (page 22)
- 2.2 *Mental illness in children and adolescents* (page 22)
- 6 *The Causes of Mental Illnesses* (pages 28–29)
- 6.2 *Risk factors for mental illnesses* (pages 28–29)
- 10 *Information about Specific Mental Illnesses* (page 33)
- 10.1 *Depression* (pages 33–37)
- 10.2 *Attention deficit hyperactivity disorder (ADHD)* (pages 37–39)
- 10.3 *Schizophrenia* (pages 39–41)

## In Advance

### Web-Based Activities

Activity	Web Component?
1	No

### Photocopies

Activity	Master	Number of copies
1	Master 3.1, <i>The Roll of the Die for Depression</i>	1 copy per team of 3 students*
	Master 3.2, <i>The Risk Meter</i>	1 copy per team of 3 students
	Master 3.3, <i>Mental Illness—More Likely or Less Likely?</i>	1 transparency
	Master 3.4, <i>ADHD: What Are the Chances?</i>	15 copies†
	Master 3.5, <i>Schizophrenia: What Are the Chances?</i>	15 copies†

\*If you have multiple class sections doing this activity, you can reuse Master 3.1 in subsequent classes.

†These numbers are based on a class of 30 students. Adjust the numbers for your class size. Half the teams will need one copy per student of Master 3.4, and the other half will need one copy of Master 3.5. Each team will consider just one of the two diseases.

### Materials

Activity	Materials
1	<ul style="list-style-type: none"> <li>• dice (1 die per team)</li> <li>• overhead projector</li> <li>• transparency pens</li> </ul>

### Preparation

Gather enough dice so that each team has one die.

In the last part of the activity, students will work in teams to complete readings about ADHD and schizophrenia. Keep track of which disease teams read about so that they can read about the other disease during Lesson 4.

## Activity 1: What Are the Risks?

## Procedure

1. Ask students to think about who gets a mental illness. Why do some people get a mental illness and others do not?

Students might propose several possibilities. For example, some students might say that it is inherited from family or that something in the environment causes some people to have a mental illness. You can challenge students by asking them why one person gets a mental illness and one doesn't even if they are in similar environments and maybe even related to each other. At this stage, accept all reasonable answers.

If students are interested, you can give them the statistics about the occurrence of mental illness in Section 2, Mental Illness in the Population, in Information about Mental Illness and the Brain.

2. Introduce the terms *risk* and *risk factor* to students. Risk is the chance that something negative or bad will happen. A risk factor is something that changes a person's chance of having something negative or bad happen. Point out that some of the things that students suggested in Step 1 might be risk factors for mental illness.

For example, everyone has some risk, or chance, for getting a cold. One common risk factor for colds is being around someone who has a cold and is coughing or sneezing. Some risks are higher than others. The risk of injury for someone who is walking on the sidewalk in the daytime is low; the risk of injury is much higher if the person is running on uneven ground at night.

3. Explain to students that they will use a model to learn more about risk factors for mental illness and how those factors influence whether a person is more likely or less likely to get depression. The activity involves rolling a die and moving positions on a meter. Briefly go over how students will complete the activity.

Hold up a copy of Master 3.1, *The Roll of the Die for Depression*, and explain how the teams will roll the die, compare the number on their die to an outcome, and then learn the consequence. Then hold up a copy of Master 3.2, *The Risk Meter*, and explain that students will make a mark on the meter that corresponds to either a higher risk (chance) for getting depression or a lower risk (chance) for getting depression, depending on the consequence for their die roll. For each roll of the die, students will make a mark (and number it 1st, 2nd, 3rd, and so forth) so they have a record of where the marker was after each roll.





**Assessment:**  
As teams work through this activity, circulate around the room and listen to them discuss their reasons for placing their arrows at specific points. This gives you an opportunity to assess their interpretations of the information.

Explain that students will work as a team to decide how far to move on the meter with each roll. Teams can decide not to move the mark on the meter at all. The team members will agree on the move and record on Master 3.2 their reasons for the direction and distance of the move. Some teams can decide not to move the mark on the risk meter in response to a given die roll. The important part is for students to think through the issue and be able to explain their decisions.

For the risk meter, only the first die roll begins at the point labeled “Starting Point.” Subsequent movements begin from the position decided upon during the previous movement.

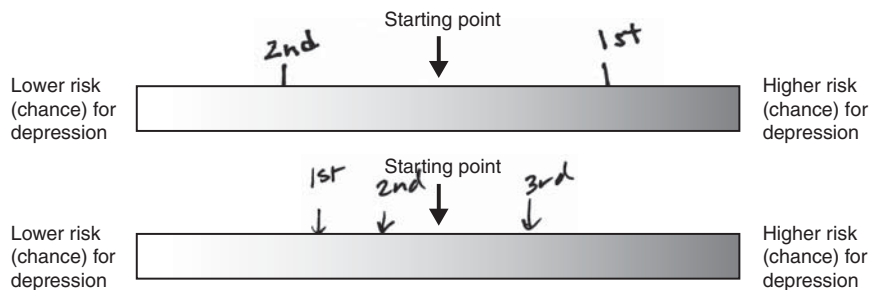


Figure 3.1. Students move positions on the risk meter based on their previous mark. The starting point is only used for the first die roll.

4. Organize students into teams of three. Give each team a die, one copy of Master 3.1, *The Roll of the Die for Depression*, and one copy of Master 3.2, *The Risk Meter*. Allow time for teams to work through the worksheets.

This activity is an opportunity for students to work collaboratively. The members of each team need to decide who will be responsible for each task in the activity (rolling the die, moving the meter, completing the table). All team members should participate in making decisions about the direction, distance, and reasons for the placement of the new mark.

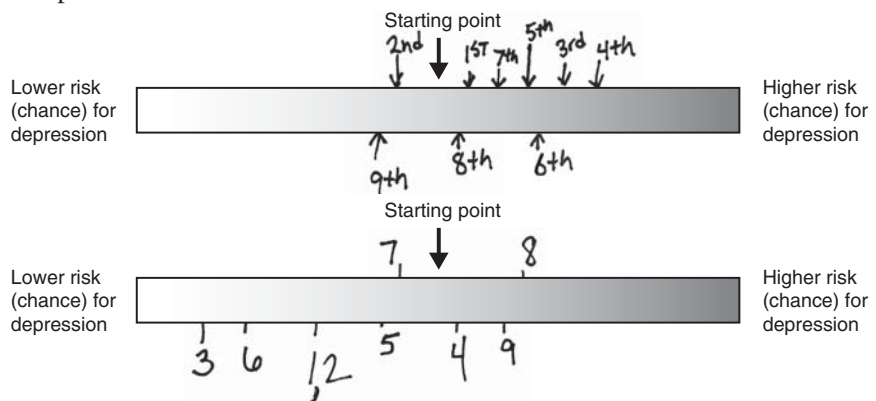


Figure 3.2. The position of the final mark on the risk meter will vary for different student teams. The final position is an outcome of the decisions made for nine rolls of the die.



**Tip from the field test:** Some teachers drew a diagram of the risk meter on the board (or on a transparency) and asked each team to draw an arrow indicating its final position (after the ninth die roll). In the discussion that follows, students can use this comparison to see easily that different teams ended up in different positions after all the die rolls.

5. After teams have completed their die rolls and moves, display a transparency of Master 3.3, *Mental Illness—More Likely or Less Likely?*, on the overhead projector. Ask teams to share their findings to fill in the first two columns (the other columns will be completed later). One team can identify a category and then other teams can describe how that category affects a person’s chance for developing depression.

The effect that each factor plays in influencing a person’s risk of getting depression should be considered individually at this point. A sample of a partially completed Master 3.3 is shown on page 114. Each of the categories on the table (and in the dice rolls of the game) represents a factor that scientists are investigating to determine how they affect a person’s risk of getting a mental illness.

**Note to teachers:** This game models fictitious individuals. It is important that students not apply it to their own, their family’s, or their friends’ lives. You might wish to emphasize the words “model” and “fictitious” during the discussion of this game to help make this point.

Some of the factors that influence a person’s risk of getting depression can be of a sensitive nature and potentially uncomfortable for a class discussion. However, experiences involving family problems and abuse or violence do increase a person’s risk of developing depression. Because these are known risk factors, they are included in this activity. If personal situations arise in the classroom, try to focus the discussion on the activity and reinforce the idea that the affected person (the model) is fictitious. The discussion questions at the end of the activity can also help give students a clearer perspective about risk factors and mental illness. Having one, or even several, risk factors that increase a person’s chances for getting depression does not dictate a certain outcome. If appropriate, discuss the issue with the individual student after the activity is over.

6. Discuss with the class the results of the activity. Guide the discussion with questions such as the following:
  - Did you move the arrow on the risk meter the same distance for each roll of the die? Why did you move the amount you did? Why did you decide not to move the arrow?



**Content Standard A:**  
Develop descriptions, explanations, predictions, and models using evidence.

**Mental Illness—More Likely or Less Likely?**

<b>Category</b>	<b>Is this a risk factor for depression? Why?</b>	<b>Is this a risk factor for ADHD? Why?</b>	<b>Is this a risk factor for schizophrenia? Why?</b>
<b>Gender</b>	Yes—depression is more common in females.		
<b>Age</b>	No—depression can occur at any age.		
<b>Family relationships</b>	Yes—an individual who has a good family relationship is less likely to become depressed.		
<b>Occurrence of disease in family</b>	Yes—a person’s risk for depression increases if a family member has depression (or a history of depression).		
<b>Smoking</b>	Yes—smoking cigarettes increases a person’s risk for depression.		
<b>Attitude</b>	Yes—a person who has a negative attitude is more likely to have depression.		
<b>Ending a relationship</b>	Yes—stressful events such as a romantic breakup can make depression more likely.		
<b>Death of a family member or friend</b>	Yes—the stress of losing a close relative or friend can make a person more susceptible to depression.		
<b>Experiencing abuse or violence</b>	Yes—a person who has experienced abuse or violence is more likely to become depressed.		

Different teams of students likely will make different decisions about how far to move the mark with each roll of the die. Some teams might move an equal distance for each factor, and other teams might move a larger or smaller distance based on their judgment about the importance of the factor. Some teams may decide that for a given factor, the risk doesn't change; therefore, the position of the arrow would not change. For example, they might get a 5 on the first roll, which indicates that the person they are modeling is male. The information tells them that depression is more common in females. Some teams might decide that being male doesn't increase the chances for getting depression and would not move the arrow. Other teams might interpret this as the chance for their individual to become depressed is decreased because depression is more common in females. Based on this logic, this group should move the arrow to the left.

The differences among rolls reflect decisions and judgments that each group made during the game. The important idea addressed with this question is that students think about why they made their decisions.

- **Do you think that some factors are more important than others for determining a person's chance of getting depression? Why?**

If the students moved the marker a greater distance for some factors than others, they are assigning greater importance to those factors.

This question provides an opportunity to talk about the use of models in science and the importance of continuing scientific studies. The game models the risk for getting depression. It does not attempt to rank the significance of the different types of risk factors. Scientists continue to investigate whether some factors have a larger influence than others in determining if someone gets a mental illness. The influence that a risk factor has may depend on the individual's age, whether other risk factors occur at the same time, whether the factor exists for a long time or repeatedly, and the individual's vulnerability.

- **Did you move the mark in different directions?**

Most likely, students will move the mark in different directions based on the roll of the die.

- **What does moving in different directions mean about an individual's chances for getting depression?**

Students should recognize that moving the marker in different directions means that some factors increase the chance of getting depression and some decrease the chance.

- Do you think some factors really can increase a person's chance of getting depression and other factors can decrease it?

This question asks students to relate the model to what happens in real life. Students should relate the movement of the marker in different directions to increased or decreased chances for getting depression. If they moved the arrow in different directions, they are indicating that some things increase the chance and other things decrease the chance. This is based in reality for depression (and other diseases, including other mental illnesses). Some social and environmental factors, such as a good relationship within the family or with a trusted, supportive adult with whom to talk, can decrease the risk for developing depression or other mental illnesses.

- Compare the final position of the marker with the starting position. If this model reflects what happens in real life, what does it say about the number of factors that can influence a person's overall chance for getting depression?

In this model, the final position is the culmination of nine die rolls. In real life, the risk of getting depression or another mental illness does not depend on a person having a single factor that increases or decreases the chance that he or she will get depression or another mental illness. Many factors, including environmental, genetic, and social factors, combine to determine a person's risk for getting a mental illness. Implicit in this model is that *everyone* has risk factors for mental illness and that most people have some factors that increase their risk and others that decrease their risk for depression.

- Did the fictitious individual modeled in the activity actually get depression? Can you be sure the individual did or did not get depression?

Students should recognize that there is nothing in this model that indicates that the fictitious person actually develops depression. On the other hand, nothing in this model indicates that the individual will not get depression. This model only includes the concept that a variety of factors can influence whether someone has a higher or lower chance of getting depression.

- If this model reflects real life, does having risk factors that increase the chances for depression mean that a person will actually get depression?

This model *does* reflect real life; even if a person has factors that increase the chance for depression, he or she may not actually get the illness. Conversely, a person could get depression even if his or her risk factors would seemingly decrease the chance. This is an opportunity to reinforce that scientists use models to learn more about what might happen in real life.

Although this activity only models risk for (and not the actuality of) getting depression, you might want to remind students that a specific mental illness such as depression does not affect all people the same way. Like other diseases, some cases are mild and some are severe.

- **If having risk factors, even some that seem to increase a person's chances of getting depression by a great amount, doesn't mean the individual has depression, can you say that a risk factor causes depression?**

A key point is that a risk factor does not say anything about what causes the illness. This might be a challenging distinction for some students, but it is an important one. At present, scientists do not understand what happens on a chemical level in the brain to cause someone to get depression or other mental illnesses. The final question in Step 10 will revisit this idea.

7. **Ask students to consider whether the risk factors that they identified for depression might also be risk factors for other mental illnesses. Explain to students that they will now look at other mental illnesses to find out what risk factors might be important for those illnesses.**

You might choose to display the transparency of Master 3.3 as you begin this step. Some teams will read about ADHD and some will read about schizophrenia. Inform students that they will read information about a disease and then make decisions about risk factors based on the reading.

8. **Ask students to continue working in their teams. Give each student in half the teams one copy of Master 3.4, *ADHD: What Are the Chances?* Give the students in the other teams one copy of Master 3.5, *Schizophrenia: What Are the Chances?***

Half of the teams will consider the risk factors for ADHD and the other half will consider the risk factors for schizophrenia. Record which teams analyze each of the mental illnesses so you can assign the other mental illness to the teams in Lesson 4. It is likely that you will need to help students with some words that appear on the masters. You might choose to write difficult words, such as

*schizophrenia, hallucination, hyperactivity, and deficit*, on the board and help students recognize the written words and pronounce them.

**Note to teachers:** Depending on your school's organization and emphasis, this activity might be one in which you collaborate with your colleagues to have students "read across the curriculum."

9. After the teams have finished their analysis, reconvene the class and display the transparency of Master 3.3, *Mental Illness—More Likely or Less Likely?*, that you partially completed earlier (Step 5). Ask teams to decide whether the risks they identified for depression are also risks for ADHD and schizophrenia. Complete the table accordingly.

Before teams report their findings about risk factors, ask them to give a brief overview of ADHD or schizophrenia to the class so that the students will have some background about the other disease. Students will have different responses for each of the diseases.

For some of the factors that are important for depression, no information is given for the other diseases. Ask students to consider whether this means the information is unknown or whether those factors just aren't important for ADHD or schizophrenia. For example, the influence of family or social factors is not addressed in the information about schizophrenia. As currently understood, these factors do not play a large part in increasing someone's risk for schizophrenia—a person's genes are a much more predictive risk factor. A goal of continuing scientific research is to learn more about how genetic and nongenetic factors influence a person's risk of getting a mental illness. It is important for students to understand the distinction between a factor not changing a person's risk level and a factor about which scientists do not know the answer.

Students also might raise questions about factors such as food allergies (related to the reading about ADHD) or viral infections (related to the reading about schizophrenia) being risk factors for depression. Questions such as these suggest that students are really trying to synthesize the information. You can tell students that it is unlikely that food allergies or viral infections change a person's risk for depression. The risk factors included in the modeling activity are not the only ones that influence a person's risk for getting depression, but they are generally agreed upon by scientists as important ones.

A sample version of the completed Master 3.3 follows. Asking students to share their information will help them understand the similarities and differences among the diseases with respect to the types of factors that influence their occurrence.



### Mental Illness—More Likely or Less Likely?

Category	Is this a risk factor for depression? Why?	Is this a risk factor for ADHD? Why?	Is this a risk factor for schizophrenia? Why?
<b>Gender</b>	Yes—depression is more common in females.	Yes—ADHD is more common in males.	No—schizophrenia occurs in males and females equally.
<b>Age</b>	No—depression can occur at any age.	Yes—a criterion for diagnosing ADHD is that symptoms appear before age 7.	Yes—schizophrenia begins most commonly when a person is in their late teens or twenties. It is very rare in children.
<b>Family relationships</b>	Yes—an individual who has a good family relationship is less likely to become depressed.	No information is given.	No information is given.
<b>Occurrence of disease in family</b>	Yes—a person’s risk for depression increases if a family member has depression (or a history of depression).	Yes—a person is much more likely to have ADHD if a family member also has it.	Yes—a person is much more likely to have schizophrenia if a family member also has it.
<b>Smoking</b>	Yes—smoking cigarettes increases a person’s risk for depression.	No information is given.	No information is given.
<b>Attitude</b>	Yes—a person who has a negative attitude is more likely to have depression.	No information is given.	No information is given.
<b>Ending a relationship</b>	Yes—stressful events such as a romantic breakup can make depression more likely.	No information is given.	No information is given.

(continued on next page)



**Content Standard A:**  
Communicate scientific procedure and explanations.

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

<b>Death of a family member or friend</b>	Yes—the stress of losing a close relative or friend can make a person more susceptible to depression.	No information is given.	No information is given.
<b>Experiencing abuse or violence</b>	Yes—a person who has experienced abuse or violence is more likely to become depressed.	No information is given.	No information is given.

10. Conclude the activity with a class discussion that focuses on the overall role of risk factors in mental illness. Guide the discussion with questions such as

- Do different mental illnesses have similar risk factors? What are they?

