Lesson Overview

Students begin by reporting their preconceptions about schizophrenia. They then explore Genes to Cognition Online to learn about symptoms of the disorder, genes and neurotransmitters associated with it, and difficulties involved in diagnosis, then share their information.

Description of Activity

In the first activity, students complete a K-T-W (What I know, What I think I know, What I want to learn) chart regarding schizophrenia. After the class develops a composite list, students can explore G2C Online to verify statements in the first two columns and provide answers to questions in the third. Students can share their findings, and then revise the lists.

In the second set of activities, students read a transcript from an interview with a patient diagnosed with schizophrenia and identify his symptoms. They explore G2C Online to compare these symptoms with DSM-IV-TR criteria for schizophrenia; discover why schizophrenia is considered the “cancer of mental illness;” learn the relationships among genes, neurotransmitters, and schizophrenia; collect information about the brain associated with the disorder; and find out how animal models contribute to our understanding of schizophrenia.

In the last activity, students construct a “jigsaw” compiling information about schizophrenia at different levels of organization with an emphasis on the interactions between levels. This activity can be substituted for, or done independently of, Part 2.

Parts of either activity can be eliminated in order to complete this lesson in a single period, if desired.

Goals and Objectives

Students will be able to:

- describe how the behavior of a person with schizophrenia may differ from normal.
- tell why schizophrenia is often considered the “cancer of mental illness.”
- explain why the identical twin of an individual with schizophrenia is more likely, but not guaranteed, to develop the disorder than a fraternal twin or older sibling.
- provide evidence that several neurotransmitters may be involved in producing schizophrenia.
- elucidate the relationships among genes, neurotransmitters, and the appearance of schizophrenia.
- identify brain structures damaged in patients with recurring symptoms of schizophrenia.
report how the use of animal models contributes to better understanding schizophrenia.

relate information about schizophrenia at one level of organization to information at other levels.

Assumptions of Prior Knowledge

Students should have a basic knowledge of principles of genetics and understanding of the biological basis of behavior.

Common Misconceptions

Students often think:

• If two people have identical genes for a trait, either both will express them, or neither will express them, i.e. genes determine the trait.
• People with schizophrenia have multiple personalities.
• People with schizophrenia show the symptoms all of the time.
• “Once a schizophrenic, always a schizophrenic.”
• Drugs have been developed that cure schizophrenia.

Implementing the Lesson

Time Allotment

Part 1: 1 x 50-minute class
Part 2: 1 x 50-minute class
Part 3: 1 x 50-minute class

Before Class

Become familiar with Genes to Cognition Online (www.g2conline.org). If necessary, reserve computers for the lesson.

Students may work individually, in pairs, or in quads. If they are to work in quads, you may want to choose appropriate groups in advance, and then implement the lesson using the jigsaw cooperative learning strategy. If class time is very limited, the K-T-W activity (What do I know, What do I think I know, What do I want to learn) can be completed in advance as a homework assignment, collected and used to inform instruction. If the class is generally slow completing lessons, you may want to eliminate one or more questions in Part 2, or choose to do either Part 2 or Part 3.

Photocopy student worksheets:

Part 1: Schizophrenia—Break with Reality
Part 2: Schizophrenia—Break with Reality
Part 3: Break with Reality—Contributions of information at each level to our understanding of schizophrenia

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During Class

Because students have a variety of preconceptions about schizophrenia that may or
cannot be correct, learning them is important. To start, have students work
individually or in pairs to answer the following questions about schizophrenia in *Part
1: Break with Reality*— What do you know about schizophrenia? What do you think
you know about schizophrenia? What do you want to learn about schizophrenia?

After students have completed their own lists, develop a composite list with the whole
class. Have students use computers individually, in pairs, or in groups to explore *G2C
Online* to verify or disconfirm statements in the first two columns and provide answers
to questions in the third. Before the end of the session, students can share their
findings, and then revise the lists. You may want to directly address misconceptions
that you detect to help dispel them.

Use student worksheet *Part 2: Break with Reality* to familiarize students with
behavioral characteristics of schizophrenia, and to help students learn why who will
develop schizophrenia is unpredictable, seek evidence that many genes are involved in
schizophrenia, locate areas of the brain commonly damaged in individuals with
schizophrenia, and find out how the use of animal models contributes to better
understanding of schizophrenia. The actual interview with Jerry was recorded and
can be viewed. The interview appears as part of *The Brain* series, module 26 at
www.learner.org.

