



# THE EFFECTS OF MARIJUANA USE IN ADOLESCENTS

**Psychoeducational Manual for Teachers and Service Providers to  
Counsel Adolescents on the Effects of Marijuana Use**



Northeast & Caribbean (HHS Region 2)

**ATTC**

Addiction Technology Transfer Center Network  
Funded by Substance Abuse and Mental Health Services Administration

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Suggested citation: Northeast and Caribbean Addiction Technology Transfer Center. (December, 2023). The Effects of Marijuana Use in Adolescents. Institute of Research, Education and Services in Addiction, Central University of the Caribbean, Bayamón, PR.

At the time of this publication, Dr. Miriam Delphin-Rittmon serves as Deputy Secretary of the U.S. Substance Abuse and Mental Health Administration. (SAMHSA); Michael Chaple, Ph.D. serves as Director and Ibis S. Carrión-González, Psy.D. as Co-Director of the Northeast and Caribbean ATTC for Puerto Rico and the North American Virgin Islands.

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# ACKNOWLEDGMENTS

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# Introduction

In human development, adolescence represents that stage between childhood and early adulthood. It is a period characterized by significant changes ranging from physical, emotional, and social. Adolescence is a time of growth, exploration and risk-taking. Some risks can foster the development of identity and independence (e.g., running for student council, asking someone out on a romantic date). However, some risky behaviors, such as using marijuana, can have adverse effects on the adolescent's health and well-being. In adolescents, the brain is actively developing and will continue to develop until about age 25.

According to the High School Students - Youth Risk Behavior Survey conducted in the U.S. in 2019, 4 out of 10 high school students indicated that they had indicated having used marijuana at some point in their lives. For their part, statistics compiled by the Center for Disease Control (CDC) show that, in 2019, 37% of high school students in the U.S. indicated having used marijuana in their lifetime and 22% indicated having used marijuana in the previous 30 days. The numbers for marijuana vaping in the previous year held steady in 2020 after large increases in 2018 and 2019. However, a large percentage of high school, middle school, and high school students indicated having vaped marijuana in the previous year: 8% of 8th graders, 19% of 10th graders, and 22% of 12th graders.

Research has shown that when marijuana use begins in adolescence, it can have permanent effects on the developing brain, especially if used regularly or in large amounts. In addition, compared to adolescents who do not use marijuana, those who use marijuana are more likely to drop out of high school, college, or fail to obtain a college degree.

Monitoring the Future is an annual survey of substance use among youth in eighth, tenth, and twelfth grades. It is conducted by researchers at the University of Michigan in Ann Arbor and is funded by the National Institute on Substance Abuse (NIDA). The researchers collected 32,260 surveys from 319 public and private school students in the United States. The results revealed a significant reduction in the percentage of adolescents reporting substance use in 2021. However, the percentage of teens reporting substance use remains at 10.2% for eighth grade; 18.7% for tenth grade; and 32.0% for twelfth grade. This means that marijuana use continues to be a concern and focus of research, especially on the effect it has on brain development, which continues until about age 20 (NIDA, 2021).



# Purpose and Objectives of this Manual

The primary purpose of this manual is to provide specific strategies for service providers to counsel adolescents about the effects of marijuana use in a way that makes them receptive to the information offered by the provider. This is through a psychoeducation process presented in a structured, non-impositional manner. It is intended to achieve this through the following objectives:

1. Psychoeducate students, in a structured and interesting way, about the effects of marijuana use.
2. Provide information about the effect of marijuana use in adolescents from reliable sources.
3. Offer students/adolescents the opportunity to learn about and discuss marijuana and its adverse effects.
4. Establish the difference between myths and realities regarding the information being provided about marijuana and its effects.
5. Allow safe spaces for dialogue for students/adolescents to express their concerns and questions regarding marijuana use and its effects.

## Overview of Substance Use Disorders

Substance use disorder is a disease that affects a person's brain and behavior, and results in an inability to control the use of legal or illegal drugs or medications. The Diagnostic Statistical Manual (DSM-5) of the American Psychiatric Association (2013) states that substance-related disorders are divided into two groups. One group is substance use disorders and the other group is substance-induced disorders. It adds that these disorders consider a total of ten classes of drugs or substances. These are: alcohol, caffeine, cannabis, hallucinogens, inhalants, opiates, sedatives, hypnotics and anxiolytics, stimulants, tobacco, and other substances. The risk of addiction and how quickly it becomes a disorder will depend on the individual and access to the substance. Some substances, such as opioids, carry a higher risk and cause addiction faster than others.