Students should understand that the three diseases modeled have similar types of factors that determine a person’s risk. You might wish to display the completed transparency of Master 3.3, *Mental Illness—More Likely or Less Likely?*, to remind students about these factors, which among others, can include:

- o gender,
- o age,
- o family environment,
- o genetics, and
- o social factors.

- Does everyone have risk factors for becoming mentally ill?

It is important for students to realize that everyone has risk factors for mental illness (just as everyone has risk factors for other diseases).

- If a person has some risk factors that increase the chances of getting a mental illness, will they definitely get the illness?

Students should recognize that they cannot infer that someone will or will not get a mental illness. A person does not develop a mental illness because of a single risk factor; the likelihood that a person will develop a mental illness is influenced by the presence of a combination of risk factors and protective factors (factors that decrease the risk for a mental illness). An example of a protective factor for depression would be a good relationship within the

family or with a trusted, supportive adult with whom the person can talk.

The idea that mental illness is influenced by a combination of factors is particularly important for middle school students to understand. Some students probably will have relatives with a mental illness, or they might feel that something in their environment places them at risk. These feelings could cause them to feel that they are at high risk overall, when actually they cannot determine their true risk from this activity. The purpose of this activity is not to induce a fear or a feeling of inevitability, but rather to have students acknowledge that mental illness is something that could affect anyone.

- **Can you control or change your risk level for mental illness?**

During the course of analyzing risk factors, students should realize that there are some risk factors over which a person has control. For example, a person can choose not to smoke cigarettes, which would lower his or her risk for depression. Students should also realize the importance of having a trusted and supportive adult to talk to when they are feeling sad or anxious about things. Talking with someone and getting help early are two ways of changing the potential influence of social and environmental stressors (risk factors) on developing depression. On the other hand, an individual cannot control other factors, such as his or her genetic makeup.

- **This lesson began by asking you to think about why some people get a mental illness and others do not. Then, as you read about ADHD and schizophrenia, you noticed that there wasn't any information given for some of the factors that were important to think about for depression. Why do you think doctors and scientists want to know if something increases or decreases a person's risk for mental illness?**

Scientists continue to search for the causes of mental illnesses. If scientists can find out what factors are common among people with a specific mental illness, those commonalities can help scientists make informed decisions about what to investigate to learn more about a particular mental illness. If almost everyone who has a specific mental illness has the same trait or life situation, that might give scientists a clue about what part of the brain to investigate.

Also, doctors and other mental health professionals are interested to know what the risk factors are for a specific mental illness for a different reason. Knowing the risk factors can help them identify



**Assessment:**  
If you wish, ask students to write their answers to these final questions in Step 10 before holding a class discussion. This gives students an opportunity to think through their answers before the discussion, and you can read each student's responses to assess his or her understanding.

people who are most likely to develop a mental illness before the mental illness actually begins. This way, individuals can get help early—before they experience severe problems in their lives. In addition, if people know that something increases their risk for mental illness, perhaps they can change their behaviors or improve their life situation to reduce the risk. For example, if a person and his or her physician know that going through a stressful period increases the risk for depression, they can work together to find ways to deal with the stress and thereby reduce the individual's risk. A person doesn't have control over all the risk factors (such as genetics) that can contribute to a mental illness, but it can be beneficial to reduce risk in the areas in which a person does have some control.

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## **Lesson Wrap-Up**







### **Assessment:**

Students summarize the big ideas from this lesson.



Ask students to write a few sentences in their journals to summarize what they believe are the big ideas that are important to remember from this lesson. As with the previous summaries students have written, this information will help them when they do the Evaluate lesson (Lesson 6) at the end of this module.

# Lesson 3 Organizer

What the Teacher Does	Procedure Reference
<b>Activity 1: What Are the Risks?</b>	
Begin the activity by asking students to consider why some individuals get a mental illness and others do not.	Page 111 Step 1
Introduce the terms <i>risk</i> and <i>risk factor</i> to students.	Page 111 Step 2
Explain to students that they will use a model to learn about risk factors for depression and how those risk factors influence whether a person is more likely or less likely to get depression. Hold up Masters 3.1 and 3.2 and explain how the activity works	Pages 111–112 Step 3 
Organize the class into teams of three students. Give each team one copy of Master 3.1, <i>The Roll of the Die for Depression</i> , and one copy of Master 3.2, <i>The Risk Meter</i> . Ask teams to complete the die rolls and worksheets.	Pages 112–113 Step 4 
Display a transparency of Master 3.3, <i>Mental Illness—More Likely or Less Likely?</i> Ask teams to share their findings to fill in the first two columns of the chart.	Page 113 Step 5 
Hold a class discussion to interpret the model. Guide the discussion with questions such as these: <ul style="list-style-type: none"> <li>• Did you move the arrow on the risk meter the same distance for each roll of the die? Why did you move the amount you did? Why did you decide not to move the arrow?</li> <li>• Do you think that some factors are more important than others for determining a person’s chance of getting depression? Why?</li> <li>• Did you move the mark in different directions?</li> <li>• What does moving in different directions mean about an individual’s chances for getting depression?</li> <li>• Do you think some factors really can increase a person’s chance of getting depression and other factors can decrease it?</li> <li>• Compare the final position of the marker with the starting position. If this model reflects what happens in real life, what does it say about the number of factors that can influence a person’s overall chance for getting depression?</li> <li>• Did the fictitious individual modeled in the activity actually get depression? Can you be sure the individual did or did not get depression?</li> </ul>	Pages 113–117 Step 6

 = Involves copying a master.

 = Involves making a transparency.

<ul style="list-style-type: none"> <li>• If this model reflects real life, does having risk factors that increase the chances for depression mean that a person will actually get depression?</li> <li>• If having risk factors, even some that seem to increase a person's chances of getting depression by a great amount, doesn't mean the individual has depression, can you say that a risk factor causes depression?</li> </ul>	
<p>Ask students to think about whether the risk factors they identified for depression might also be risk factors for other mental illnesses. Explain that they will now look at other mental illnesses to find out what risk factors might be important for those illnesses.</p>	<p>Page 117 Step 7</p>
<p>Have students continue to work in their teams. Give each student in half the teams one copy of Master 3.4, <i>ADHD: What Are the Chances?</i> Give students in the other teams one copy of Master 3.5, <i>Schizophrenia: What Are the Chances?</i> You may need to help students initially with difficult words such as <i>schizophrenia</i> and <i>hyperactivity</i>.</p>	<p>Pages 117–118 Step 8</p> 
<p>Reconvene the class and discuss the findings about risk factors for ADHD and schizophrenia. Display the partially completed transparency of Master 3.3, <i>Mental Illness—More Likely or Less Likely?</i>, and complete the remaining columns.</p>	<p>Pages 118–119 Step 9</p> 
<p>Conclude the activity with a class discussion that focuses on the overall role of risk factors in mental illness. Guide the discussion with questions such as these:</p> <ul style="list-style-type: none"> <li>• Do different mental illnesses have similar types of risk factors? What are they?</li> <li>• Does everyone have risk factors for becoming mentally ill?</li> <li>• If a person has some risk factors that increase the chances of getting a mental illness, will they definitely <i>get</i> the illness?</li> <li>• Can you control or change your risk level for mental illness?</li> <li>• This lesson began by asking you to think about why some people get a mental illness and others do not. Then, as you read about ADHD and schizophrenia, you noticed that there wasn't any information given for some of the factors that were important to think about for depression. Why do you think doctors and scientists want to know if something increases or decreases a person's risk for mental illness?</li> </ul>	<p>Pages 120–122 Step 10</p>
<p><b>Lesson Wrap-Up</b></p>	
<p>Ask students to summarize the main ideas of this lesson by writing a few sentences in their journal.</p>	<p>Page 122</p>

# Treatment Works!



## At a Glance

### Overview

Students begin the lesson by recalling how mental illnesses change the way a person thinks, feels, or behaves. They then employ their definition of illness to consider the goals of a treatment plan. Finally, students read information and view PET images that show that treatment can change the activity levels in the brain and restore functioning.

### Major Concepts

Most mental illnesses can be treated effectively. Treatments may include the use of medications and psychotherapies.

### Objectives

After completing this lesson, students will

- be able to explain that mental illnesses can be treated effectively using drugs and psychotherapy and
- understand that treatment allows individuals with mental illness to function effectively in society.

### Teacher Background

Consult the following sections in *Information about Mental Illness and the Brain*:

- 4 *Diagnosing Mental Illness* (pages 23–24)
- 4.1 *Mental health professionals* (page 23)
- 7 *Treating Mental Illnesses* (pages 29–31)
- 8 *The Stigma of Mental Illness* (pages 31–32)
- 9 *The Consequences of Not Treating Mental Illness* (pages 32–33)
- 10.1.3 *Treating depression* (pages 35–36)
- 10.2.3 *Treating ADHD* (pages 38–39)
- 10.3.3 *Treating schizophrenia* (page 41)
- 11 *Finding Help for Someone with Mental Illness* (page 41)



## In Advance

### Web-Based Activities

Activity	Web Component?
1	Yes

### Photocopies

Activity	Master	Number of copies
1	Master 4.1, <i>Do People with Depression Get Better?</i>	1 copy per student
	Master 4.2, <i>The Brain's Response to Treatment</i>	1 color transparency (for print-based version) or 1 copy per student (for Web-based activity)*
	Master 4.3, <i>Do People with ADHD Get Better?</i>	15 copies <sup>†</sup>
	Master 4.4, <i>Do People with Schizophrenia Get Better?</i>	15 copies <sup>†</sup>

\*There are several options for using this master. If you wish to do this activity in a completely print-based manner, you can make one color transparency to display at the appropriate time. Alternatively, you can make color photocopies and laminate them for student teams to use. Make enough copies so each team has one copy. If you choose to use the images from the Web site, you can simply make black-and-white copies of Master 4.2 for students and not worry about how well the images photocopy. (The same images are on the Web site; students will simply use the print-outs for the text information.)

<sup>†</sup> These numbers are based on a class of 30 students. Adjust the numbers for your class size. Half the students will need one copy of Master 4.3 and the other half will need one copy of Master 4.4.

### Materials

Activity	Materials
1	• overhead projector

### Preparation

No preparation is needed other than photocopying the masters.

## Procedure

### Activity 1: Will It Get Better?

1. Present the students with the situation that someone they know is sick. What should the person do?

Most students will respond that the person should see a doctor. If students don't make this connection quickly, provide more detail about the scenario by saying the person has been coughing for about a week, has a sore throat, and has developed a mild fever. (This should help distinguish the person's problem from a cold, which wouldn't require a visit to the doctor.)

2. Ask students to state why individuals go to the doctor. What do they want the doctor to do for them?

Students should respond people want the doctor to make them feel better.

3. Prompt students to recall the definition for illness that they developed during Lesson 2 (see Activity 2, Step 2). Ask them to relate the factors in the definition to what they want the doctor to do for the individual.

The definition of illness includes three important parts that students should remember:

- Illness affects a specific part or parts of the body.
- Illness causes that part (or parts) to function outside normal ranges.
- Illness interferes with a person's life.

What someone really wants the doctor do is help the affected body part to function in a normal way so that his or her life is not affected negatively.

4. Ask whether anyone in the class remembers how mental illness affects the functioning of the brain as they discussed in Lesson 1.

Students learned in Lesson 1 that the brain controls feelings, thoughts, and behaviors. Mental illness changes a person's feelings, thoughts, and behaviors in a long-term manner.

5. Ask students, "What does someone who has a mental illness want a doctor to do to help them?"

Using the information that they have learned about mental illness and illness (using the previous questions as prompts), students should respond that the individual wants the doctor to help the symptoms get better. This would enable the person to get his or her emotions, thoughts, and behaviors back to normal.

6. Have students consider the following questions about someone who is getting treatment for mental illness:

- How would a doctor or psychiatrist who is treating the patient decide whether the treatment is working and the person is getting better?

On the basis of what they have learned in previous lessons, students should answer that the doctor or mental health professional will want to know whether a person's symptoms have improved and



**Content Standard A:**  
Different kinds of questions suggest different kinds of scientific investigations.

if the person is again doing the things he or she usually does. Relieving the symptoms would enable the person to go to work or school and participate more effectively in family or social events.

- How would a scientist who is investigating the cause of a mental illness decide whether the treatment works?

Students might propose that scientists could take PET images of people who received treatment for their mental illness to determine whether the treatment changed what happened in the brain. Such answers reinforce the idea that scientists are really trying to figure out what happens in the brain. This is different from doctors who treat mental illness; physicians decide how well treatment has worked by determining whether a person's symptoms and level of functioning have improved.

7. Confirm for students that PET imaging is a way for scientists to learn more about whether treatment for mental illnesses works. Ask students what images the scientists would want to have for their analysis.

Students should recognize that scientists would want to compare the PET image from before someone begins treatment with one that is taken during or shortly after treatment. Students might correctly suggest taking several images over the time course of treatment. Having images taken over a period of time could be useful for scientists, but the most essential images are the before- and after-treatment images.

Emphasize again to students that PET imaging is used by scientists in their research investigations and not by physicians for diagnosing patients. Similarly, scientists use PET images to study the effects of treatment on the brain, but physicians evaluate treatment based on relief of the symptoms—the changes in thinking, feeling, and behavior—caused by the mental illness.

**Note to teachers:** Two versions of Step 8 follow. Choose the appropriate version depending on whether you will use a color transparency or the online version of the brain images. Continue the activity with Step 9.

**For classes using the *print-based version of Step 8:***

8. Give each student a copy of Master 4.1, *Do People with Depression Get Better?* Ask for volunteers to read parts of the text. At the appropriate time in the reading, display a transparency of Master 4.2, *The Brain's Response to Treatment*, on the overhead projector.



You will probably need to help students with words such as *psychotherapy* and *psychotherapist*. The reading explains how physicians usually treat depression. The PET images on Master 4.2 show dramatic changes in brain activity after treatment for depression. The changes in brain function after treatment enable scientists to determine whether the treatments that relieve the symptoms of a mental illness also make brain function return to normal.

As with the other PET images in the module, these PET images provide visual evidence that reinforces the biological nature of mental illnesses.



**Content Standard A:**  
Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.

**For classes using the *Web-based version* of Step 8:**



8. Give each student a copy of Master 4.1, *Do People with Depression Get Better?* Ask for volunteers to read parts of the text. At the appropriate time in the reading, project the PET images provided on the Web site for this lesson. Give each student a black-and-white copy of Master 4.2, *The Brain's Response to Treatment*, so they can read the information that will help them interpret the information in the PET images.

You will probably need to help students with words such as *psychotherapy* and *psychotherapist*. The reading explains how physicians usually treat depression. The PET images on the Web site show dramatic changes in brain activity after treatment for depression. The changes in brain function after treatment enable scientists to determine whether the treatments that relieve the symptoms of a mental illness also make brain function return to normal.

As with the other PET images in the module, these PET images provide visual evidence that reinforces the biological nature of mental illnesses.

The images on Master 4.2 are also provided on the Web site. You can display these images as an alternative to making color copies or a color transparency. Choose whichever format is most convenient for you. To access the images online, open your browser to the following URL, <http://science.education.nih.gov/supplements/mental/student>. Select “Lesson 4—Treatment Works!” If you choose to use the images online, you will still need to provide students with the text information presented on Master 4.2. With this approach, you can prepare these handouts in black-and-white and not worry about how well the images copy.

9. Ask students to summarize the treatments that helped Andrew in the scenario.

Students should respond that Andrew took medicine and got psychotherapy to relieve his symptoms.

10. Ask students to consider how other mental illnesses might be treated. Inform them that they will now analyze other cases to find out whether treatments for other diseases are similar or different. Divide students into teams of three. Each team will analyze either ADHD or schizophrenia. Give each student in half of the teams one copy of Master 4.3, *Do People with ADHD Get Better?* Give each student in the remaining teams one copy of Master 4.4, *Do People with Schizophrenia Get Better?*

Refer to your record of which student teams read about each disease in Lesson 3—or ask students to remind you. In this lesson, students can read about the mental illness that they did not read about in Lesson 3. Having them read about the other mental illness will broaden their understanding about mental illnesses.

11. Conclude the activity with a class discussion that summarizes issues about the treatment of mental illnesses. Guide the discussion with questions such as

- Are certain aspects of treatment similar for all of the mental illnesses discussed in the readings?

Students should recognize from the reading that the treatment plan for each of the mental illnesses discussed normally and optimally includes both medications and psychotherapy.

- Do medications or psychotherapy just fix the symptoms, or do they actually cure the illness?

This question isn't addressed directly in the reading material, but the distinction between treatment and cure is an important one for students to think about. At present, doctors can only treat the symptoms of mental illnesses without necessarily curing them. Treatment allows individuals to enjoy normal aspects of life such as social events, family relationships, work, and school. If students have difficulty with this idea, ask them what they know about how a doctor treats strep throat. After taking antibiotics, will strep throat come back (resulting from the same infection and not another infection)? If the antibiotics are taken appropriately, the person will be cured. Ask students to compare that to a disease such as diabetes or asthma for which a person must take medication regularly. What happens if the person stops taking medication? If people with diabetes stop taking their



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

medications, their symptoms return and their health is negatively (and potentially seriously) affected. The medication does not cure the disease. Depending on which mental illness a person has, he or she may need to stay on medication for much of his or her life. For other mental illnesses such as depression or ADHD, a person may only need to take medication for a while and can then stop after the symptoms go away. In these cases, a person may need to go back on medication or return to psychotherapy if the illness recurs.

The PET images might lead some students to suggest that the mental illness has been cured. However, this is another opportunity to have students think about the relationship between symptoms (effects on a person's thoughts, feelings, and behaviors) and brain activity as seen in a PET image. Would they expect a person who is not experiencing symptoms to have brain activity that matches a person who is experiencing symptoms?

- **What would happen if a person who has a mental illness stopped taking medication and stopped psychotherapy?**

If students now understand that mental illnesses can usually only be treated and not necessarily cured, they should propose that the person's symptoms might return. This is true of some mental illnesses. Some individuals will have only one episode of a mental illness, but in others, the symptoms reappear. Treating a mental illness decreases the chance that it will reoccur.