*Part 3: Break with Reality—Contributions of information at each level to our
understanding of schizophrenia* is completed most successfully when the “jigsaw"
cooperative learning strategy is used. Divide the class into six groups of two to four
students. Students in each of the six groups will become experts about one level of
information about schizophrenia. Direct the expert groups to mine the schizophrenia
area of *G2C Online* to find out what we know about schizophrenia at their assigned
level, and then to record the information so classmates will understand what they
have learned. Each expert group should then see how the information they’ve written
down is important to understanding schizophrenia at the adjacent levels of
organization. For example, after gathering information about biochemicals and writing
the most important information on the table, the biochemicals expert group should
mine the website to find out how biochemicals affect cells, and the relationship
between genes and the biochemicals. (Expert groups for *genes* and *environment* will
only have one set of interactions to research.) All members of an expert group should
agree on what they include on the table, and each should complete a form.

When the expert groups have completed their task, one member of each expert group
should form a new group that includes a member from every other expert group
forming a jigsaw group. Each member of a jigsaw group should share his/her
information with the rest of the members of that group. Because all members of the
same expert group had the same information written on their tables, all jigsaw groups
should compile identical tables. Thus, the teacher can stay with one group during the
jigsaw phase to assess the success of the groups. Suggestions and adjustments are
best accomplished by reconvening the whole class.
Recommendations for Assessment:

Have students use the DNALC Simple Mapper to construct individual concepts maps including the following terms: schizophrenia, psychotic symptoms, positive symptoms, negative symptoms, delusions, hallucinations, disorganized speech, grossly disorganized behavior, affective flattening, loss in fluency and productivity of thought and speech, lack of goal-directed behavior, DSM-IV-TR, dopamine, glutamate, serotonin.

Have teams of students create their own brochure to acquaint the public with appropriate information about schizophrenia.

Use the G2C Online Test Item Bank to construct an assessment based on this lesson.

Suggestions for Extended Learning

Have students participate in a structured academic controversy to decide if the patient described at http://www.eugenicsarchive.org/eugenics/view_image.pl?id=55 treated at Kings Park Mental Hospital in New York in 1917 was appropriately diagnosed/treated for schizophrenia. In this instructional strategy, individuals or partners working as teams divide into opposing groups. One accepts the viewpoint that the patient was correctly diagnosed and looks for evidence to support that view. The other opposes that viewpoint and looks for evidence that refutes that view. They discuss their findings, and then decide which viewpoint they support.

Make a list of all of the parts of the brain associated with schizophrenia. Have students locate these parts using the 3-D Brain from G2C Online and read about their functions. Using this information, ask students to explain why people with schizophrenia display a wide variety of symptoms.

“Criteria for diagnosis of schizophrenia will probably be very different in DSM-VI (a future Diagnostic and Statistical Manual of Mental Disorders to be published about a decade from now) from DSM-IV-TR, the current edition.” Ask students to tell why they agree or disagree with this statement.
Glossary

**Affective flattening:** Affective flattening is restriction in the range and intensity of emotional expression.

**Delusion:** A delusion is an erroneous belief that usually involves a misrepresentation of perceptions or experiences. A persecutory delusion involves the false belief of being tormented, followed, spied on or tricked. A grandiose delusion involves the false belief of being extremely important, famous, or God-like.

**Dopamine:** Dopamine is a neurotransmitter that stimulates the hypothalamus to synthesize hormones and affects alertness, attention, reward, and movement.

**DSM-IV-TR:** DSM-IV-TR (successor to DSM-IV), an acronym for Diagnostic and Statistical Manual of Mental Disorders (4th Edition, Text Revised), is a widely used manual for mental health professionals that classifies psychological disorders. It is published by the American Psychiatric Association.

**Glutamate:** Glutamate, an amino acid, is an excitatory neurotransmitter important for information processing in neuronal networks, especially in the hippocampus and cerebral cortex.

**Hallucination:** A hallucination is a perceptual experience that occurs in the absence of external stimulation of the corresponding sensory organ, such as hearing or seeing something that is not there.

**Disorganized speech:** Disorganized speech is a distortion of language and thought processes that is characterized by nonsensical utterances.

**Negative symptom:** A negative symptom is a lack of insufficient expression of a normal behavior such as emotional flattening, lack of speech, and lack of goal-directed behavior.

**Positive symptom:** A positive symptom is an excessive or distorted expression of a normal behavior such as a delusion, hallucination, disorganized speech, or grossly disorganized behavior.