It has been established that any drug or substance that is consumed in excess tends to produce a direct activation in the brain, specifically in the reward system, which in turn rewards behaviors and the production of memories (APA, 2014). It may begin with experimental use of a recreational drug in social situations. Later, such use may become more frequent. In others, especially with opioids, drug addiction begins with exposure to medications prescribed to them or to family members and/or friends.

The need for higher doses of a particular substance increases over time. This happens because the effects become more difficult to obtain with the initial dose. Also, over time, the substance becomes more necessary, both for the person to feel good as well as to be able to "live". Attempting to stop using the substance can, in turn, cause intense cravings and symptoms akin to being physically ill. This is known as withdrawal symptoms.

# Suggested Instructions for Use of this Manual

This manual is divided into four sections. The first section covers the topic of the brain and its functions. The second section covers the topic of addictions. The third section deals with managing the effects of marijuana use. Finally, the fourth section includes supporting material and links. The first three sections contain various topics to be discussed, which are designed in modules. In total, the manual has ten modules.

Each module has a specific title or topic, the objectives of the module, the materials needed and suggested instructions. As part of the instructions, reference material, examples of how to present the information and suggestions are included. In addition, for those modules that require it, the necessary worksheets are indicated and grouped in Section IV of the manual.

The following suggestions are offered to maintain a logical sequence:

1. Read the manual before putting it into practice.
2. Follow the sequence of the modules, starting with Module 1 and ending with Module 10.
3. Read each module a few days before presenting it to familiarize yourself with the content, terminology, and suggested instructions.
4. Have the necessary materials ready, as well as the worksheets and any other reference materials.
5. Set aside as much time as you deem necessary for each module.
6. Take into consideration the content of each module to determine if you can present it in the same space or if you need to separate additional spaces.
7. You can modify the activities or the format according to the particular needs of your students/adolescents (audience).
8. Consider the availability of equipment and/or materials before deciding how to present specific information.

It is important to be able to provide space to listen to students/adolescents, answer their questions and/or clarify their doubts. In case you do not have the precise information to answer a question that arises during the completion of the modules, you can calmly let them know that you will look for the information and clarify the doubt at a later time. It is suggested that you write down any doubts and/or questions that come up while presenting the material in this manual and add them to the comment sheets provided for each module in Section IV. This will help to update the content of the manual from time to time, adjusting it to the needs expressed by students/adolescents.