Students might raise questions about the length of time that a person needs to continue treatment. This varies depending on the individual's mental illness and its severity. For some cases of depression, for example, a person may need treatment for a few months. On the other hand, a person who has schizophrenia may need to take medication for the rest of his or her life. The length of time recommended for psychotherapy treatment also varies. In general, the more severe the case of mental illness, the longer the period of psychotherapy.

- **What do you think would happen if a person does not get help for his or her mental illness?**

An untreated mental illness interferes with a person's thoughts, feelings, and behaviors. People who have symptoms will not function as well as they could. This decreased level of functioning could result in difficulties at school or work, or in problems in their relationships with family and friends. The way that people feel affects not only how much they enjoy the activities that they do but also whether they participate in them at all.

Consider using an analogy to help students understand the idea of consequences. How many people would not seek medical help for a badly broken arm? What are the consequences of not having the broken arm fixed? The arm would probably heal, but it would probably not heal properly. This, in turn, might affect the person's ability to move the arm. The person will have difficulty participating in many aspects of a usual life (for example, playing sports, driving a car, or using a computer). This will affect the kinds of jobs and hobbies the person can have, which may affect the friendships the person may have otherwise developed. The consequences of failing to treat the problem go far beyond the initial broken bone.

The major point here is that students recognize that not treating a mental illness often has negative consequences for all aspects of a person's life. Although this idea is important to remember for all individuals who have a mental illness, perhaps it is most critical for young people, who are developing numerous academic, emotional, and social skills at this time in their lives. If they experience a delay in their development of important life skills, they may have difficulties reaching their full potential.

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## **Lesson Wrap-Up**

Ask students to write a few sentences in their journals to summarize what they believe are the big ideas that are important to remember from this lesson. Having this information will help students when they do the Evaluate lesson (Lesson 6) at the end of this module.



### **Assessment:**

Students summarize the big ideas from this lesson.



# Lesson 4 Organizer

What the Teacher Does	Procedure Reference
<b>Activity 1: Will It Get Better?</b>	
Present students with the situation that someone they know is sick. What should the person do? Ask students to respond to the questions, "Why do people go to the doctor?" and "What do they want the doctor to do for them?"	Pages 126–127 Steps 1–2
Ask students to recall the definition for the illness that they developed during Lesson 2. Ask them to relate the factors in the definition to the goal of the doctor's visit. Students should conclude that the individual wants help from the doctor in relieving symptoms.	Page 127 Steps 3–4
Prompt students to recall that mental illnesses result from changes in the brain that affect feelings, thoughts, and behaviors. Ask students to consider what a person who has a mental illness wants when he or she visits a doctor for help with it. Make sure students understand that the person wants relief from the symptoms of the mental illness.	Page 127 Step 5
<p>Ask students to consider the following questions:</p> <ul style="list-style-type: none"> <li>• How would a doctor or psychiatrist who is treating the patient decide whether the treatment is working and the person is getting better?</li> <li>• How would a scientist who is investigating the cause of a mental illness decide whether the treatment works?</li> </ul> <p>Help students understand that the goals of mental health professionals who are treating a patient who has a mental illness are different from those of a scientist who is investigating the changes that occur in the brain of someone who has a mental illness and how treatment affects those brain changes.</p>	Pages 127–128 Step 6
Confirm for students that scientists can use PET images to learn more about how treatment for mental illness affects brain functioning. Ask students to consider what types of brain images might be most useful.	Page 128 Step 7
Give each student a copy of Master 4.1, <i>Do People with Depression Get Better?</i> Ask volunteers to read parts of the text. At the appropriate time, display a color transparency of Master 4.2, <i>The Brain's Response to Treatment</i> . As an alternative to using the color transparency of Master 4.2, display the images from the Web-based version of Lesson 4 and give each student a black-and-white copy of Master 4.2 that gives them the text information they need to interpret the images.	Pages 128–129 Step 8




= Involves copying a master.



= Involves making a transparency.



= Involves using the Internet.

Ask students to summarize the treatments that helped Andrew.	Page 130 Step 9	
Ask students to consider how other mental illnesses might be treated. Tell them that they will analyze other cases to find out. Divide the class into teams of three students. Give each student in half of the teams one copy of Master 4.3, <i>Do People with ADHD Get Better?</i> Give each student in the remaining teams one copy of Master 4.4,	Page 130 Step 10	
Conclude the activity with a class discussion that summarizes issues about the treatment of mental illnesses. Guide the discussion with questions such as these: <ul style="list-style-type: none"><li>• Are certain aspects of treatment similar for all of the mental illnesses discussed in the readings?</li><li>• Do medications or psychotherapy just fix the symptoms, or do they actually cure the illness?</li><li>• What would happen if a person who has a mental illness stopped taking medication and stopped psychotherapy?</li><li>• What do you think would happen if a person does not get help for his or her mental illness?</li></ul>	Pages 130–132 Step 11	
<b>Lesson Wrap-Up</b>		
Ask students to summarize the main ideas of this lesson by writing a few sentences in their journal.	Page 132	

# In Their Own Words



## At a Glance

### Overview

Students watch a video of people telling about their experiences with a mental illness. Through a class discussion, students compare and contrast the life stories they saw to reinforce how mental illnesses are biological illnesses that affect a person's thoughts, feelings, and behaviors but that can be treated so that individuals can function effectively in their everyday lives.

### Major Concepts

Mental illnesses are diseases that affect many aspects of a person's life but that can be treated effectively so that the individual can function effectively in everyday life.

### Objectives

After completing this lesson, students will

- be able to relate the information in the videos to what they have learned about mental illness in previous lessons,
- recognize, on a more personal level, the ways a mental illness can affect a person's life, and
- appreciate the importance of treatment for mental illnesses in improving a person's life.

### Teacher Background

Consult the following sections in Information about Mental Illness and the Brain:

- 4 *Diagnosing Mental Illness* (pages 23–24)
- 4.1 *Mental health professionals* (page 23)
- 7 *Treating Mental Illnesses* (pages 29–31)
- 8 *The Stigma of Mental Illness* (pages 31–32)

- 9 The Consequences of Not Treating Mental Illness (pages 32–33)
- 10.1.3 Treating depression (pages 35–36)
- 10.2.3 Treating ADHD (pages 38–39)
- 10.3.3 Treating schizophrenia (page 41)
- 11 Finding Help for Someone Who Has a Mental Illness (page 41)

## In Advance

### Web-Based Activities

Activity	Web Component?
1	Yes

### Photocopies

Activity	Master	Number of copies
1	Master 5.1, <i>My Story</i> Master 5.2, <i>Telling Their Own Stories—A Summary</i> Master 5.3, <i>Things to Think About</i>	1 copy per student 1 transparency 1 copy per student

### Materials

Activity	Materials
1	<ul style="list-style-type: none"> <li>• DVD player and TV*</li> <li>• computer with an Internet connection and projection system*</li> <li>• overhead projector</li> <li>• transparency pens</li> </ul>

\*The video is accessible in two formats. You will need to decide which setup is most convenient and appropriate for your situation. The DVD format most likely will be the easiest to use for showing the video to the class. The video is also available on the Web site. If using the Internet, you can show the video to the class via a projection system, or you can have small groups of students watch at multiple computers around the room.

### Preparation

Decide which format you will use for this activity. If using the DVD, arrange to have a DVD player and television available. If you are using the video on the Web site, make sure that the video will play properly on your computer(s).

Prescreen the video and decide whether a school counselor or school health professional should sit in the class while the video is being shown. At a minimum, inform these individuals about when the video will be shown and about its content. Make the video available to them if they wish to view it. If one of these individuals chooses to attend the class, ask them to respond to specific questions that arise but not to interrupt the flow of the activity. As with other activities, students may have questions near the beginning of the activity that will be answered at a later point.

Review the video in advance so you can help students identify and keep track of which individual they are to focus on while watching the video.

## Activity 1: Like Any Other Kid

## Procedure



1. Ask students to recall information from previous lessons. In particular, ask them to recall the definition for mental illness that they learned in Lesson 2. Also, ask them to remember what they learned about treatments for mental illness in Lesson 4.

Before they watch the video, students should remember that mental illness is a condition that affects a person's thoughts, feelings, or behaviors (or all three) and that causes the person difficulty in functioning. Students should also recall that mental illnesses are treatable with medications and/or psychotherapy.

**Note to teachers:** The concepts developed in the preceding lessons prepare the students for watching this video. Although it might be tempting to use this video in isolation from the rest of the unit, its real purpose is to reinforce concepts learned in the earlier lessons and to see how those concepts apply to real people. Students who don't understand the foundation concepts are likely to draw misconceptions about mental illnesses.

2. Inform students that they will be watching a video that includes four people telling about their experience with a mental illness. Distribute Master 5.1, *My Story*. Each student will need one copy. Ask students to read through the items on the master so they will have an idea of the kind of information they should be listening for during the video. Inform students that they can use this master while watching the video to write brief notes and reminders about what they see and hear. They do not need to write in complete sentences or worry about turning it in to you later.

You can either ask students to read the master silently or ask several students to read sections aloud in class. Answer any questions they may have about the items on the master. Make sure that students understand that the questions on this master are to help them identify important points to listen for.

The video presents a great deal of information, and some points are more subtle than others. The questions on the master will help students anticipate things to listen for and help focus their attention. While the video is playing, it is important that students concentrate more on it than on writing answers—they can fill in more details later when they discuss the questions with their group (Step 5).

3. Ask students to count off using numbers 1 to 4. Students will, according to their numbers, focus on one of the individuals on the video. For example, all of the students that counted off as "1" will

focus on the same individual, the “2”s will all focus on another individual, and so forth. Ask students to sit with other classmates who have the same number.

Students will watch the complete video and hear the stories of all four individuals. However, to make it easier for them to pick out as much detail as possible, students will focus on different individuals. Later in the activity, students will, through class discussion, incorporate more information about the other individuals.

4. Using a projection system, show the video *Like Any Other Kid* to the class. As each of the four individuals appears onscreen, identify the student number that corresponds to that individual.

The use of a DVD player and television, if available, may be the easiest way to show the video to the class. However, if such a system is not available, you can access the video from the Web site and show it using a projection system. If neither of these systems is available, you can have students divide into small teams of three to four students (each group composed of students with the same count-off number) and watch at multiple computers stationed around the room. If you have students working at different computers, you will need to circulate among the groups to help them identify which individual they are focusing on. On the Web site, the video is divided into three sections. Have students watch all three sections one after the other. (Having the video in three sections makes downloading easier and will help when students wish to review specific sections later.)

As the video begins, you will need to help students identify the individual they should focus on. Make sure you have previewed the video beforehand so you are comfortable knowing which individual onscreen corresponds to each number. For example, the first girl who appears on the video is Individual #1, the second individual would correspond to Individual #2, and so forth. Make sure that you have reviewed the video beforehand so you can identify the individuals easily.

5. Ask students to work in their teams to answer the questions on Master 5.1 for the individual they focused on. Help students understand that the video may not include direct answers by each individual for each of the questions, but that they can make inferences from what the individual *did* say. Circulate among the teams to listen as they discuss their answers, and ask guiding questions if teams are confused about how to answer the questions.

Each individual on the video may not have spoken directly about each of the questions on Master 5.1. For some of the answers, students may need to draw a conclusion based on a number of

different comments made by a given individual. However, students can usually derive some information about each individual and relate it to the questions on the master.

Students may want to view the video again to complete their answers. Depending on the setup you are using, you can show the entire video again to the whole class or let teams watch segments of their choosing (either on a display system or individual computer monitors). If students want to see a specific segment of the video again, use your DVD player controls to advance to that segment.

<b>Video Segment</b>	<b>Segment Duration (minutes:seconds)</b>
Music and Title	00:44
About My Problems	11:48
Some Understand ... Others Just Don't Get It	5:20
What It Means To Be Supportive	5:48
Closing Credits	00:28

6. Convene a class discussion to summarize the information presented in the video. Display a transparency of Master 5.2, *Telling Their Own Stories—A Summary*, and complete answers to the questions as a class, with different teams contributing information from the individual they focused on.

The primary pedagogical point for this class discussion is to give students a chance to see that although the four individuals on the video have different mental illnesses and different experiences with mental illness, there are some things that apply to all of the cases. The class discussion will help students reach this conclusion. After students provide answers for the different individuals on the video, you might prompt students to think about the similarities among individuals that are brought up. The extent of the class discussion will vary depending on the time available and student interest. In addition to the questions provided on Master 5.2, students will likely bring up their own observations and questions for discussion.

Students may also mention situations in their own, their family's, or their friends' lives. If this happens, tell them that it might not be appropriate to discuss this with the class and that you would rather talk to them privately at the end of class. If appropriate, you might suggest the student talk to a school counselor or school nurse. As indicated in *A Special Note: Teaching about Mental Illness in the Classroom* (page 000), be aware of local or national resources that can help people learn more about specific mental illnesses or about getting help. You can also refer to the organizations listed in the *Additional Resources for Teachers* section (page 53). Also, be



prepared for students' trying to diagnose themselves or someone else in the class because of what they see in the video. As with other lessons in this curriculum supplement, the diagnosis of a mental illness requires the expertise of a qualified mental health professional. Reinforce to students that they are not equipped to make a diagnosis based on what they have learned here.

Sample answers to the questions on Masters 5.1 and 5.2 are provided below. Direct answers for all of the questions are not provided on the video for each of the individuals. Students can simply say that the information is not provided, or they can make some inferences based on what is on the video.

**Question 1. What mental illness does the person have?**

Individual #1: depression

Individual #2: ADHD

Individual #3: schizophrenia

Individual #4: schizophrenia

**Question 2. When did it start?**

The answers to this were not explicitly stated in all of the cases. Individual #2 indicates she was diagnosed in the eighth grade but could remember having problems in school in third or fourth grade. Individual #4 states that she was about 11 years old. Although the other two individuals don't give a specific age at which their mental illness began, you can assume it was during their teenage years, probably several years before the interview.

**Question 3. How did the illness affect the person's thoughts?**

**Note to teachers:** For Questions 3 through 6, students might list their answers in a different category (thought, feeling, or behavior) from the one you might use, or they might include a response in multiple categories. Some observations are difficult to classify as only thoughts, feelings, or behaviors. As long as students can justify their reasons for placing a response in a particular category, various answers are acceptable. The purpose of having students list responses as thoughts, feelings, or behaviors is to reinforce the definition of mental illness that students learned previously.

Individual #1: negative self-talk, concentrating on covering up her depression

Individual #2: trouble paying attention, forgetting things

Individual #3: thought mother was trying to harm him, blackouts, worried about grades

Individual #4: hearing voices, seeing things that weren't there

**Question 4. How did the illness affect the person's feelings?**

Individual #1: worthlessness, feeling sad a lot, angry at herself, disappointed with herself

Individual #2: angry a lot, confused about why she is having these problems, felt bad about herself

Individual #3: uncomfortable around people, flat emotions

Individual #4: scared by hallucinations

**Question 5. How did the illness affect the person's behaviors?**

Individual #1: feeling tired a lot, crying, feeling sluggish, "acting" to cover up her depression, suicide attempt, cutting

Individual #2: disrupting class, talking in class, forgetting homework, not listening

Individual #3: stayed away from people, difficulty keeping his grades up in school, somewhat slurred speech

Individual #4: saw things that weren't there (red eye dots), heard voices, skipped school

**Question 6. Did the illness cause the person difficulty in his or her life? In what ways?**

Individual #1: Yes, she worked to cover up her problems, she expended energy to cover up her problems, she didn't socialize much.

Individual #2: Yes, her grades went down, she didn't have much hope for success in the future, she felt alone and different from other people.

Individual #3: Yes, he felt uncomfortable around people, didn't have many friends, friends wouldn't talk to him much anymore, and he seemed to feel isolated.

Individual #4: This may be difficult for students to answer clearly. This individual states that her symptoms now don't interfere with her life (implying that they did previously). She also implies that she didn't realize how her symptoms were affecting her life when she first started having them.

**Question 7. What kind of treatment did the individual get?**

Individual #1: hospitalization, counseling

Individual #2: medication, counseling

Individual #3: hospitalization, medication, seeing a therapist

Individual #4: hospitalization, medication, seeing a therapist

**Question 8. How has the individual's life changed after treatment?**

Individual #1 No direct information is given, but you could infer that she is not cutting or attempting suicide any more.

Individual #2: Her grades improved, she is more hopeful about success in future, and she feels more understanding for other people.

Individual #3: He played on the varsity baseball team, his grades got better, he goes out more, and he believes in himself more.

Individual #4: Her symptoms are much better and don't interfere with her life. She doesn't see red dots in people's eyes or believe in the "anti"s.

**Question 9. In what ways were other people important to each of the individuals in the video?**

Each of the individuals in the video mentions that having someone to talk to is important. Some individuals talk about how friends can help, and others talk about the role of family. Therapists are also mentioned as playing important roles in their lives. Individual #1 spoke about how her friends were the first ones to alert adults to her problems and her destructive behavior. Obviously, their role was important in identifying her depression and finding help. Most of the individuals mentioned that several different people, including friends, family, and therapists, were important in helping them cope with their mental illness.

**Note to teachers:** The video contains information about the experiences of four individuals who have been diagnosed with a mental illness. Because these represent specific cases, there may be some differences from how other cases are managed. Some specific comments raised in the video that might cause confusion or elicit comments among students include the following:

- Three of the four individuals on the video speak about hospitalization as part of their treatment. For many individuals who are diagnosed with a mental illness, hospitalization is

not required. The severity of the mental illness will dictate the treatment. For example, the female in the video who has depression speaks about being hospitalized. Many individuals who have depression do not need hospitalization. Because of the severity of this individual's depression, including her suicide attempts and cutting behaviors, her treatment included being hospitalized.