**Psychotic symptom:** A psychotic symptom is an abnormal behavior such as a delusion, hallucination, disorganized speech, or disorganized behavior that grossly interferes with the capacity to meet ordinary demands of life.

**Schizophrenia:** Schizophrenia is a mental disorder characterized by positive symptoms such as hallucinations, delusions, disorganized speech, and grossly disorganized behavior; and negative symptoms such as lack of emotion, lack of speech, and lack of goal-directed behavior.

**Serotonin:** Serotonin is a neurotransmitter associated with arousal, sleep, appetite, moods, and emotions.
Resources

Video/DVD


Books


Articles


Correlation to the National High School Standards for Teaching Psychology (American Psychological Association)

**Standard Area: Biological Bases of Behavior**

**Content Standard 1: Structure and function of the neuron**

Performance Standard
1.2: Describe how information is transmitted and integrated in the nervous system.
1.3: Analyze how the process of neurotransmission can be modified by heredity and environment.

**Content Standard 3: Hierarchical organization of the structure and function of the brain**

Performance Standard
3.1: Identify the structure and function of the major regions of the brain.
3.2: Recognize that specific functions are centered in specific lobes of the cerebral cortex.

**Content Standard 4: Technologies and clinical methods for studying the brain**

Performance Standard
4.1: Explain how research and technology have provided methods to analyze brain behavior and disease.

**Content Standard 7: How heredity interacts with environment to influence behavior**

Performance Standard
7.1: Assess the effects of heredity and environment on behavior.

**Standard Area: Psychological Disorders**

**Content Standard 1: Characteristics and origins of abnormal behavior**

Performance Standard
1.1: Distinguish the common characteristics of abnormal behavior.
1.2: Cite examples of abnormal behavior.
1.4: Describe major explanations for the origins of abnormality.

**Content Standard 2: Methods used in exploring abnormal behavior**

Performance Standard
2.1: Identify the purpose of different research methods.
2.2: Characterize the advantages and limitations of different research methods for studying abnormal behavior.

**Content Standard 3: Major categories of abnormal behavior**

Performance Standard
- 3.1: Discuss major categories of abnormal behavior.
- 3.2: Explore the challenges associated with accurate diagnosis.

**Content Standard 4: Impact of mental disorders**

Performance Standard
- 4.1: Consider factors that influence vulnerability to abnormal behavior.
- 4.2: Discuss the stigma associated with abnormal behavior.
National Science Education Standards

Content Standard A: Science as Inquiry

- Identify questions and concepts that guide scientific investigations
- Formulate and revise scientific explanations and models using logic and evidence
- Recognize and analyze alternative explanations and models

Content Standard C: Life Science

The Behavior of Organisms

- Multicellular animals have nervous systems that generate behavior. In sense organs, specialized cells detect light, sound, and specific chemicals and enable animals to monitor what is going on in the world around them. Behavioral biology has implications for humans, as it provides links to psychology, sociology, and anthropology.

Content Standard G: History and Nature of Science

Nature of scientific knowledge

- Scientific explanations must meet certain criteria. First and foremost, they must be consistent with experimental and observational evidence about nature, and must make accurate predictions, when appropriate, about systems being studied.
- Because all scientific ideas depend on experimental and observational confirmation, all scientific knowledge is, in principle, subject to change as new evidence becomes available.

Historical Perspectives

- Usually, changes in science occur as small modifications in extant knowledge. The daily work of science and engineering results in incremental advances in our understanding of the world and our ability to meet human needs and aspirations. Much can be learned about the internal workings of science and the nature of science from study of individual scientists, their daily work, and their efforts to advance scientific knowledge in their area of study.

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Answer Key

Part 1: Break with Reality

Although students typically include only information that is correct in the first “What I know” column of a K-T-W, they are more likely in this particular one to include common misconceptions such as, “People with schizophrenia have a split personality (or multiple personalities).” Because students often have so many misunderstandings about schizophrenia, it is worthwhile examining the K-T-W carefully and using the contents to inform instruction.

Because answers to the K-T-W are so variable, an adequate answer sheet cannot be provided.

Part 2: Break with Reality

Schizophrenia is a serious mental disorder, often considered the “cancer of mental illness.” In this lesson you’ll read an interview of a person with schizophrenia and decide what abnormal symptoms he shows, learn why who will develop schizophrenia is unpredictable, seek evidence that many genes are involved in schizophrenia, locate areas of the brain commonly associated with schizophrenia, and find out how the use of animal models contributes to better understanding of schizophrenia. To complete this lesson, go to appropriate areas of G2C Online dealing with schizophrenia.