## **Section I: The Brain and Its Functions**



# Module 1: What is the Brain?

## Objectives:

### The students will:

1. Learn the structure of the brain
2. Learn the parts that make up the brain
3. Identify each of its parts

### Materials:

1. Handout: The Brain
2. Pencil
3. Colored pencils, markers, crayons

### Instructions:

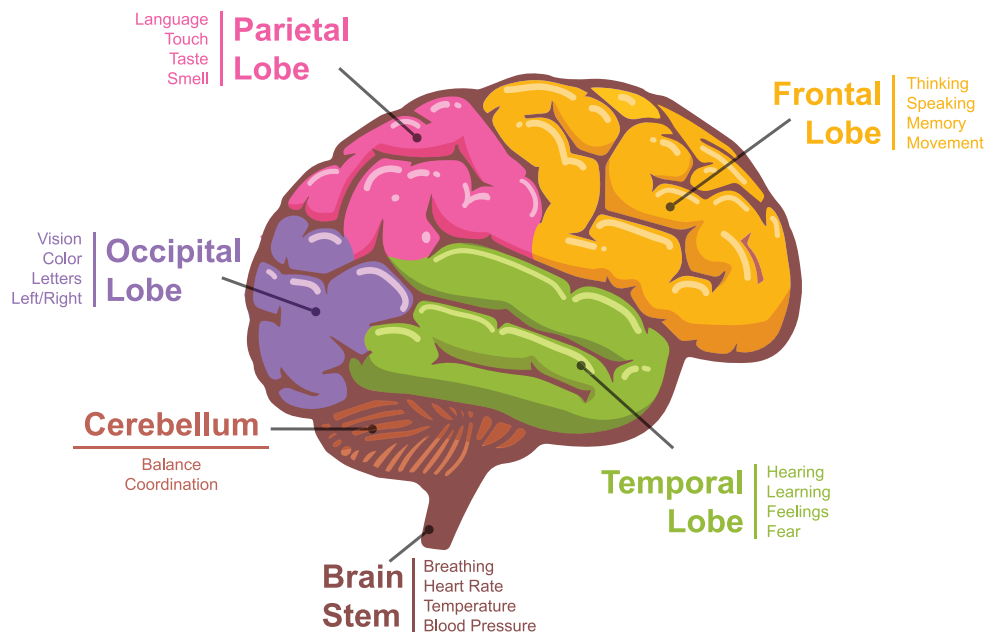
1. Communicate to students/adolescents the objectives of this module. We suggest letting them know what is expected of them. For example, active participation, completing the activities, respecting the opinions of their peers, etc.
2. Brainstorming: Write the word **brain** in large letters. It can be previously written on a poster board or flip chart paper.
3. Ask openly: what word comes to mind when you hear the word brain?
4. Provide the definition of brain.
5. Distribute the handout *The Brain* to each of the students/adolescents.
6. Start by letting them know that this is the whole brain as seen from the outside.
7. Inform students/adolescents that the brain is divided into two main parts: **right hemisphere and left hemisphere**.
8. Ask students/adolescents to identify these two parts, writing the name in the corresponding space.
9. Explain that the brain is also divided into 4 sections known as **lobes**.
10. Mention the names of each lobe: **frontal, parietal, temporal, and occipital**.
11. Ask students/adolescents to identify each lobe in the brain illustration by writing the name in the corresponding space.

12. Explain that each lobe has a particular function (Table 1).

13. Students/adolescents can then assign a color to each lobe and color them in.

**Table 1: Brain Lobes and their Functions**

Lobe	Functions
1. Frontal	<ul style="list-style-type: none"> <li>• process attention and motion information</li> <li>• planning</li> <li>• decision making</li> <li>• speech</li> <li>• emotional regulation</li> <li>• reasoning</li> <li>• motivation</li> <li>• behavior</li> <li>• *executive functioning*</li> </ul>
2. Parietal	<ul style="list-style-type: none"> <li>• integrating sensory information of touch, taste, vision, temperature, pressure, and pain</li> </ul>
3. Temporal	<ul style="list-style-type: none"> <li>• main center for vision processing</li> </ul>
4. Occipital	<ul style="list-style-type: none"> <li>• important in the processing of auditory information</li> <li>• language recognition</li> <li>• memory building</li> </ul>



[https://www.freepik.com/free-vector/colored-labeled-human-brain-diagram\\_1311040.htm#query=brain%20lobes&position=19&from\\_view=search&track=ais&uid=416778e0-6942-4979-9308-22928cff90be](https://www.freepik.com/free-vector/colored-labeled-human-brain-diagram_1311040.htm#query=brain%20lobes&position=19&from_view=search&track=ais&uid=416778e0-6942-4979-9308-22928cff90be)