- One individual (the female who had depression) indicates that a person with depression usually has to see a social worker first. This may have been the case in her situation, but other mental health professionals, including physicians, psychologists, and nurses, often play important roles in recognizing, diagnosing, and treating an individual's mental illness.
- Because the video includes only four cases, students may get the impression that everyone with a specific mental illness would act in that same way and have the same symptoms. In fact, different individuals can have different sets of symptoms. Remind students that some cases of mental illness are mild and some are more severe. Some cases have a greater impact on a person's life than others. In this way, mental illnesses are similar to other diseases in that some cases cause a greater degree of dysfunction than others.
- Individual #3 on the video says that when he first experienced a problem and before he was diagnosed with schizophrenia, his mother gave him sleeping pills to help him. Students may question the appropriateness of this action. Although the individual's mother was undoubtedly trying to do something to help her son, you might want to inform students that it isn't a good idea to give prescription medications (as most sleeping pills are) to someone other than the person the prescription was written for. (Most teenagers would not have sleeping pills prescribed for them.) Also, it isn't a good idea to give someone a medication when you don't know what is wrong with him or her.
- The video includes the cases of one individual who has depression, one who has ADHD, and two who have schizophrenia. This may raise questions in students' minds about how common the different mental illnesses are. Statistics about the frequency of each of these mental illnesses are provided in Information about Mental Illness and the Brain, Sections 10.1, 10.2, and 10.3 (pages 33, 37, and 39).
- One of the individuals mentions the portrayal of mental illness in the media. Students are likely to think of examples they have seen on television or in movies. If students want to learn more about whether a specific portrayal they have seen is correct, they can conduct research on the specific mental illness to learn more about it. Additional Resources for Teachers lists several Web sites that provide high-quality information (page 53).

7. Conclude the activity by addressing any questions that students may have after watching the video. Can students see any similarities among the four individuals, even though they have different mental illnesses?

Students should be able to draw some general conclusions from the video. For example, students can see that each individual had their thoughts, feelings, and behaviors altered in a way that negatively affected their lives. Treatment improved each of their situations and relieved their symptoms. The support of family and friends helped each of the individuals cope with their situation.

You may also wish to have students consider how the material presented in the video relates to information they learned in the previous activities. For example, does the information presented in the video support the idea that mental illnesses have similarities to other diseases? How does the information on the video relate to what they learned in Lesson 4 about treatment for mental illnesses?

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## Lesson Wrap-Up



### Assessment:

The wrap-up for this lesson is different in format from the wrap-ups in previous lessons. The series of questions in Master 5.3 can be used for individual students to assess their understanding of mental illness. The teacher can also collect the students' responses to evaluate what students are thinking about mental illness at this stage in the unit.

Give each student one copy of Master 5.3, *Things to Think About*. Ask students to answer the questions either on the master or in their journals.

# Lesson 5 Organizer

What the Teacher Does	Procedure Reference
<b>Activity 1: Like Any Other Kid</b>	
Begin the activity by asking students to recall information from previous lessons, including the definition for mental illness and types of treatment for mental illnesses.	Page 137 Step 1
Inform students that they will be watching a video of four individuals telling about their experiences with a mental illness. Give each student one copy of Master 5.1, <i>My Story</i> . Have students read through the questions so they will know what information to listen for while watching the video. Answer any questions students may have about Master 5.1.	Page 137 Step 2
Ask students to count off using numbers 1 to 4. Inform students that they will be focusing on a specific individual in the video based on their numbers.	Pages 137–138 Step 3
Show the video <i>Like Any Other Kid</i> to the class using a projection system. If having students watch in teams of three or four through an Internet connection, organize them into teams that have the same numbers. Watch the video straight through the first time.	Page 138 Step 4
Organize the class into teams of three to four students who have the same number. Have students respond to the questions on Master 5.1. Allow students time to watch the video or segments of the video again to clarify their responses.	Pages 138–139 Step 5
Convene a class discussion to summarize the information in the video. Display a transparency of Master 5.2, <i>Telling Their Own Stories—A Summary</i> , to help guide the discussion.	Pages 139–143 Step 6
Conclude the activity by addressing any questions that students might raise after watching the video. Ask students to consider any similarities they can see among the four individuals on the video.	Page 144 Step 7
<b>Lesson Wrap-Up</b>	
Distribute one copy of Master 5.3, <i>Things to Think About</i> , to each student. Ask students to write brief answers to the three questions now that they have seen personal accounts of people who have a mental illness.	Page 144



= Involves copying a master.



= Involves making a transparency.



= Involves using the Internet.



= Involves using a DVD.

# You're the Expert Now



## Overview

Students synthesize and communicate the information they gained in the previous lessons. Students develop a brochure that informs people about mental illness. Students then evaluate other students' brochures using criteria outlined in a rubric. Their evaluations must provide specific reasons to justify their scores. Finally, students revisit the questions about mental illness that they answered in Lesson 1, compare their answers, and discuss how their answers have changed.

## Major Concepts

Learning the facts about mental illness can dispel misconceptions. The ability to evaluate scientific and health-related information is an important skill for students that they can apply throughout their lives.

## Objectives

After completing this lesson, students will

- synthesize what they have learned about mental illness from the previous lessons,
- communicate their new understanding to others, and
- evaluate information about mental illness that other students have compiled for accuracy and relevance.

## Teacher Background

Because this lesson evaluates what students have learned in the previous lessons, no new content is presented here. However, you might find it helpful to refer to sections in Information about Mental Illness and the Brain when students pose questions.

## At a Glance

## Web-Based Activities

Activity	Web Component?
1	No
2	No

## In Advance



## Photocopies

Activity	Master	Number of copies
1	Master 6.1, <i>Rubric for Evaluating the Brochures</i>	1 transparency and 1 copy per student
	Master 6.2, <i>Deciding What's Important</i>	1 transparency
	Master 6.3, <i>Sample Art</i>	1 copy per team
	Master 6.4, <i>Brochure Scoring Sheet</i>	1 copy per student
2	Master 6.5, <i>What Do You Know?</i>	1 copy per student

## Materials

Activity	Materials
1	<ul style="list-style-type: none"> <li>• overhead projector</li> <li>• a variety of the following:                             <ul style="list-style-type: none"> <li>paper (plain or colored)</li> <li>scissors</li> <li>colored pencils</li> <li>markers</li> <li>crayons</li> <li>glue sticks</li> <li>computers (optional)*</li> </ul> </li> </ul>
2	no materials needed

\*Instead of having students create their brochures with paper and art supplies, have them use the computer and a word-processing program or slide-presentation software, such as PowerPoint.

## Preparation

### Activity 1

Organize the materials for preparing the brochures into sets that can be distributed to each team.

### Activity 2

Have available the students' copies of Master 1.2, *What Do You Think?*, that they completed in Lesson 1.

Ask students to have the summaries that they have written in their journals (lesson wrap-ups for Lessons 1 through 5) ready for use during this lesson.

Review **A Special Note** (page 55) at the beginning of this curriculum supplement, which offers suggestions for helping students who have issues related to mental illness. Also review the section **How Can Controversial Topics Be Handled in the Classroom?** in the **Implementing the Module** section (page 11). If desired, arrange for the school nurse, guidance counselor, or other community mental health professional to help facilitate the discussion in this activity.

## Activity 1: Spreading the Word—What Should People Know?

## Procedure

1. Begin by asking students, “Do you think everyone should learn more about mental illness? Why? How could you help students, parents, and the public learn what you have learned about mental illness?”

Because there are many appropriate answers to these questions, this is an opportunity to get answers from most students in the class. Students may suggest that they could teach the module for others, prepare posters, develop radio or television spots, design brochures or magazine ads, or organize “mental illness awareness” walks or other similar events.

2. Acknowledge that there are many ways to inform people about mental illness, but tell students that for this lesson, they will work in teams to develop a brochure. Conduct a brief class discussion in which you ask students to list some features that an effective brochure might include.

Students should indicate that the brochure should have a clear and important message, include information that supports the message, use facts accurately, be eye-catching, and be easy to read.

3. Display a transparency of Master 6.1, *Rubric for Evaluating the Brochures*, and explain that after they have created their own brochure (as a team), they will evaluate other teams’ brochures using the criteria in the rubric. Briefly go over the criteria with the class and indicate when the brochure evaluations will take place.

It is important to review the evaluation criteria before students design their brochures. They may find it unfair if they do not see the rubric used to evaluate their brochures until it is too late for them to make any adjustments.

If students have not used a rubric to evaluate information before, explain how the rubric presents specific criteria and assigns points based on how effectively information is presented. At this point, students do not need to know all the specifics (they will get a copy of the rubric later in the lesson when they do their critiques), but students should have some familiarity with the criteria that they will use to evaluate brochures.

Set aside at least half of a class period for the brochure evaluations. You will need to make enough photocopies of each team’s brochure that each student has one brochure to evaluate.



**Content Standard A:** Science advances through legitimate skepticism. Asking questions and querying other scientists’ explanations is part of scientific inquiry.

4. Explain to students that they will need to decide on one important message for their brochures. Display a transparency made from Master 6.2, *Deciding What's Important*, to help students distinguish important “big ideas” from interesting but less important details.

The diagram on Master 6.2 is a graphic way to help students think about what topic they should address in their brochure.

The outermost rectangle on Master 6.2 includes ideas that are “worth being familiar with,” though not the most important ones to remember months or years after instruction. The middle rectangle includes ideas that are “important to know and do.” The innermost rectangle represents “enduring understandings.” These are the fundamental, critical understandings that should endure in students’ understanding of a topic.

For this activity, emphasize to students that their brochures should focus on one big idea that they feel everyone should know and remember about mental illness. Encourage students to think about this diagram when they begin working with their team to decide on the message for their brochure.

5. Organize students into teams of two or three and tell them to decide on the one big idea for their brochure. Allow teams approximately 10 minutes to decide on the important message for their brochure.

This will likely be the most challenging part of the activity. Have students refer to the brief summaries that they have written as the wrap-up for each of the previous lessons. This information should give them ideas and remind them of what they have done in earlier lessons. You can help students by asking them to list the activities they completed in the previous lessons. Encourage students to consider what they think the important ideas were in those activities. For example, students may want to focus their brochure on

- mental illnesses and changes in the brain,
- risk factors for mental illnesses,
- effective treatments for mental illness, or
- the ways mental illnesses are like other diseases.

As teams work, circulate around the room and check to see that each team’s big message is something that students can address given the information they have learned in the previous lessons. If teams have trouble narrowing the focus of their brochures, help them by asking questions such as, “What *one* idea is the most important point you want to get across in your brochure?” Help students understand that the idea is not necessarily to tell everything that they have learned during the course of the module, but to make decisions about what is most important and how to select facts that support their decision.

**Note to teachers:** Because this lesson is the Evaluate part of the BSCS 5E Instructional Model, students should not turn this into a research project that requires them to find more facts about a particular mental illness or about mental illness in general. The purpose of this activity is for students to synthesize and communicate what they have learned in the previous lessons of the module. Having students do Internet searches or read material supplied as teacher background reading will not allow you to assess what they have learned from the previous lessons.

6. After the teams have decided on an appropriate message, give them paper for their brochures. Show the class a copy of Master 6.3, *Sample Art*, and tell them that these pictures will be available to illustrate their brochure, if they wish to use them.

Encourage students to illustrate their brochures with drawings. Teams can also use color to enhance the appearance of their brochures.

7. As the teams work, visit each team and assign a code number or letter for each brochure.

Circulate among the teams while they are working, answering questions or providing feedback. You may wish to have students complete part of the task as homework, with each team deciding who will be responsible for different parts of the brochure.

The code letter or number will allow you to know who worked on each brochure and what brochure each student is evaluating. Students, however, will not know whose brochure they are evaluating (see Step 9).

8. At the appropriate class session for the critique phase of the activity, give each student one copy of Master 6.1, *Rubric for Evaluating the Brochures*, and one copy of Master 6.4, *Brochure Scoring Sheet*.

Remind students that they discussed the categories on the rubric earlier. If helpful, go over one category specifically to help students learn how to use a rubric for evaluating a brochure. For example, you may wish to point out that if the students feel that the brochure they are evaluating contains several points of information that support its purpose and those points are accurate, they could score it a 5. If some important information is included but some is missing, they might score it as a 3 for that criterion. If the brochure doesn't contain specific facts that support the big idea, students should give it a 1.



**Content Standard A:**  
Communicate scientific procedures and explanations.



**Content Standard A:**

Think critically and logically to make the relationships between evidence and explanations.



**Assessment:** Although you could evaluate the brochures produced by the teams to assess students' understanding, we encourage you to use each student's completed critique on Master 6.4, *Brochure Scoring Sheet*, as a way to assess each student's understanding of the material in this supplement. This also puts greater emphasis on learning fundamental ideas about mental illness than on designing attractive brochures.

Also point out to students that they will need to provide specific reasons for their scores on Master 6.4, *Brochure Scoring Sheet*. Inform them that simply saying yes or no is not enough. If a fact is incorrect, students should identify what is incorrect and make the appropriate correction. If they feel that the brochure has not focused on a major idea or tries to cover too many ideas, they should identify what the problem is and decide what would have been a better idea for the brochure.

9. Give each student one brochure (not his or her team's brochure) to evaluate.

You will need to make enough photocopies of each brochure so that each student (not each team) can have one to evaluate. Alternatively, if you have enough class sections, you can give each student a brochure from another class section to evaluate.

Having students provide specific reasons for their scoring is an opportunity for students to demonstrate what they have learned about mental illnesses during the previous lessons. It also allows students to practice their critical-thinking skills. In life, everyone is presented with information and has to make life decisions based on that information. To be an informed citizen and voter, learning how to analyze information about many topics for accuracy and relevance is essential.

**Activity 2: What Do You Think about Mental Illness Now?**

1. Distribute a copy of Master 6.5, *What Do You Know?*, to each student and allow 5 to 10 minutes for students to answer the questions.

In this activity, students answer the same questions as in Lesson 1. This enables students to determine whether their understanding about mental illness has changed after they learned factual information about this subject.

2. After students have answered the questions, give each student the copy of Master 1.2, *What Do You Think?*, that he or she completed in Lesson 1. Direct students to open (remove the staple and unfold) Master 1.2 and compare the answers they just wrote with those they wrote earlier.

Allow a few minutes for students to compare their responses. Each student should only look at his or her own responses. Ask students whether their answers are different today from when they answered the questions in Lesson 1 and, if so, how they are different.

3. **Conduct a brief class discussion. Ask students the following questions:**
- If your answers were different today, why do you think they were different?
  - Does learning about mental illness make a difference? Why?
  - Do you think you would react differently now to someone who has a mental illness compared with your reaction before you completed the module?

At least some students' responses should be different now that they have learned more about mental illnesses. Even if some students' attitudes have not changed within the span of this module, the knowledge they have gained may influence their opinions later after more life experiences. Lead students to the idea that understanding more about mental illness affects their opinions about how people who have a mental illness should be treated.

Notice that the discussion questions above do not ask students to divulge their answers. Because of the potentially sensitive nature of the questions on Master 6.5, students may be uncomfortable sharing what they wrote. Use your judgment about discussing responses to specific questions. The discussion will need to be handled with sensitivity because students may bring up personal experiences or stories. You might wish to ask the school nurse or guidance counselor to help you facilitate this discussion. See A Special Note (page 3) at the beginning of the module about how to find help (school nurse, counselor, or community services) for students who have issues related to mental illness. Also refer to How Can Controversial Topics Be Handled in the Classroom? on page 11 or Additional Resources for Teachers on page 53.

### **Extension Activity (Optional)**

If students are interested in helping educate others about mental illness as a service project, they can expand the scope of the brochure. Ask students to vote on the brochure that has the most important information for the community to know. Use that brochure as a starting point for the new and expanded brochure. Students can work together as a class to





- decide what additional information should be included,
- check the facts presented in the brochure for accuracy, and
- determine how the brochure could be more appealing.

Some students, for example, could search the Internet for additional sources of information, some students could focus on improving the written text, and others could work on improving the illustrations and design. Students could then distribute the revised brochure within the school or the community.



**Assessment:** Giving students time to compare their answers from Lesson 6 with those from Lesson 1 fulfills one goal of the Evaluate phase of the BSCS 5E Instructional Model: it provides an opportunity for students to assess their own progress by comparing their current understanding with their prior knowledge.

# Lesson 6 Organizer

What the Teacher Does	Procedure Reference
<b>Activity 1: Spreading the Word—What Should People Know?</b>	
Ask students to consider the questions, “Do you think everyone should learn more about mental illness?” and “How could you help students, parents, and the public learn what you have learned about mental illness?”	Page 149 Step 1
Inform students that they will work in teams to develop brochures about mental illness. Discuss features that an effective brochure might include.	Page 149 Step 2
Display a transparency of Master 6.1, <i>Rubric for Evaluating the Brochures</i> . Explain to students that after they create their own brochure (as a team), they will evaluate other teams’ brochures using the criteria in the rubric. Briefly go over the criteria on the rubric.	Page 149 Step 3 
Display a transparency of Master 6.2, <i>Deciding What’s Important</i> . Explain to students that before they begin creating their brochure, they will need to decide on the “big idea” to convey in their brochure.	Page 150 Step 4 
Organize students into teams of two or three students. Allow teams approximately 10 minutes to decide on the idea for their brochures. Students can use the summaries they wrote in the wrap-ups to remind them of what they have learned. Check with each team to ensure they have a workable idea.	Pages 150–151 Step 5
Give students paper and supplies to use for their brochures. Have copies of Master 6.3, <i>Sample Art</i> , available as possible illustrations. Encourage students to create their own artwork as well.	Page 151 Step 6 
Assign a code number or letter for each brochure. Students should not identify their brochures with their names. Record which students worked on each “coded” brochure for your information.	Page 151 Step 7
For the critique phase of the activity, give each student one copy of Master 6.1, <i>Rubric for Evaluating the Brochures</i> , and one copy of Master 6.4, <i>Brochure Scoring Sheet</i> . Go over the information on the masters with students and make sure they understand their task.	Pages 151–152 Step 8 
Give each student one brochure (not his or her team’s brochure) to evaluate. Ask students to evaluate their assigned brochure using the rubric and scoring sheet.	Page 152 Step 9



## Activity 2: What Do You Think about Mental Illness Now?

Give each student one copy of Master 6.5, *What Do You Know?*, and allow 5 to 10 minutes for students to answer the questions.

Page 152  
Step 1



Give each student his or her copy of Master 1.2, *What Do You Think?*, from Lesson 1. Direct students to open Master 1.2 and compare their answers with those that they just wrote on Master 6.5.

Page 152  
Step 2



Conduct a brief class discussion. Ask students the following questions:

- If your answers were different today, why do you think they were different?
- Does learning about mental illness make a difference? Why?
- Do you think you would react differently now to someone who has a mental illness compared with your reaction before you completed the module?

Page 153  
Step 3



= Involves copying a master.



= Involves making a transparency.