1. Read the following interview. (This interview is a transcript of an interview presented in the Schizophrenia episode of the PBS series The Brain.)

At the National Institute of Mental Health, St. Elizabeth’s Hospital in Washington, DC, a mental health team observed an interview with a patient named Jerry. Jerry was diagnosed with schizophrenia and taking medicines including Haloperidol to manage his illness. In the interview, Jerry twirled his hair as he entered the room and continued twirling with one hand and then the other throughout the interview.

Question: How are you doing?

“I’m not doing so hot. I think and feel as though people have called me here to electrocute me, judge me, put me in jail or kill me, electrocute me because of some of the sins I’ve been in.”

Question: Is this a new feeling for you?

“The main thing is don’t get excited but the thing is, is it’s not a new feeling, no. I’m scared of people. I’m so scared I can tell you that picture’s got a headache.”

Question: Can you tell me more about that; the picture has a headache.

“When a sperm and an egg go together to make a baby only one sperm goes up in the egg and when they touch there’s two contact points that touch before the other
two and then it’s carried up into the egg. When they fuse, it’s like nuclear fusion, except it’s human fusion. There’s a mass lost, a proton. One heat abstraction goes up and the electron spins around, comes back down again in the proton to form the mind, and the mind can be reduced to one atom.”

**Question:** At this point, what would you like us to do for you?

“I would like you to get me off cigarettes, get me dried out, cleaned up so I can go home and get a job in a bakery and go to medical school.”

a. What is abnormal about Jerry’s behavior?

Possible responses might include abnormal behaviors such as hair twisting, disconnected thoughts and/or “word salad” revealed in speech, persecutory and/or grandiose delusions revealed in statements, and lack of focus.

b. Compare the abnormalities you identified with criteria for schizophrenia in DSM-IV-TR.

According to DSM-TR-IV criteria for schizophrenia, the behaviors identified above are all characteristic of schizophrenia. Additional symptoms might be hallucinations, negative symptoms such as poverty of language and inappropriate affect, and social/occupational dysfunction.

2. What did you learn about why schizophrenia is referred to as the “cancer of mental illness?”

According to Daniel Weinberger, schizophrenia is often referred to as the cancer of mental illness because it spreads to all aspects of people’s lives, affecting all of their relationships and their abilities to carry out all of their daily activities.

3. Why do neuroscientists suspect that several neurotransmitters may be involved in producing schizophrenia?

According to Jeffrey Lieberman, people taking recreational drugs that affect the neurotransmitters dopamine, glutamate, and serotonin can show symptoms of schizophrenia. Cocaine, amphetamine, and methamphetamine stimulate the release of dopamine that can result in hallucinations and delusions. Phencyclidine (PCP or angel dust) blocks the effects of glutamate at receptors in the brain, and produces symptoms of schizophrenia. LSD, mescaline, psilocybin, and ecstasy block the effects of serotonin at specific receptors, and produce hallucinations that are characteristic of schizophrenia.

4. How are genes and neurotransmitters related to the appearance of schizophrenia?

According to Dr. Lieberman, genes affect the development of neurons and neurotransmitters. Neural circuits resulting from the interactions of neurons and neurotransmitters affect how we think and what we perceive. Disturbances in the
neural circuits can affect the way we think and can produce symptoms of schizophrenia.

5. Explain why the identical twin of an individual with schizophrenia is more likely to develop the disorder than a fraternal twin or older sibling, but is not guaranteed to develop it.

According to Daniel Weinberger, genes affect vulnerability to schizophrenia. If you have specific genes and other factors, you can become schizophrenic, but if you don’t have the other factors, you won’t become schizophrenic.

6. Identify regions of the brain thought to be involved in schizophrenia, and provide evidence why scientists think these areas are involved.

Different parts of the brain play different roles in terms of how the brain organizes our behavior and enables us to adapt to our environment. PET and fMRI studies have shown frontal lobe processing abnormalities during executive functions, working memory, cognitive tasks, or complicated environmental tasks. There’s also a lot of imaging evidence that the hippocampus, associated with memory, is disrupted in schizophrenia. Screen 3 from the Dana Review (#1291) says, “Both structural and functional imaging studies have indicated that many areas are involved together, including the prefrontal cortex, the temporal lobes, the limbic regions, the thalamus, the basal ganglia, and the cerebellum.”