# Masters

## Lesson 1, *The Brain: Control Central*

- Master 1.1, *Find the Mistakes* . . . . . student copies\*
- Master 1.2, *What Do You Think?* . . . . . student copies
- Master 1.3, *What’s Happening in the Brain?* . . . . . color transparency or color copies for teams\*

## Lesson 2, *What’s Wrong?*

- Master 2.1, *Analyzing the Cases* . . . . . team copies
- Master 2.2, *Medical Charts A – F* (6 pages) . . . . . team copies\*
- Master 2.3, *Doctors’ Reference Manual* (11 pages) . . . . . classroom sets\*
- Master 2.4, *Comparing the Cases: A and B* . . . . . transparency
- Master 2.5, *Comparing the Cases: C and D* . . . . . transparency
- Master 2.6, *Comparing the Cases: E and F* . . . . . transparency
- Master 2.7, *Is It an Illness?* . . . . . transparency
- Master 2.8, *Looking Inside the Brain* . . . . . color transparency or color copies for teams\*

## Lesson 3, *Mental Illness: Could It Happen to Me?*

- Master 3.1, *The Roll of the Die for Depression* (2 pages) . . . . . team copies
- Master 3.2, *The Risk Meter* . . . . . team copies
- Master 3.3, *Mental Illness—More Likely or Less Likely?* . . . . . transparency
- Master 3.4, *ADHD: What Are the Chances?* . . . . . student copies
- Master 3.5, *Schizophrenia: What Are the Chances?* . . . . . student copies

## Lesson 4, *Treatment Works!*

- Master 4.1, *Do People with Depression Get Better?* . . . . . student copies
- Master 4.2, *The Brain’s Response to Treatment* . . . . . color transparency\* or student copies+
- Master 4.3, *Do People with ADHD Get Better?* . . . . . student copies
- Master 4.4, *Do People with Schizophrenia Get Better?* . . . . . student copies

## Lesson 5, *In Their Own Words*

- Master 5.1, *My Story* . . . . . student copies
- Master 5.2, *Telling Their Own Stories—A Summary* . . . . . transparency
- Master 5.3, *Things to Think About* . . . . . student copies

## Lesson 6, *You’re the Expert Now*

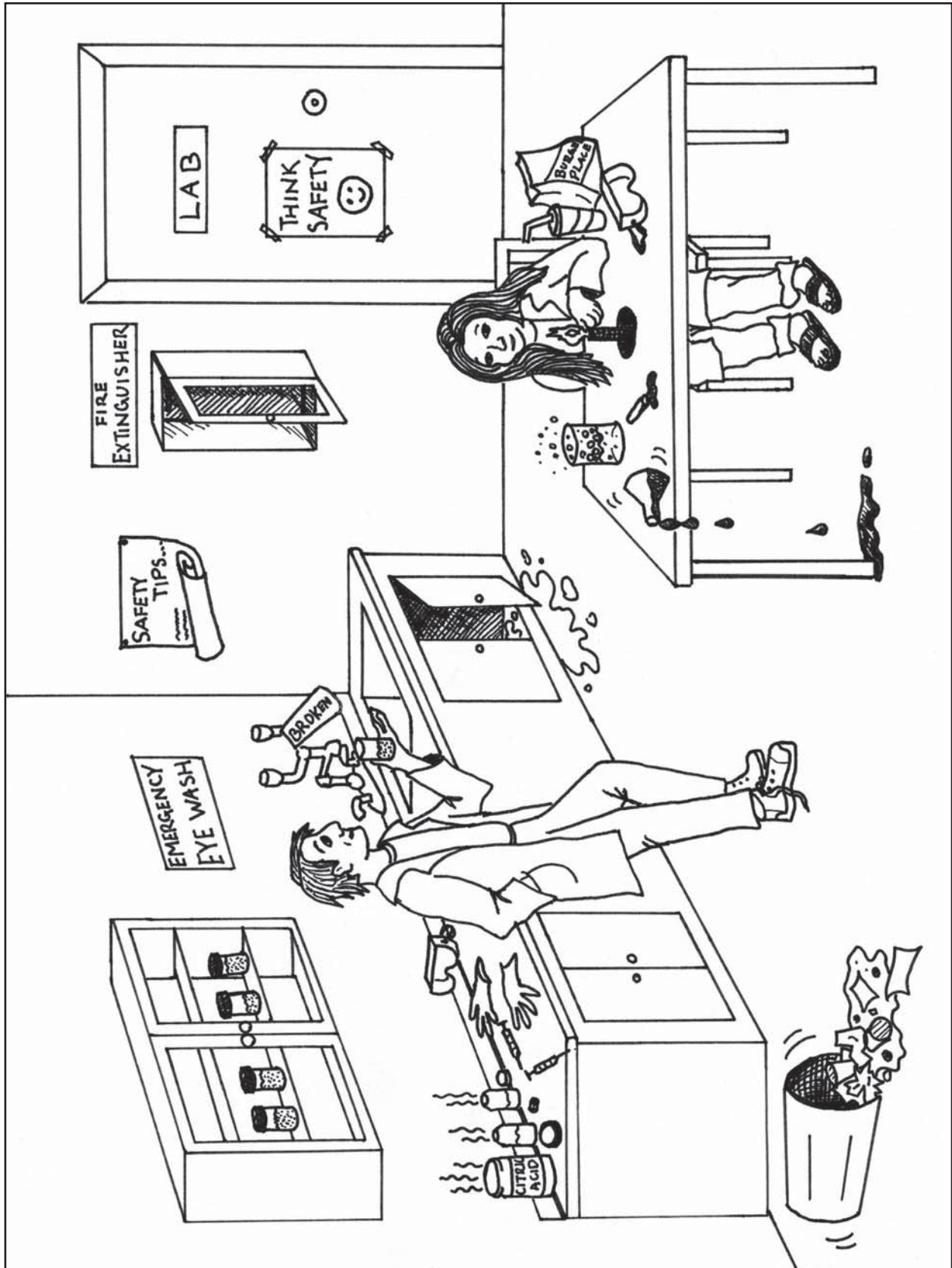
- Master 6.1, *Rubric for Evaluating the Brochure* . . . . . transparency and student copies
- Master 6.2, *Deciding What’s Important* . . . . . transparency
- Master 6.3, *Sample Art* . . . . . team copies
- Master 6.4, *Brochure Scoring Sheet* . . . . . student copies
- Master 6.5, *What Do You Know?* . . . . . student copies

\*Masters needed for print version of activity only.

+Copies (black and white) needed if using Web version of activity.

# Find the Mistakes

Find the safety mistakes made in the lab.



# What Do You Think?

Write two or three sentences to answer each of the following questions:

1. What is mental illness?
2. Name some mental illnesses that you have heard about.
3. How would a person who has a mental illness look or act?
4. If you learned that a new student at school has a mental illness, how would you act toward him or her? How would you feel about him or her?
5. What causes someone to be mentally ill?

# What's Happening in the Brain?

Master 1.3, which includes full-color PET images, can be found at the end of the module. Please replace this page with that one.

# Analyzing the Cases

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Write the letters (A–F) of your two cases at the top of the right-hand columns of the table. Then fill in the information, one part at a time.

<b>Part</b>		<b>Case:</b>	<b>Case:</b>
<b>1</b>	<b>Symptoms and other information</b>		
	<b>Possible health problem(s)</b>		
<b>2</b>	<b>New symptoms and information in Part 2</b>		
	<b>Possible health problem(s)*</b>		
<b>3</b>	<b>Time passed since Part 1 (when symptoms first appeared)</b>		
	<b>Probable health problem*</b>		
	<b>Part(s) of the body affected</b>		

\*Consult the *Doctors' Reference Manual* if you need help completing the chart.



**Medical Chart A, Part 1:  
History of the Illness**

Patient: Alex A.

Age: 13

<b>Date</b>	<b>Complaint</b>
<u>Yesterday afternoon</u>	<u>Sore throat</u>
	<u>(Patient's mother wondered if it had something to do with</u>
	<u>a big history test coming up)</u>

---

**Medical Chart A, Part 2:  
Medical Examination Results**

Patient: Alex A.

Age: 13

Exam date: \_\_\_\_\_

<b>Test</b>	<b>Results</b>	<b>Test</b>	<b>Results</b>
Height:	<u>62 in.</u>	Weight:	<u>111 lbs.</u>
Blood pressure:	<u>Normal</u>	Temperature:	<u>99.4°F</u>
Throat:	<u>Slightly red</u>	Lungs:	<u>No wheezing</u>
Abdomen:	<u>No tenderness</u>	Lymph nodes:	<u>No swelling</u>
Urine test:	<u>Not done</u>	Additional tests:	<u>Strep &amp; mono</u>
			<u>tests ordered</u>

Additional patient complaints: Stuffy, runny nose

Additional information: \_\_\_\_\_

---

**Medical Chart A, Part 3:  
Doctor's Notes to Interns**

Patient: Alex A.

Age: 13

You have to decide what the health problem is (that is, make a diagnosis) based on  
what we have learned from the patient's history and medical exam. Sore throat is a  
common symptom for many problems, including allergies, colds, the flu, strep  
throat, and mononucleosis. Compare Alex's symptoms with the information in the  
Doctors' Reference Manual to decide what's wrong with him.

**Medical Chart B, Part 1:  
History of the Illness**

Patient: Alex B.

Age: 13

<b>Date</b>	<b>Complaint</b>
<u>Yesterday afternoon</u>	<u>Sore throat</u>
	<u>(Patient's mother wondered if it had something to do with a big history test coming up)</u>

---

**Medical Chart B, Part 2:  
Medical Examination Results**

Patient: Alex B.

Age: 13

Exam date: This afternoon

<b>Test</b>	<b>Results</b>	<b>Test</b>	<b>Results</b>
Height:	<u>62 in.</u>	Weight:	<u>111 lbs.</u>
Blood pressure:	<u>Normal</u>	Temperature:	<u>102°F</u>
Throat:	<u>Red with white patches on tonsils</u>	Lungs:	<u>No wheezing</u>
Abdomen:	<u>No tenderness</u>	Lymph nodes:	<u>Swollen</u>
Urine test:	<u>Not done</u>	Additional tests:	<u>Strep &amp; mono tests ordered</u>

Additional patient complaints: Throat very sore today

Additional information: none

---

**Medical Chart B, Part 3:  
Doctor's Notes to Interns**

Patient: Alex B.

Age: 13

You have to decide what the health problem is (that is, make a diagnosis) based on what we have learned from the patient's history and medical exam. Sore throat is a common symptom for many problems, including allergies, colds, the flu, strep throat, and mononucleosis. Compare Alex's symptoms with the information in the Doctors' Reference Manual to decide what's wrong with him.

**Medical Chart C, Part 1:  
History of the Illness**

Patient: Abby C.

Age: 12

<b>Date</b>	<b>Complaint</b>
<u>Two nights ago</u>	<u>Difficulty breathing</u>
	<u>Sore chest</u>

---

**Medical Chart C, Part 2:  
Medical Examination Results**

Patient: Abby C.

Age: 12

Exam date: This morning

<b>Test</b>	<b>Results</b>	<b>Test</b>	<b>Results</b>
Height:	<u>58 in.</u>	Weight:	<u>95 lbs.</u>
Blood pressure:	<u>Normal</u>	Temperature:	<u>101.5°F</u>
Throat:	<u>Normal</u>	Lungs:	<u>Wheezing</u>
Abdomen:	<u>No tenderness</u>	Lymph nodes:	<u>No swelling</u>
Urine test:	<u>Not done</u>	Additional tests:	<u>None ordered</u>

Additional patient complaints: Coughing up mucus

Additional information: No asthma in family; Abby's mother has allergies

---

**Medical Chart C, Part 3:  
Doctor's Notes to Interns**

Patient: Abby C.

Age: 12

You have to decide what the health problem is (that is, make a diagnosis) based on what we have learned from the patient's history and medical exam. Coughing, chest pain, and wheezing are common symptoms for several illnesses including bronchitis, pneumonia, asthma, and allergies. Compare Abby's symptoms with the information in the Doctors' Reference Manual to decide what's wrong with her.

**Medical Chart D, Part 1:  
History of the Illness**

Patient: Abby D.

Age: 12

<b>Date</b>	<b>Complaint</b>
<u>Two nights ago</u>	<u>Difficulty breathing</u>
	<u>Sore chest</u>

---

**Medical Chart D, Part 2:  
Medical Examination Results**

Patient: Abby D.

Age: 12

Exam date: This morning

<b>Test</b>	<b>Results</b>	<b>Test</b>	<b>Results</b>
Height:	<u>58 in.</u>	Weight:	<u>95 lbs.</u>
Blood pressure:	<u>Normal</u>	Temperature:	<u>98.5°F</u>
Throat:	<u>Normal</u>	Lungs:	<u>Wheezing</u>
Abdomen:	<u>No tenderness</u>	Lymph nodes:	<u>No swelling</u>
Urine test:	<u>Not done</u>	Additional tests:	<u>None ordered</u>

Additional patient complaints: None

Additional information: Abby has had bronchitis four times in the past year  
Abby's mother has allergies and her uncle has asthma

---

**Medical Chart D, Part 3:  
Doctor's Notes to Interns**

Patient: Abby D.

Age: 12

You have to decide what the health problem is (that is, make a diagnosis) based on what we have learned from the patient's history and medical exam. Coughing, chest pain, and wheezing are common symptoms for several illnesses including bronchitis, pneumonia, asthma, and allergies. Compare Abby's symptoms with the information in the Doctors' Reference Manual to decide what's wrong with her.

**Medical Chart E, Part 1:  
History of the Illness**

Patient: Jenna E.

Age: 15

<b>Date</b>	<b>Complaint</b>
<u>6 weeks ago</u>	<u>Sadness, poor appetite</u>
	<u>Not interested in favorite sport (volleyball)</u>
	<u>Grades went down</u>

---

**Medical Chart E, Part 2:  
Medical Examination Results**

Patient: Jenna E.

Age: 15

Exam date: This afternoon

<b>Test</b>	<b>Results</b>	<b>Test</b>	<b>Results</b>
Height:	<u>64 in.</u>	Weight:	<u>120 lbs.</u>
Blood pressure:	<u>Normal</u>	Temperature:	<u>98.5°F</u>
Throat:	<u>Normal</u>	Lungs:	<u>Normal</u>
Abdomen:	<u>No tenderness</u>	Lymph nodes:	<u>No swelling</u>
Urine test:	<u>Not done</u>	Additional tests:	<u>Blood tests normal</u>

Additional patient complaints: Jenna is annoyed at having a doctor's appointment;  
she wanted to play volleyball this afternoon.

Additional information: Jenna's grandfather died two months ago. In the past two  
weeks, her grades have come back up.

---

**Medical Chart E, Part 3:  
Doctor's Notes to Interns**

Patient: Jenna E.

Age: 15

You have to decide what the health problem is (that is, make a diagnosis) based on  
what we have learned from the patient's history and medical exam. It's normal to  
feel sad after someone close to you dies, but depression is more than just sadness.  
Is Jenna depressed or just experiencing normal sadness? Compare her symptoms  
with the information in the Doctors' Reference Manual to decide what's wrong.

**Medical Chart F, Part 1:  
History of the Illness**

Patient: Jenna F.

Age: 15

<b>Date</b>	<b>Complaint</b>
<u>6 weeks ago</u>	<u>Sadness, poor appetite</u>
	<u>Not interested in favorite sport (volleyball)</u>
	<u>Grades went down</u>

---

**Medical Chart F, Part 2:  
Medical Examination Results**

Patient: Jenna F.

Age: 15

Exam date: This afternoon

<b>Test</b>	<b>Results</b>	<b>Test</b>	<b>Results</b>
Height:	<u>64 in.</u>	Weight:	<u>120 lbs.</u>
Blood pressure:	<u>Normal</u>	Temperature:	<u>98.5°F</u>
Throat:	<u>Normal</u>	Lungs:	<u>Normal</u>
Abdomen:	<u>No tenderness</u>	Lymph nodes:	<u>No swelling</u>
Urine test:	<u>Not done</u>	Additional tests:	<u>Blood tests normal</u>

Additional patient complaints: Jenna is not sleeping well and has no confidence in herself.  
She is often angry at her parents.

Additional information: Jenna's grandfather died two months ago. Last week, she  
dropped out of her band, one of her favorite activities.

---

**Medical Chart F, Part 3:  
Doctor's Notes to Interns**

Patient: Jenna F.

Age: 15

You have to decide what the health problem is (that is, make a diagnosis) based on  
what we have learned from the patient's history and medical exam. It's normal to  
feel sad after someone close to you dies, but depression is more than just sadness.  
Is Jenna depressed or just experiencing normal sadness? Compare her symptoms  
with the information in the Doctors' Reference Manual to decide what's wrong.

# ***Doctors' Reference Manual:***

## **Allergies**

### **What are the symptoms of allergies?**

Most allergies are mild. Mild allergies have symptoms such as an itchy rash, runny nose, itchy nose and throat, and coughing and wheezing. Allergies do not cause fevers. Some strong allergies have life-threatening symptoms. The bronchial tubes swell and block the airway to the lungs. Then the affected person has difficulty breathing. If untreated, the person may stop breathing and die.

### **What causes allergies?**

The immune system protects the body against harmful things such as bacteria and viruses. When a person's immune system reacts to something that is not harmful, an allergy is the result. Common harmless substances that cause allergies include pollen, mold, animal dander, and dust. Some people have allergies to particular foods, drugs, or insect bites.

### **Who gets allergies?**

Many children and adults have allergies. Allergies often run in a family. This means that genes affect whether someone has allergies. People who have problems such as eczema (a skin rash) and asthma often have allergies.

### **What is the treatment for allergies?**

For mild and moderate allergic reactions, the treatment is to reduce the symptoms. For example, people who have allergies can use drugs to reduce itchy skin and relieve runny, stuffy noses. People who are having a strong allergic reaction, such as to a bee sting, must be treated immediately with drugs that stop the immune reaction.

### **Is there a cure for allergies?**

There is not always a cure for allergies, although some may be improved by desensitization shots. The best way to prevent allergies is to avoid the things that cause the inappropriate immune response. For example, people who have food allergies should check the ingredients in foods before they eat to make sure the substance they are allergic to is not in the food. People who are allergic to a particular drug should be sure to tell their physicians so they are not given that drug.

### **What happens if allergies are not treated?**

In the case of a strong allergic reaction, which is usually not caused by a seasonal allergy, the affected person may die. For mild allergies, affected people have uncomfortable symptoms until the substance that causes the allergy is removed.



# ***Doctors' Reference Manual:***

## **Asthma**

### **What are the symptoms of asthma?**

Common symptoms of asthma include coughing, wheezing, difficulty breathing, and tightness in the chest. During an asthma attack, affected people may feel anxious. If the attack is severe, they may also have pale, sweaty faces, blue lips or fingernails, and tightened neck and chest muscles.

### **What causes asthma?**

Asthma is caused by narrowing of the bronchial tubes that lead to the lungs. This narrowing makes breathing difficult. Many people who have asthma also have allergies such as hay fever or skin allergies. Many also have relatives who have asthma or other allergies. This indicates that genetics influences asthma. Certain environmental conditions such as living in large urban areas, exposure to cigarette smoke, and exposure to certain chemicals also make it more likely that a person will develop asthma.

Asthma attacks are triggered by different things for different people. Pet hair, pollens, and molds are common triggers. Exercise, cold air, cigarette smoke, and certain drugs cause asthma attacks in some people. Having a cold or being stressed also triggers asthma attacks for some people.

### **Who gets asthma?**

About 7 to 10 percent of children and 3 to 5 percent of adults have asthma.

### **What is the treatment for asthma?**

Most people who have asthma take certain drugs daily (or several times a day) to prevent asthma attacks. These drugs help keep the bronchial tubes from narrowing. During an asthma attack, people who have asthma take drugs that help reduce swelling quickly. People whose asthma is triggered by allergies sometimes take allergy shots to reduce their sensitivity.

### **Is there a cure for asthma?**

Although symptoms decrease over time for some people, there is no cure for asthma. Most people who have asthma can lead normal lives by learning to manage their illness. They use an instrument that measures how much their bronchial tubes are blocked. They compare the measurement with the levels in their management plan. The plan tells them whether to maintain their current dose of medicine, increase their dose of medicine, call 911, or go to the emergency room.

### **What happens if asthma is not treated?**

Asthma can be a serious illness. Without long-term treatment, asthma attacks can occur more often and become more serious. If a severe asthma attack is not treated quickly, the bronchial tubes may swell so much that the airways are completely blocked.

# ***Doctors' Reference Manual:*** **Attention Deficit Hyperactivity Disorder** **(ADHD)**

## **What are the symptoms of attention deficit hyperactivity disorder (ADHD)?**

People with ADHD have difficulty paying attention, are overly active, and are impulsive. Examples of not being able to pay attention include difficulty following instructions, being easily distracted, losing and forgetting things, doing careless or sloppy work, not paying attention to details, and making careless mistakes. Overly active and impulsive behaviors include difficulty staying seated, talking too much, having trouble waiting for a turn, and interrupting others. Everyone shows some of these behaviors at times, but people with ADHD show them often. The behaviors cause problems in at least two areas of a person's life, such as school and home. The behaviors appear before age seven and last for at least six months.

## **What causes ADHD?**

Many children who have ADHD have at least one close relative who also suffers from ADHD. This suggests that genes have an effect on getting ADHD. Research has shown that there are differences in the brains of people with and without ADHD. Several regions of the brain tend to be smaller in people who have ADHD than in people who do not have this illness.

## **Who gets ADHD?**

ADHD affects as many as 1 of every 20 children. Both boys and girls get ADHD, but more boys are affected than girls.

## **What is the treatment for ADHD?**

Effective treatments for ADHD include medication and behavior therapy. Sometimes, in addition to ADHD, people have another illness, such as depression, which also needs to be treated.

## **Is there a cure for ADHD?**

There is no cure for ADHD, but the treatment described above helps almost all children who are affected by this disorder.

## **What happens if ADHD is not treated?**

Children who have ADHD often have trouble in school because of the symptoms of inattention, impulsiveness (lack of control over their behaviors), and overly active behavior. They may also have trouble making and keeping friends. Children with ADHD often have low self-esteem because of their problems in school and with friends. Some research studies found that children with untreated ADHD have a higher risk of abusing drugs. Other studies have not found this to be true.

# ***Doctors' Reference Manual:***

## **Bronchitis**

### **What are the symptoms of bronchitis?**

The symptoms of bronchitis include coughing, difficulty breathing, and wheezing. People who have bronchitis usually cough up mucus. They may feel tired, and their chests may feel tight or sore. Sometimes, people who have bronchitis have a slight fever (lower than 101°F).

### **What causes bronchitis?**

Bronchitis occurs when the bronchial tubes that lead to the lungs swell. Acute (short-term) bronchitis often follows a respiratory infection caused by a virus. Chronic (long-term) bronchitis is a more serious illness. Most chronic bronchitis is caused by cigarette smoke, either from smoking or from breathing in cigarette smoke in the surrounding air.

### **Who gets bronchitis?**

Anyone can get bronchitis. Chronic bronchitis is more common among people who are over 45. Smokers of all ages are more likely to have chronic bronchitis than nonsmokers.

### **What is the treatment for bronchitis?**

People who have acute bronchitis should rest, drink lots of water and juice, and use a humidifier to keep the air around them warm and moist. People who have chronic bronchitis should avoid things that cause the bronchial tubes to swell. Quitting smoking and avoiding polluted air help people who have chronic bronchitis. Sometimes, doctors prescribe drugs that relax and open the bronchial tubes.

### **Is there a cure for bronchitis?**

There is not always a cure for bronchitis. Most healthy people who get acute bronchitis get over it within two weeks. People who have chronic bronchitis should avoid things that cause their bronchial tubes to swell.

### **What happens if bronchitis is not treated?**

Most people who have acute bronchitis get well without any complications. In a small number of people, the bronchitis may come back and become chronic.

# ***Doctors' Reference Manual:***

## **Colds**

### **What are the symptoms of colds?**

The symptoms of colds include runny and stuffy nose, sneezing, sore throat, coughing, and headache. There may be no fever, or only a slight fever (lower than 101°F). Symptoms usually last one to two weeks.

### **What causes colds?**

More than 200 different viruses can cause the symptoms of colds. These viruses infect cells in the membranes in the nose. Mucus in the nose traps many of the things people inhale, such as pollen, dust, bacteria, and viruses. People are infected with a cold virus when the virus gets past the mucus and enters a cell in the nose.

### **Who gets colds?**

Children get an average of 6 to 10 colds a year. Adults get two to four colds a year. Children get more colds than adults because they have less resistance to infection and because they have contact with many other children in day care centers and schools. Almost everyone who inhales cold viruses is infected, but only about 75 percent of them develop cold symptoms. In the United States, colds are most common during the fall and winter.

### **What is the treatment for a cold?**

There is no treatment that stops cold viruses. The symptoms of colds are treated to make the patient more comfortable. A person who has a cold should rest, drink plenty of water and juice, gargle with warm salt water, and take acetaminophen (Tylenol) to relieve headaches.

### **Is there a cure for colds?**

Colds cannot usually be cured. Vaccination to prevent all colds is difficult because there are so many different cold viruses. Each virus would need its own vaccine. Cold viruses also change often, so a new vaccine is needed each time a virus changes.

### **What happens if colds are not treated?**

Most people get over colds within two weeks. In a small number of cases, colds may lead to bacterial infections of the sinuses or the ear. Ear infections are more common in children than in adults. People who get these infections have high fevers. Bacterial sinus and ear infections must be treated with antibiotics. People who have asthma may have asthma attacks when they are ill with colds. People who have chronic bronchitis may get worse when they have a cold.

# ***Doctors' Reference Manual:***

## **Depression**

### **What are the symptoms of depression?**

People who are depressed have five or more of the following symptoms nearly every day for more than two weeks. They

- are sad or easily irritated;
- lose interest in activities they once enjoyed;
- have changes in appetite;
- have no energy;
- feel that they are worthless;
- have difficulty concentrating;
- have a hard time sleeping, or oversleep;
- lose their appetite, or overeat;
- think a lot about death and suicide; and
- have changes in activity levels, including restlessness, agitation, or slowness.

### **What causes depression?**

No one thing causes depression. Depression tends to run in families. This indicates that genes have an effect on depression. Other things that may trigger depression include the loss of a parent or other loved one, divorce, learning or behavioral problems, physical or emotional abuse, and traumas such as violent crimes, floods, or tornadoes.

### **Who gets depression?**

Both adults and children can suffer from depression. For children, about the same number of boys and girls are affected. For teenagers and adults, women are more likely to have depression than men. People with a family history of depression are more likely to suffer from this illness.

### **What is the treatment for depression?**

Treatment involves counseling, medication, or a combination of the two.

### **Is there a cure for depression?**

There is no cure for depression, but 80 percent of people who are depressed are helped by counseling, medication, or both. These treatments reduce the person's symptoms and help them live a normal, happy life. Often, however, people who have had their depression treated successfully will have another period of depression that requires treatment at another time in their lives.

### **What happens if depression is not treated?**

Many people who are not treated get over depression after several months or years, but the illness tends to reappear throughout their lives. Children and teenagers who are depressed often have problems in school and difficult relationships with family and friends. They may also have social problems such as drug abuse. People who are seriously depressed may commit suicide.

# ***Doctors' Reference Manual:***

## **Influenza (Flu)**

### **What are the symptoms of the flu?**

Symptoms of the flu include fever above 100°F, headache, tiredness, cough, sore throat, stuffy nose, and body aches.

### **What causes the flu?**

The flu is caused by one of many influenza viruses. These viruses change from year to year, so people can get the flu every year (or even several times in one year). Illnesses that cause vomiting and diarrhea are often called the stomach flu, but they are not really the flu. They are caused by different viruses or bacteria.

### **Who gets the flu?**

Both adults and children can get the flu.

### **What is the treatment for the flu?**

People who have the flu should rest, drink plenty of water and juice, and take acetaminophen (Tylenol) for headaches and body aches.

### **Is there a cure for the flu?**

There is no cure for the flu, but this illness can often be prevented by getting a flu vaccine. Because the flu virus changes often, a new vaccine is prepared each year. This vaccine protects people against new varieties of the virus expected to be present that year. If a new flu virus appears after the vaccine is made, a person who is vaccinated can still get the flu from this new virus.

### **What happens if the flu is not treated?**

Most people get better in one or two weeks. A few people develop pneumonia, bronchitis, or sinus or ear infections after they have the flu. The flu is more dangerous for some people. People who are older than 65, very young children, and people of any age who have other long-term illnesses such as asthma are more likely to have complications from the flu.

# ***Doctors' Reference Manual:***

## **Mononucleosis (Mono)**

### **What are the symptoms of mononucleosis (mono)?**

The most common symptoms of mono are fever above 101°F, sore throat with white patches on the tonsils, swollen lymph nodes all over the body, headaches and body aches, extreme tiredness, lack of appetite, swollen spleen and liver, and sometimes a red rash. Young children may have a fever but no other symptoms.

### **What causes mono?**

Mono is caused by a virus. Doctors diagnose most cases of mono based on symptoms, but they can use a blood test that indicates whether the virus that causes mono is present.

### **Who gets mono?**

Anyone can get mono, but most people who have obvious symptoms are between ages 15 and 24. Most people have been exposed to the mono virus by the time they are 35. People who have been infected by the mono virus are immune. They will not get the disease again, even if they did not have many symptoms when they were infected.

### **What is the treatment for mono?**

People who have mono should rest, drink plenty of water and juice, take acetaminophen (Tylenol), and gargle with salt water to relieve sore throat. Most of the symptoms of mono get better within 10 days, but tiredness may last for several months. However, a swollen spleen and liver may take six weeks to return to normal size.

### **Is there a cure for mono?**

There is no cure for mono, but in most cases people recover after two weeks. After they have recovered, they are immune to mono.

### **What happens if mono is not treated?**

In most cases, people recover from mono on their own. In rare cases, the spleen can swell so much that it splits open. When this happens, the person must have surgery to repair the damage. Other rare complications include inflammation of the liver (a form of hepatitis), anemia, and nerve damage.



# ***Doctors' Reference Manual:***

## **Pneumonia**

### **What are the symptoms of pneumonia?**

Symptoms of pneumonia include coughing, fever, chills, chest pain, difficulty breathing, and weakness. People usually cough up mucus from the lungs. When a person has pneumonia, doctors hear abnormal sounds such as bubbling or cracking when they listen to the lungs. This indicates that there is thick liquid in the lungs. Doctors may also use chest X-rays to confirm their diagnosis of pneumonia.

### **What causes pneumonia?**

People have pneumonia when their lungs are infected by bacteria, viruses, or other organisms. There are more than 50 kinds of pneumonia. It can be a mild or a very serious illness. Bacterial pneumonia begins suddenly and the symptoms are sometimes strong. Viral pneumonia begins slowly and the symptoms are milder.

### **Who gets pneumonia?**

Anyone can get pneumonia. Very young children, people who are 65 or older, or people who have long-term illnesses such as diabetes or AIDS are more likely to get pneumonia than are other people.

### **What is the treatment for pneumonia?**

People who have bacterial pneumonia take antibiotics to stop the infection, usually at home. Antibiotics are not used to treat viral pneumonia because they do not stop viruses. People who have pneumonia should rest and drink lots of water and juice. Young, healthy people recover from pneumonia in two to three weeks. Older adults or people who have other health problems may need two months to recover.

### **Is there a cure for pneumonia?**

Antibiotics treat bacterial pneumonia. There is no cure for viral pneumonia, but most people get better on their own.

### **What happens if pneumonia is not treated?**

Most people who have mild pneumonia get better on their own, but people who have bacterial pneumonia need to take antibiotics or they could become very sick. This is why it is important to see a doctor when symptoms of pneumonia are present.

# ***Doctors' Reference Manual:***

## **Schizophrenia**

### **What are the symptoms of schizophrenia?**

The most common signs of schizophrenia are hallucinations (seeing or hearing things that other people do not), odd speech, and delusions. People who have delusions believe something even after they have been shown that it is not true. For example, they may believe someone is putting poison in their food. Other signs of schizophrenia include blank facial expressions, talking only in short statements, and not remembering to eat, bathe, or take care of other personal needs.

Most people who have schizophrenia have periods of time when they have these serious symptoms. These periods are called relapses. During relapses, people with schizophrenia usually need to be in a hospital or other care facility. Between relapses, affected people have no or few symptoms. These periods of time are called remissions. During these times, affected people can live at home and go to work or school.

### **What causes schizophrenia?**

No one thing causes schizophrenia. People who have a parent or relative who has schizophrenia are more likely to develop the illness themselves. This means that genes have an effect on schizophrenia. Environmental factors are also involved. The illness often appears after a stressful event such as losing a loved one or being the victim of a crime.

Certain regions of the brain are smaller in people who have schizophrenia than those regions in healthy people. Some affected people have differences in blood-flow patterns in their brains and in the amounts of certain brain chemicals when compared with healthy people.

### **Who gets schizophrenia?**

About 1 percent of people have schizophrenia. Most of these people develop it between the ages of 16 and 25. Very few children have schizophrenia.

### **What is the treatment for schizophrenia?**

Schizophrenia is treated by one or a combination of medicines. Most people who have schizophrenia will have to take the medicines all of their lives. Counseling may also help people who have schizophrenia. Illnesses such as depression or anxiety often occur along with schizophrenia. In these cases, people must take medicines for those illnesses as well.

### **Is there a cure for schizophrenia?**

There is no cure for schizophrenia. The medications and other treatments described above can help with the symptoms of the illness.

### **What happens if schizophrenia is not treated?**

The most serious complication of schizophrenia is suicide. Some people who have schizophrenia try to kill themselves because they are depressed. Others hear voices that tell them to kill themselves. Some people with schizophrenia hear voices or see things that scare them. Rarely, these people may commit violent acts because they are afraid people near them are trying to hurt them.

# ***Doctors' Reference Manual:***

## **Strep Throat**

### **What are the symptoms of strep throat?**

People who have strep throat have a sore throat that is especially painful when they swallow. They usually have fever above 101°F and swollen lymph nodes in their neck. Their throats are bright red with a white or yellow coating on the back of the throat or tonsils. Sometimes, strep throat causes a skin rash known as scarlet fever. Usually, people who have strep throat do not have cold symptoms such as coughing, sneezing, or runny nose.

### **What causes strep throat?**

Strep throat occurs when a particular type of bacterium infects the throat. When a person has symptoms of strep throat, the doctor collects bacteria from his or her throat and tonsils using a cotton swab. A rapid strep test checks for the presence of the bacteria that cause strep throat on the swab.

### **Who gets strep throat?**

Both children and adults get strep throat, but it is more common among children than adults. Strep throat occurs most frequently during the colder months of the year.

### **What is the treatment for strep throat?**

Strep throat is treated with an antibiotic. Usually, the patient feels better within a day or two after beginning the antibiotic.

### **Is there a cure for strep throat?**

Yes, the antibiotic usually cures strep throat. However, it is possible to be infected by strep bacteria again.

### **What happens if strep throat is not treated?**

Most people will get well without treatment. However, a small percentage of untreated people develop complications such as scarlet fever and rheumatic fever. Those who develop scarlet fever have a rash that lasts over a week. As the rash fades, the skin peels. Scarlet fever is treated with the same antibiotic used for strep throat.

If scarlet fever is not treated, rheumatic fever may develop about 20 days later. Rheumatic fever may affect the heart, joints, skin, and brain. Damage to the heart may be long term.

# Comparing the Cases: A and B

Part		Case: Alex A.	Case: Alex B.
1	Symptoms and other information		
	Possible health problem(s)		
2	New symptoms and information in Part 2		
	Possible health problem(s)		
3	Time passed since Part 1 (when symptoms were first noticed)		
	Probable health problem		
	Part(s) of the body affected		

# Comparing the Cases: C and D

Part		Case: Abby C.	Case: Abby D.
1	Symptoms and other information		
	Possible health problem(s)		
2	New symptoms and information in Part 2		
	Possible health problem(s)		
3	Time passed since Part 1 (when symptoms were first noticed)		
	Probable health problem		
	Part(s) of the body affected		

## Comparing the Cases: E and F

Part		Case: Jenna E.	Case: Jenna F.
1	Symptoms and other information		
	Possible health problem(s)		
2	New symptoms and information in Part 2		
	Possible health problem(s)		
3	Time passed since Part 1 (when symptoms were first noticed)		
	Probable health problem		
	Part(s) of the body affected		

# Is It an Illness?

<b>Analysis Question</b>	<b>Sadness (Case E)</b>	<b>Depression (Case F)</b>
<b>What are the symptoms (effect on life)?</b>		
<b>What part of the body is affected?</b>		
<b>How long did the symptoms last?</b>		
<b>Are the symptoms outside the normal range?</b>		



# Looking Inside the Brain

Master 2.8, which includes full-color PET images, can be found at the end of the module. Please replace this page with that one.