7. How can the use of animal models contribute to better understanding of schizophrenia?

Scientists can alter genes in mice that confer risk for schizophrenia, and then see what other changes occur in the brain as a result of that genetic manipulation. They cannot do that with humans. Such studies in other animals enable scientists to convert correlations, or things that co-occur in the human illness, into an understanding of cause and effect.

Suggestions for Extended Learning

Have students participate in a structured academic controversy to decide if the patient described at http://www.eugenicsarchive.org/eugenics/view_image.pl?id=55 treated at Kings Park Mental Hospital in New York in 1917 was appropriately diagnosed/treated for schizophrenia. In this instructional strategy, individuals or partners working as teams divide into opposing groups. One accepts the viewpoint that the patient was correctly diagnosed and looks for evidence to support that view. The other opposes that viewpoint and looks for evidence that refutes that view. They discuss their findings, and then decide which viewpoint they support.

Students taking the affirmative view can find many passages to support evidence of symptoms such as hallucinations, inappropriate behavior and affect. Students taking the negative view can find indications that the patient was suffering from migraine.
headaches and reacting to headache pain, had learned maladaptive behavior patterns from family members since she was a young child, or was mentally retarded.

Make a list of all of the parts of the brain associated with schizophrenia. Locate these parts using the G2C 3-D Brain. Using this information, explain why people with schizophrenia display a wide variety of symptoms.

Among the listed parts could be: frontal lobe, prefrontal cortex, temporal lobe, limbic region, thalamus, basal ganglia, cerebellum, and hippocampus. These parts of the brain are associated with thinking, planning, speaking, hearing, emotions, memory, and other functions.

“Criteria for diagnosis of schizophrenia will probably be very different in DSM-VI from DSM-IV. Tell why you agree or disagree with this statement.”

Answers will vary. A sample response follows:
Criteria for the diagnosis of schizophrenia will probably be different in DSM-VI because of advances in neuroscience, especially in the use of biotechnology. Substituting human genes in model organisms without affecting protein function can reveal how humans may respond under a variety of experimental conditions shedding light on the genetics of schizophrenia. The use of modern imaging techniques, such as fMRI or PET scans, may establish better links between the brain and behaviors of people with schizophrenia providing anatomical markers for the disorder.

**Part 3: Break with Reality — Contributions of Information at Each Level to Understand Schizophrenia**

Because the website contains so much information about schizophrenia, students in expert groups will need to make decisions about what to include on the table. As a result, tables from different classes will not be identical, but they will have most of the same basic information.

On the next page is a table that was filled-in by an advanced group of learners who mined the website in order to complete the assignment. This group was less selective than most other groups in choosing information to include.

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## Part 3: Break with Reality—
**Contributions of Information at Each Level to Understand Schizophrenia**

<table>
<thead>
<tr>
<th>Information about Genes</th>
<th>A study of a Scottish family revealed balanced translocation between chromosomes 1 and 11 in DISC1 is strongly correlated with psychiatric disorders, namely schizophrenia (David Porteous). There is no one gene for schizophrenia – maybe 10, 20, or more genes are likely to be causal. Neuregulin, dysbindin, DISC1, and COMT are good candidates. (David Porteous)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interactions of Genes and Biochemicals</td>
<td>Increased neuregulin signaling in schizophrenia may suppress the NMDA receptor, leading to lowered glutamate levels. (chromosome map) RNAi knockdown of DTNBP1 reduces glutamate levels in cultured cells. (chromosome map) GRM3 is a G-protein coupled receptor for glutamate, a major excitatory neurotransmitter. GRM3 also modulates serotonin and dopamine transmission. (chromosome map) DAOA is found in peroxisomes where it triggers the degradation of the gliotransmitter D-serine, which is a strong activator of NMDA-type glutamate receptors. (chromosome map) Stimulation of dopamine D1 receptors increases DARP-32 phosphatase inhibition. (chromosome map) In COMT, the lack of dopamine transporters in the cortex may accentuate the effect of the valine polymorphism, with its diminished ability to clear dopamine. (chromosome map) Genetic predisposition with a variety of biochemicals can promote symptoms.</td>
</tr>
<tr>
<td>Information about Biochemicals</td>
<td>According to Columbia University’s Jeffrey Lieberman, three main chemical hypotheses of schizophrenia are the glutamate, dopamine, and serotonin hypotheses. The one that is probably most often mentioned is a chemical called dopamine. (Daniel Weinberger) (PCP affects) Glutamate NMDA receptors affected, Dopamine, Serotonin</td>
</tr>
</tbody>
</table>
Interactions of Biochemicals and Cells

Overstimulation of neural circuits...