# The Roll of the Die for Depression

In this activity, you will model a person's risk for getting depression. Roll the die one time for each row in the table below. After each roll, work with your team members to decide whether the person's chance for getting depression increases or decreases. Mark the risk meter based on your group's conclusions.

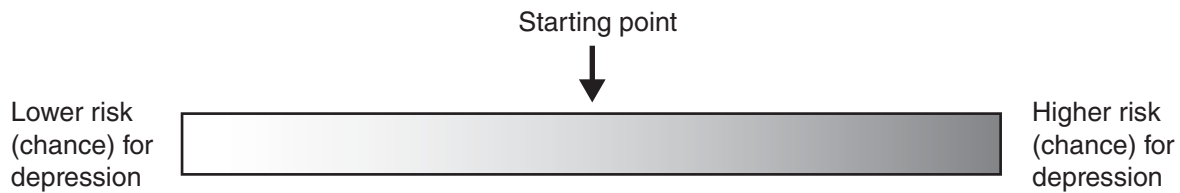
Die roll	Outcome If the number on the die is:	Consequence
1st	<b>1, 2, or 3:</b> The person you are modeling is female.	Anyone can get depression, but it is more common in females than in males.
	<b>4, 5, or 6:</b> The person you are modeling is male.	
2nd	<b>1 or 2:</b> The person is a child or teenager.	People of all ages can get depression.
	<b>3 or 4:</b> The person is between 20 and 35 years old.	
	<b>5 or 6:</b> The person is over 35 years old.	
3rd	<b>1, 2, or 3:</b> The person has a close family that gets along most of the time.	Individuals who have a close family with lots of communication among family members are less likely to be depressed.
	<b>4, 5, or 6:</b> The person has a family that often has a hard time getting along with each other.	
4th	<b>1, 2, or 3:</b> The person has a parent, brother, or sister who has depression.	A person who has depression often has a family member who also has depression.
	<b>4, 5, or 6:</b> The person does not have any close family members with depression.	
5th	<b>1, 2, or 3:</b> The person smokes cigarettes.	Young people who smoke cigarettes are more likely to have depression.
	<b>4, 5, or 6:</b> The person does not smoke cigarettes.	
6th	<b>1, 2, or 3:</b> The person sees the bad side of things in life.	People who are pessimistic about life (who always see the negative side of things) and who feel hopeless are more likely to be depressed.
	<b>4, 5, or 6:</b> The person sees the good side of things in life.	

Die roll	Outcome If the number on the die is:	Consequence
7th	<b>1, 2, or 3:</b> The person recently broke up with a boyfriend or girlfriend.	Stressful events such as a romantic breakup can make depression more likely.
	<b>4, 5, or 6:</b> The person did not break up with a boyfriend or girlfriend recently.	
8th	<b>1, 2, or 3:</b> The person has close friend or family member who died recently.	The death of a close friend or family member is a stressful event and can make depression more likely.
	<b>4, 5, or 6:</b> None of the person's close friends or family members died recently.	
9th	<b>1, 2, or 3:</b> The person has experienced abuse or violence.	A person who experiences abuse, violence, or disaster is more likely to get depression.
	<b>4, 5, or 6:</b> The person has not experienced abuse or violence.	

# The Risk Meter

Team Members: \_\_\_\_\_ Date: \_\_\_\_\_

Work with your team members to determine whether the risk of getting depression increases or decreases based on the outcome of the roll of the die. Place a new arrow on the meter for each die roll (and indicate which roll it is—1st, 2nd, and so forth). For each roll of the die, your starting point will be your last arrow. For example, for the move with the 2nd die roll, you will start from the arrow you made for the 1st die roll. Then, complete the chart to explain why you moved your arrow on the meter.



Die roll	The die number you rolled	Movement on the meter (Did you move to the left, to the right, or not at all?)	Reason
1st			
2nd			
3rd			
4th			
5th			
6th			
7th			
8th			
9th			

# Mental Illness—More Likely or Less Likely?

<b>Category</b>	<b>Is this a risk factor for depression? Why?</b>	<b>Is this a risk factor for ADHD? Why?</b>	<b>Is this a risk factor for schizophrenia? Why?</b>

# ADHD: What Are the Chances?

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Read the following information about ADHD. Then, record the things that might increase or decrease a person's chances for getting ADHD in the table at the bottom of the page. You can also write information that might be important to think about but doesn't seem to change the person's chances.

ADHD, or attention deficit hyperactivity disorder, is a mental illness that causes a person to have trouble at home, at school, and/or at work. A person who has ADHD often

- has trouble sitting still (is very active);
- can't always control his or her behaviors (talks too much, interrupts others, and has trouble waiting for a turn);
- loses or forgets things;
- is easily distracted;
- makes careless mistakes;
- has more injuries than other people;
- puts off doing things that are difficult;
- appears not to listen to things; and
- has trouble paying attention for a long period of time.

The person's symptoms must meet certain guidelines before a doctor can diagnose him or her with ADHD. The person's symptoms must start before he or she is 7 years old. The symptoms must last for at least 6 months. The symptoms must also occur more often or be more severe than in other people of the same age. Finally, the symptoms must cause problems in at least two areas of life (school, home, friends, or work).

ADHD is the most common mental illness in children and adolescents. About 3 to 5 percent of students have ADHD. ADHD is more common among children, but adults can have it too. Boys are 2 to 3 times more likely to have ADHD.

Scientists do not know what causes ADHD. Children who have ADHD usually have a family member who also has ADHD. One research study found that a person is 11 to 18 times more likely to have ADHD if his or her identical twin has ADHD. Scientists do not believe that ADHD is caused by having food allergies, eating too much sugar, watching too much television, going to poor schools, or suffering minor head injuries.

<b>Factors to consider</b>	<b>A risk or not a risk?</b>	<b>Why?</b>

# Schizophrenia: What Are the Chances?

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Read the following information about schizophrenia. Then, record the things that might increase or decrease a person's chances for getting schizophrenia in the table at the bottom of the page. You can also record information that might be important to think about but doesn't seem to change the person's chances.

Schizophrenia is not a split personality or multiple personalities. The most common symptoms of schizophrenia are odd speech, seeing or hearing things that aren't there (hallucinations), and believing something even when told it isn't true (delusions). For example, people who have schizophrenia may believe aliens from another planet are giving them secret information. Most people who have schizophrenia do not have symptoms all the time. In between episodes of serious illness, they may have minor symptoms such as blank facial expressions or talking only in short sentences. Most people who have schizophrenia take medicine that helps them deal with their symptoms. Counseling helps them deal with their disease, too. Most people who have schizophrenia can live on their own and work at a job; very few people need to be in the hospital because of their disease.

About 1 in 100 people in the population has schizophrenia. Both males and females can get it. About half the people who have schizophrenia are male and half are female. Schizophrenia usually begins at a younger age in males (late teens or early twenties) and in females, in their mid-twenties or early thirties. It is very uncommon for children to get schizophrenia, but it can happen in children over age 5.

Scientists do not have all the answers about what causes schizophrenia. They do know that people who have a close family member who has schizophrenia are more likely to get it than are people who do not have a family member with the illness. A person whose identical twin has schizophrenia has a 40 to 50 percent chance of having the illness. A possible cause that scientists are studying is an infection by a virus that happens before the person is born.

<b>Factors to consider</b>	<b>A risk or not a risk?</b>	<b>Why?</b>

# Do People with Depression Get Better?

## ***Andrew's story***

“I was having a hard time sleeping and I felt sad all the time. I had a hard time concentrating at my job, and nothing was fun anymore. A friend told me to see my doctor.

“After my doctor ran some tests and asked me about my symptoms, she decided that I had depression. She wrote a prescription for some medicine. She told me that the medicine should help me feel better but that it would be best if I got psychotherapy, too. Psychotherapy is “talk” therapy—the psychotherapist helps people understand their problems. She set up some sessions for me with a psychotherapist she knows.

“I didn't really want to take medicine all the time, and I didn't think that talk therapy would do anything for me. When I told this to the doctor, she showed me a letter from a patient who described how his depression got better after he started treatment. The patient thanked the doctor for helping him have a normal life again and gave the doctor permission to show the letter to other patients.

“She also showed me the results of a scientific study about depression. Scientists took PET images from people who have depression before and after they got treatment. The PET images showed that treatment changes what is happening in the brain. You can probably see why I decided treatment might be a good idea.

(Now look at the two PET scans in Master 4.2, *The Brain's Response to Treatment*.)

“I went back to my doctor after a month. I wasn't feeling any better, so she prescribed a different medicine. She told me to keep going to my psychotherapy sessions.

“It took a while, but I started feeling better. I was sleeping better and enjoying my old hobbies. My work was going well, and my friends said I seemed happier, too. My doctor told me that my experience with depression was typical. Medication and psychotherapy help 80 percent of people who have this illness.”



# **The Brain's Response to Treatment**

Master 4.2, which includes full-color PET images, can be found at the end of the module. Please replace this page with that one.

# Do People with ADHD Get Better?

## *John's story*

"I was always in trouble at school. I couldn't sit still, and I couldn't concentrate long enough to finish my assignments. I thought I was just stupid. I had trouble making friends, too. They didn't like to play with me because I never wanted to wait my turn and I wouldn't follow the rules of the games they played.

"When I was in the second grade, my teacher had a meeting with my parents and the school counselor. He thought I might have ADHD. The counselor talked with my parents and my teacher about my symptoms and observed me in class and on the playground. My parents also took me to our family doctor to make sure I didn't have any other illnesses that could cause my symptoms.

"Our doctor referred us to another doctor who specializes in mental illnesses that affect children. She talked with my parents and me and decided that my counselor was right: I did have ADHD. She got me started on some medicine and worked with both my parents and me to help me develop ways to stay focused on my schoolwork.

"School became a much happier place for me after that. The medicine helped me think, and the methods I learned to focus on my work and get it completed really helped. I learned that I wasn't stupid after all! And, I still divide large tasks into small steps and reward myself as each step is completed, the same way I learned to do when I was in school.

"I went on to college and graduate school. Even though I was grown up by then, I still had trouble concentrating and sitting still. The strategies I had learned to help me stay focused really paid off then.

"Today, I am a scientist who studies childhood mental illnesses. Through my studies, I have learned that 90 percent of kids like me can overcome their illness if they get the medicines and psychotherapy used to treat ADHD. In my research, I take brain scans of people who have ADHD and compare them with people who do not have ADHD. I have found that the areas of the brain that control attention are less active in children who have ADHD. After treatment, these areas become more active.

"My personal experience with ADHD and my research in this area have convinced me that treatment really works!"

# Do People with Schizophrenia Get Better?

## *Melinda's story*

“Like 2 million other Americans, our daughter Melinda has schizophrenia. She started showing symptoms right after she graduated from college. She heard voices telling her that certain people were plotting to kill her, she seemed to jump from one thought to another so quickly that she made no sense, and she was no longer interested in anything.

“Her behavior became more and more strange. Some days, she did nothing but sit around in her pajamas. She wouldn't get dressed, brush her teeth, or eat. Her face was blank and she spoke only in flat, short sentences. Before this time, Melinda was always busy and always excited about something in her life. It worried us to see her this way.

“Our doctor diagnosed Melinda with schizophrenia. He gave her a prescription for a special kind of medicine for people who have this disease. He said that after the medicine began to work, Melinda should begin psychotherapy to help her learn skills for coping with her illness. Finally, he encouraged us to begin family education to learn more about schizophrenia and how we could help Melinda manage her illness.

“The medicine helped Melinda a lot. She stopped hearing voices and she could talk with us more normally. But, she still had problems expressing emotions, and we didn't feel she was well enough to live in her own apartment.

“Melinda didn't like some of the side effects of the medicine. It made her mouth dry and caused her muscles to twitch. After a while, she decided she was better and stopped taking her medicine so she wouldn't have the side effects.

“Soon, the voices were back. Melinda's behavior became more and more strange, and one night, she even called the police because the voices in her head told her the neighbor's house was bugged. Then we put her in the hospital. The doctors got her started on another medicine and got her back into psychotherapy.

“The new medicine didn't have as many side effects for Melinda. She has stayed on this medicine. Her psychotherapy sessions have helped her learn ways to live on her own.

“Today, Melinda has a full-time job. She lives in her own apartment and often goes out with her friends. She continues to take her medicine and go to her psychotherapy sessions. We are so proud of our daughter!

“The family education program helped us learn that Melinda's experience with schizophrenia is common. Most people who have this illness can work, live on their own, and enjoy friends and family if they continue with their treatment.”

# My Story



**Individual #1**  
**Marissa**

**Individual #2**  
**Katie**

**Individual #3**  
**Chris**

**Individual #4**  
**Kellie**

**Individual #** \_\_\_\_\_

1. What mental illness does the person have?
2. When did it start?
3. How did the illness affect the person's thoughts?
4. How did the illness affect the person's feelings?
5. How did the illness affect the person's behaviors?
6. Did the illness cause the person difficulty in his or her life? In what ways?
7. What kind of treatment did the individual get?
8. How has the individual's life changed after treatment?
9. In what ways were other people important to each of the individuals in the video?

# Telling Their Own Stories—A Summary

1. What mental illness does the person have?
2. When did it start?
3. How did the illness affect the person's thoughts?
4. How did the illness affect the person's feelings?
5. How did the illness affect the person's behaviors?
6. Did the illness cause the person difficulty in his or her life? In what ways?
7. What kind of treatment did the individual get?
8. How has the individual's life changed after treatment?
9. In what ways were other people important to each of the individuals in the video?

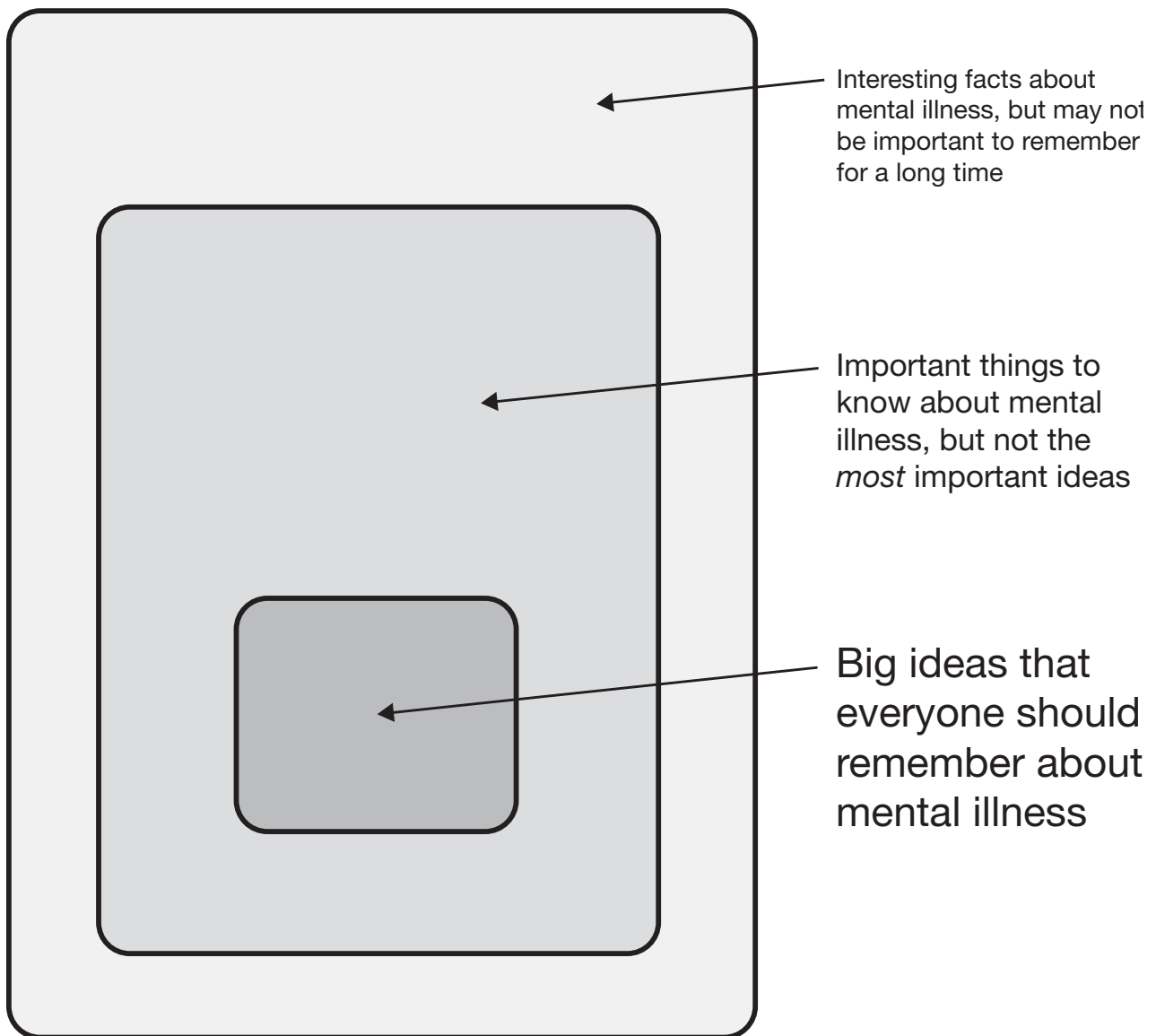
## Things to Think about

1. One of the individuals on the video stated that she didn't like it when people called her a schizophrenic and that she liked it better when people referred to her as "a person who has schizophrenia." Can you explain why she might feel that way? Do you think that other people who have a health problem might also feel this way? Why?
2. If you felt that you, a brother or sister, or a friend showed symptoms of a mental illness, what might you do to help yourself or the other person? Explain your answer and include examples from the video if it was helpful.
3. Research studies have shown that many people who have a mental illness (including adults, children, and teenagers) don't get treatment. Why do you think people don't seek help for a mental illness? How might a person's life be affected if he or she does not get treatment? Include examples from the video to support your answer.

## Rubric for Evaluating the Brochures

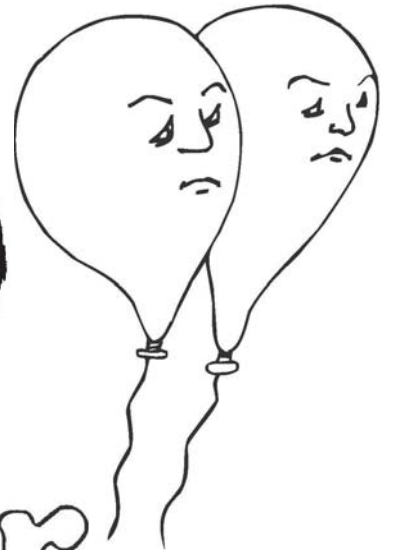
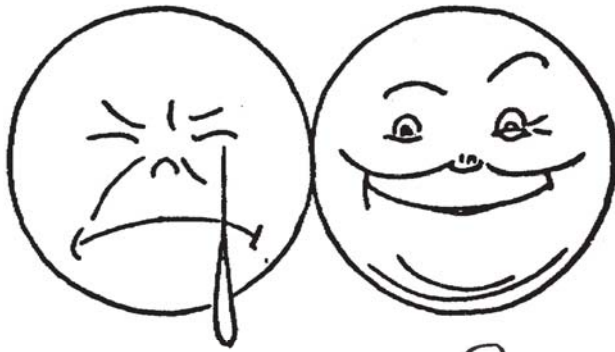
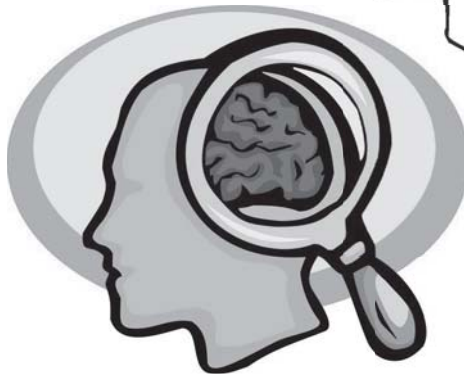
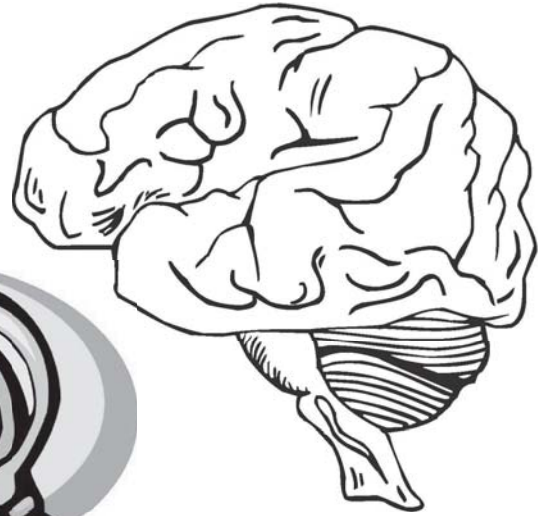
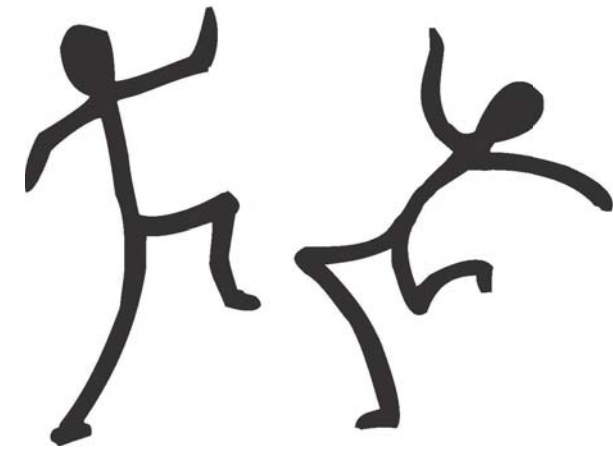
Category	Excellent (5 points)	Good, but could be improved (3 points)	Needs a lot of improvement (1 point)
<b>The brochure has a clear idea or message.</b>	<ul style="list-style-type: none"> <li>• The main message of the brochure is very clear.</li> <li>• The brochure focuses on a single idea.</li> </ul>	<ul style="list-style-type: none"> <li>• The main message of the brochure is somewhat clear.</li> <li>• The brochure's theme is all right, but it includes more than one main idea.</li> </ul>	<ul style="list-style-type: none"> <li>• The main message of the brochure is not clear at all.</li> <li>• The ideas are not focused on a single theme. The brochure tries to include too many different ideas.</li> </ul>
<b>The brochure's message is important for people to know.</b>	<ul style="list-style-type: none"> <li>• The main message is very important for people to understand.</li> </ul>	<ul style="list-style-type: none"> <li>• The main message is somewhat important for people to understand, but not the most important thing.</li> </ul>	<ul style="list-style-type: none"> <li>• The message is only slightly important for people to understand.</li> </ul>
<b>The brochure includes accurate information.</b>	<ul style="list-style-type: none"> <li>• The message of the brochure is supported by many facts.</li> <li>• The facts that support the message are accurate.</li> </ul>	<ul style="list-style-type: none"> <li>• Some important facts that would support the idea are missing.</li> <li>• Some of the facts are not accurate (are wrong).</li> </ul>	<ul style="list-style-type: none"> <li>• The brochure does not include facts to support the idea.</li> <li>• Most of facts that support the message are not accurate (are wrong).</li> </ul>
<b>The brochure is well written.</b>	<ul style="list-style-type: none"> <li>• There are no spelling or grammar errors in the brochure.</li> </ul>	<ul style="list-style-type: none"> <li>• There are only a few spelling or grammar errors in the brochure.</li> </ul>	<ul style="list-style-type: none"> <li>• There are many spelling and grammar errors in the brochure.</li> </ul>
<b>The brochure looks nice.</b>	<ul style="list-style-type: none"> <li>• The brochure uses art and color nicely.</li> <li>• The brochure is very neat.</li> </ul>	<ul style="list-style-type: none"> <li>• The use of art and color could be improved.</li> <li>• The brochure is a little sloppy.</li> </ul>	<ul style="list-style-type: none"> <li>• The brochure is very sloppy.</li> <li>• The brochure does not use art or color well.</li> </ul>

# Deciding What's Important





# Sample Art



# Brochure Scoring Sheet

Name: \_\_\_\_\_

Date: \_\_\_\_\_

When you evaluate a brochure, use the rubric to score each category. Enter your score for each category on this form. Then give a specific reason (or reasons) why you assigned that score.

The ID code for the brochure I am evaluating is \_\_\_\_\_.

Category	Score	Reason for score (Give specific reasons or examples to explain the score that you gave for each category. If a statement is wrong, indicate what it should say to be correct.)
<b>The brochure has a clear idea or message.</b>		
<b>The brochure's message is important for people to know.</b>		
<b>The brochure includes accurate information.</b>		
<b>The brochure is well written.</b>		
<b>The brochure looks nice.</b>		
<b>Total Score</b>	_____	

1. What is the best thing about this brochure?
  
2. What suggestions do you have for improving this brochure?

# What Do You Know?

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Write two or three sentences to answer each of the following questions:

1. What is mental illness?
2. Name some mental illnesses that you have heard about.
3. How would a person who has a mental illness look or act?
4. If you learned that a new student at school has a mental illness, how would you act toward him or her? How would you feel about him or her?
5. What causes someone to be mentally ill?

# What's Happening in the Brain?

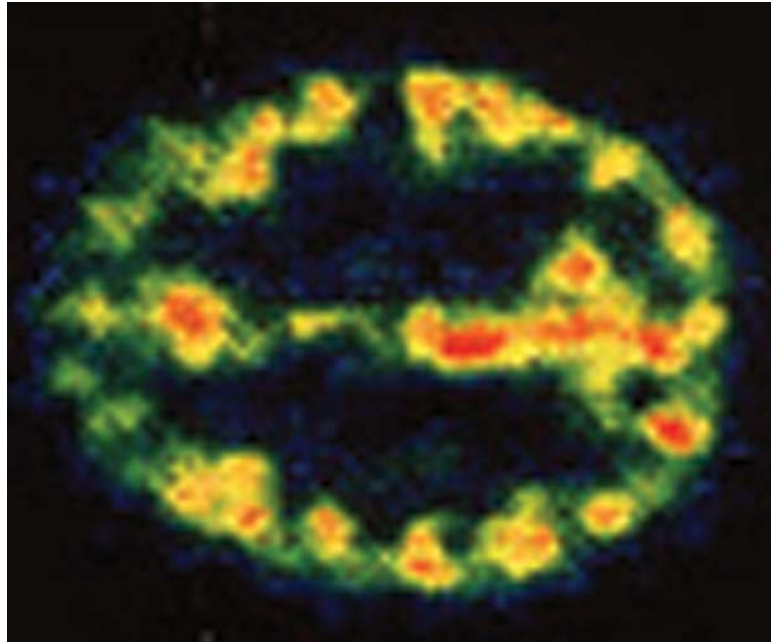


image 2

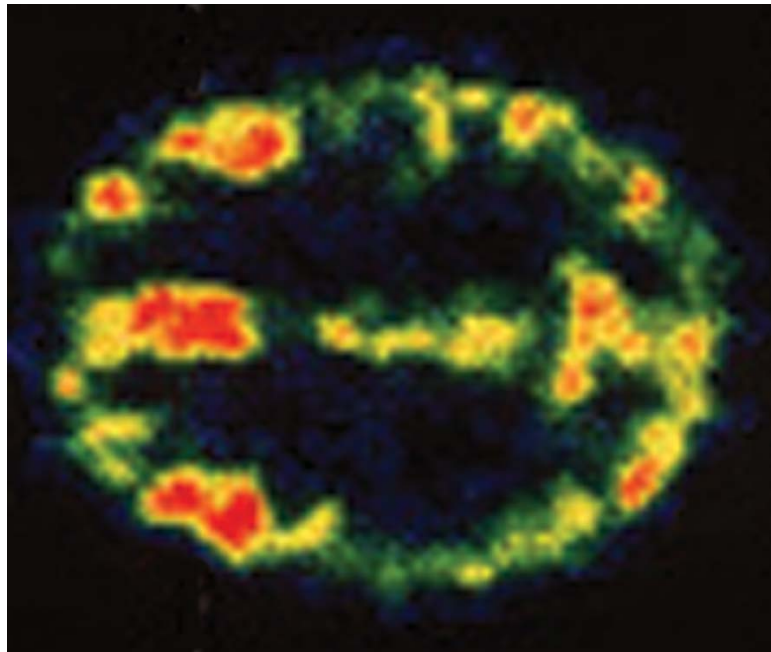
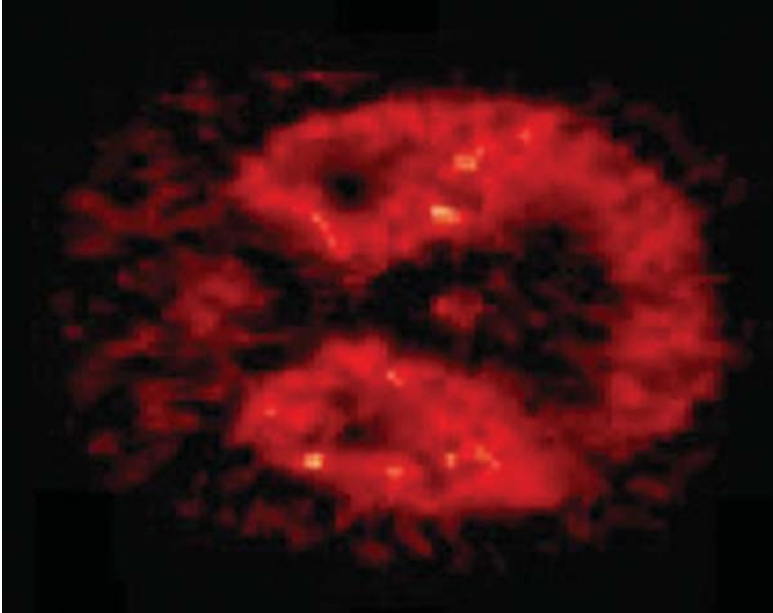


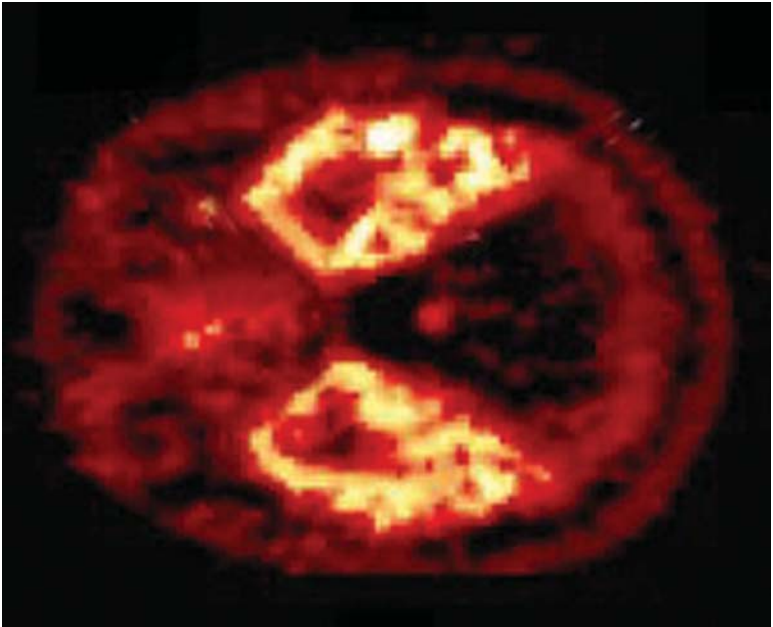
image 1

# Looking Inside the Brain

ability to use a  
specific brain  
chemical



with  
depression

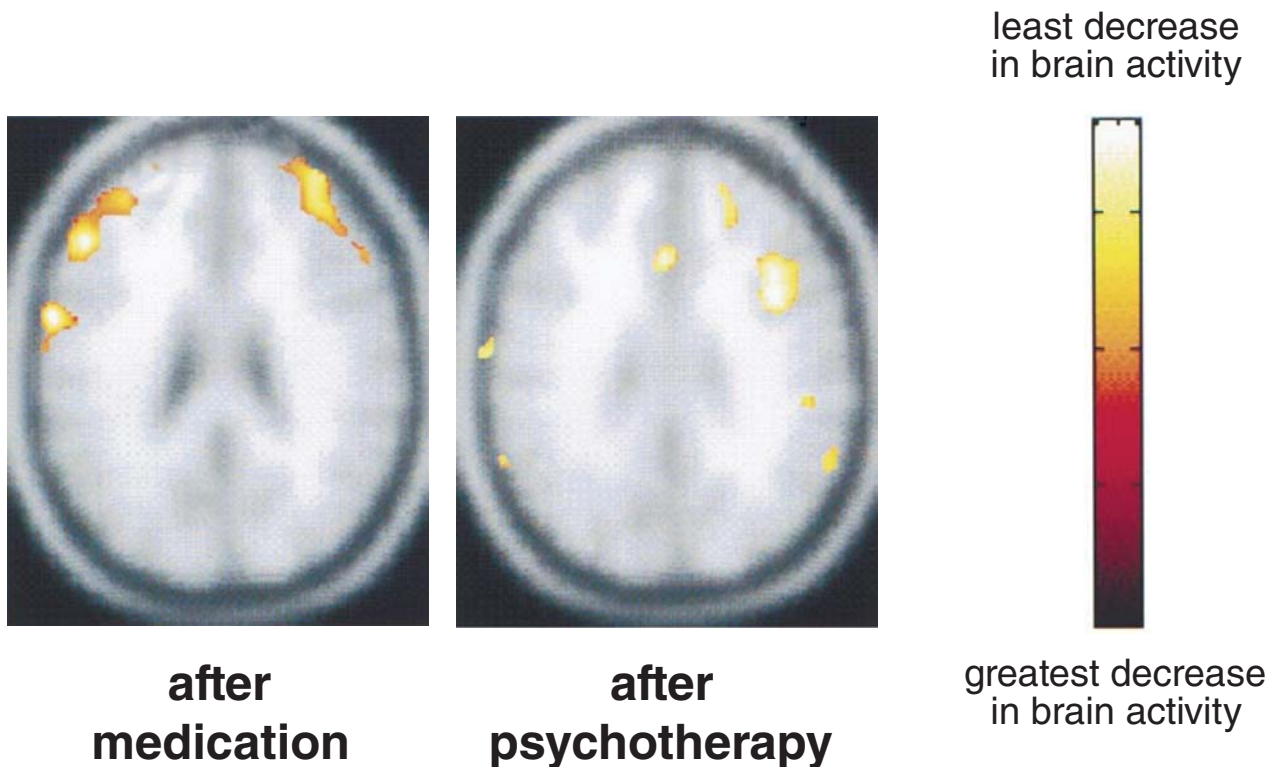


without  
depression

# The Brain's Response to Treatment

The scientists who took these PET images of people with depression wanted to see whether treatment makes the brain work more like the brain of someone who does not have depression. Before they could look at the effects of treatment, however, the scientists needed to know what differences there are in the brains of people who have depression compared with the brains of people who do not have depression. The scientists investigated and found out that some parts of the brain are less active in people who have depression, and some are more active. Knowing which areas of the brain in someone who is depressed can be less active and which can be more active allowed the scientists to make sense of the PET images showing brain changes after treatment.

These images, which look at areas of the brain that become less active with treatment, use color differently from how it was used in the images you looked at earlier in this unit. In these images, color highlights the parts of the brain that have different activity levels after treatment compared with before treatment. As you can see on the scale bar, red indicates the largest decrease in brain activity and yellow, a lesser decrease in brain activity. Areas of the PET images shown in color are the areas that decrease in activity after treatment. That means that the treatment caused the brain to be more like that of a person who does not have depression.



Master 4.2