Dopamine is what’s called a neurotransmitter, meaning that it’s a chemical that allows two neurons in the brains to communicate, produces a bridge across the synapse between two cells and allows the nerve impulse to progress (Jeffrey Lieberman).

The dopamine hypothesis of schizophrenia basically says that the symptoms of schizophrenia, principally the hallucinations, the delusions, the psychosis are the result of too much dopamine active in the brain, secreted into the synapses within a certain neural circuit. And as a result of this, it produces this over-stimulation of the cells and these symptoms (Jeffrey Lieberman).

Interactions of Cells and Brain Anatomy

Defective communication among brain cells (both neurons and glia)

It is generally believed that the cause of schizophrenia originates in the way a certain group of genes produce abnormalities in the development of the brain. Now these are not gross abnormalities where there is clear deformation of the brain or it doesn’t develop, these are very subtle abnormalities that cause selected neural circuits to form in a way that doesn’t quite make them fully functional and fully viable in the face of all of the different types of activities they have to perform in the course of an individual’s lifetime (Jeffrey Lieberman).

Information about Cells

Multiple regions of the brain affected include hippocampus, and the frontal lobes (namely the dorsolateral prefrontal cortex (DLPFC)). See Daniel Weinberger, James Watson, and David Lewis interviews.
<p>| Interactions of Brain Anatomy and Cognition | Progressive loss of “gray matter,” –loss of synaptic connections, Broca’s area affected. Early symptom “walking spastic,” limited early social interactions. The frontal lobes are the part of the brain that are probably the most highly evolved, most human part of the brain that is involved with processing complex environmental information and making plans for how to act in those complicated environments. The frontal lobe is involved in aspects of thinking and behavior related to planning, judgment, following through on a series of acts so that those acts are coherent, logical, and sequential, and appreciating that past experience is important for how you guide your behavior in the here and now. The frontal lobe is thought to be the central executive, the chief executive officer if you will of the brain. Because many of the problems that patients with schizophrenia have involve the regulation of their behavior, the regulation of their perception of their cognitive apparatus, the ability to organize behavior so that it fits the contextual environmental context – these functions which are thought to be served by the frontal lobe suggest that the frontal lobe is not really working that well in schizophrenia. (Daniel Weinberger) What happens during hallucinations is that Broca’s area is working significantly and that lets us know that when you’re actually experiencing a hallucination. (Sukhi Shergill) |
| Information about Cognition | Positive symptoms e.g. delusions, holding a fixed false belief in the face of contrary evidence, hallucinations. Negative symptoms can be thought of as a loss of normal function; a loss of motivation, a loss of the ability to express emotion, a loss of the ability to generate speech, a loss of the ability to experience pleasure. (David Lewis) Schizophrenia can be hard to distinguish from bipolar disorder and distinguishing whether someone is polar or schizophrenic is hard. But there’s a real mood variance in bipolar disorder (James Watson). Although schizophrenia is rarely diagnosed before adolescence, abnormalities may exist from an early age. (James Watson) Worldwide, approximately 1% of people suffer from schizophrenia. (Dana Review). |</p>
<table>
<thead>
<tr>
<th>Interactions of Cognition and Environment</th>
<th>Diathesis—stress model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If one identical twin has schizophrenia, the chances that a second will also have it are between 40 and 60% (Dana Review).</td>
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<tr>
<td></td>
<td>About one third of people who suffer from schizophrenia will not have another episode so they are fully recovered. You may need to take medication in the short term for about 6 to 9 months but after that, most people won’t have another episode. About a third of people will have another episode of the schizophrenic illness, and usually that’s in response to stress or if they stop taking the medication.</td>
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<td></td>
<td>A rather unfortunate group is a third of patients who will continue, they will improve a little bit, but they won’t get back to the way they were functioning before. (Sukhi Shergill)</td>
</tr>
<tr>
<td></td>
<td>Several studies have shown that neurons that should migrate during fetal development fail to do so in schizophrenia, possibly as a consequence of pregnancy complications. (Dana Review)</td>
</tr>
</tbody>
</table>

| Information about Environment | Viruses such as polio and measles; stresses such as obstetric complications, poverty, inadequate nutrition, urban living, migration, alcohol abuse, and vitamin D deficiency during pregnancy can contribute. |