# Module 2: My Dominant Hemisphere

## Objectives:

### The students will:

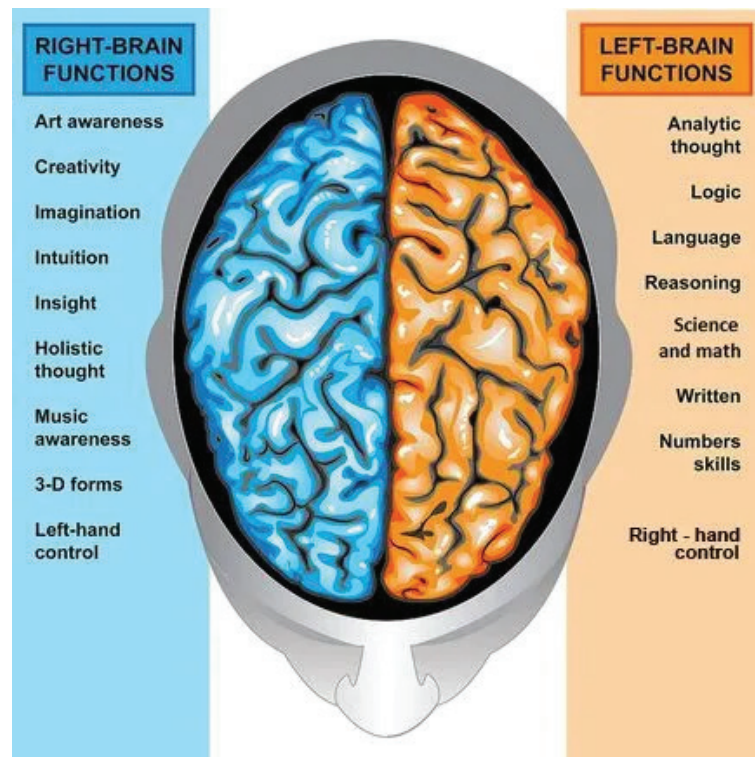
1. Learn about the brain structure
2. Learn about both hemispheres of the brain
3. Identify their dominant hemisphere

### Materials:

1. Handout: Dominant quadrant test (pages 12 and 14)
2. Pencil
3. Colored pencils, markers, crayons

### Instructions:

1. Present or refer to an image of the brain.
2. Tell students/adolescents that the brain is divided into two hemispheres: left and right.
3. Explain the characteristics of both hemispheres, using the information in the image below:

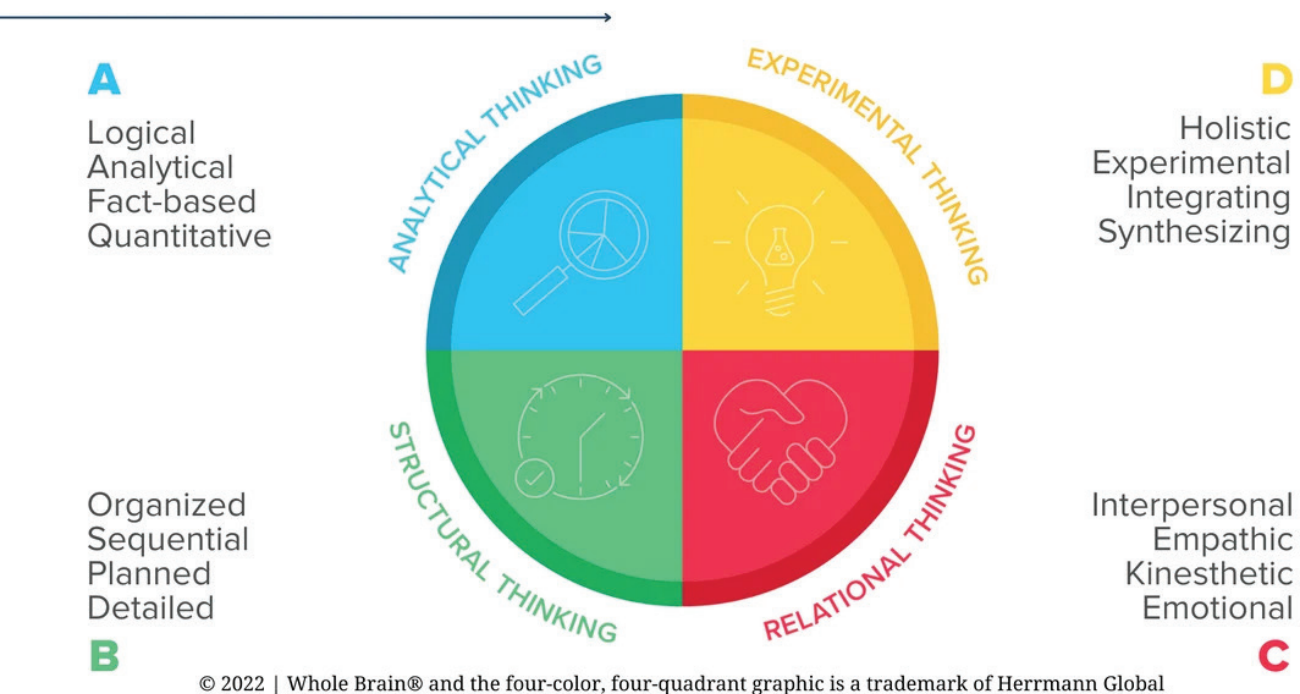


<https://brainmadesimple.com/left-and-right-hemispheres/>



4. Explore with students/adolescents which hemisphere they believe to be their dominant hemisphere based on what the image shows.
5. Communicate to students that there is a theory that explains that the cerebral hemispheres are divided into quadrants (4). This theory is known as the Whole Brain Thinking and was proposed by **Ned Herrmann**.
6. Discuss with students the diagram of the brain quadrants below.

## Whole Brain® Model



<https://www.thinkherrmann.com/whole-brain-thinking-blog/use-your-whole-brain-to-ignite-demand>

7. Cut out the strips with the information from each quadrant below. Distribute the strips among students and ask them to read the information in each quadrant. It is suggested to start with Quadrant A, then Quadrant B, followed by Quadrant C, and finally Quadrant D

### Quadrant A: The Logical

A person who will have a cold, calculating and unemotional personality style. They are known as "expert" people and are those individuals who excel in logic and mathematical tests.

### Quadrant B: The Organizer

If this zone predominates in our brain processing, we will have a controlled, detailed, and well-organized way of thinking.

### **Quadrant C: The Emotional**

These people will have an emotional, expressive, and sensitive way of thinking. They are highly sensitive individuals, who enjoy creating and maintaining interpersonal bonds with others.

### **Quadrant D: The Creative**

These people have an intuitive, integrative, and very imaginative way of thinking. They are creative, innovative and have a very rich inner world.

8. Randomly ask some students what they think is their dominant quadrant. Ask them to elaborate briefly on their answers, including some examples.
9. Tell students that Hermann also designed a simple test that serves to help people identify their dominant quadrant.
10. Read the test instructions. It is suggested to provide the printed test for the students so that they can answer it.

## Test

**Instructions:** This test serves to identify the dominant quadrant. It is not a diagnostic test or a test to draw formal conclusions. Read each question. Circle the answer that best completes the sentence.

### ***A. When a good friend, partner or family member comes to me because they have a problem...***

1. I do not worry if the problem is not considerably serious.
2. I write them a list of possible solutions.
3. I hug the person and feel sorry for them.
4. I come up with a plan to help them.

### ***B. When studying before taking a test...***

1. I really enjoy doing exercises to prepare for the exam.
2. I develop a study plan, combining rest with hours of concentration.
3. I get very nervous and feel very anxious, especially the day before.
4. I look for fun notes, draw pictures to remember and develop techniques to retain names and dates.

### ***C. What I look for in a partner is...***

1. A person to share knowledge and wisdom with.
2. I seek someone who is compatible with my personality, pleasant and whom I consider attractive.
3. Love and passion, I like to experience many emotions in my relationship with my partner.
4. Someone with whom I can share adventures and new experiences.

### ***D. When I have a family argument...***

1. I don't get too involved; I just observe how others behave.
2. I analyze how each member of the family behaves and try to act accordingly.
3. I start to cry, I can't bear to see my family fighting, I love them very much.
4. I look for the best way to calm the environment and I come up with some dynamic or game if necessary.

### ***E. When I get a feeling or a hunch...***

1. I don't usually have that kind of feeling.
2. I reflect on why I feel it and try to find the most reasonable explanation for this feeling.
3. I enjoy it very much; I love to notice how my mind is trying to tell me something.
4. I follow that hunch, I'm not usually wrong.



***F. My ideal job would be...***

1. Professor of mathematics, physics, or businessman/businesswoman.
2. Administrative, accounting, or managerial.
3. Psychologist, journalist, or social worker.
4. Architect, composer, writer, poet, or designer.

**11.** Once they have finished answering the test, ask students to add up the value of each answer selected. For example, if in situation A they selected answer 2, they should add 2 points. They should add up all the scores. The total sum should be between 6 and 24 points.

**12.** Provide students with the scoring scales corresponding to the dominant quadrant, following the legend below:

**From 1 to 6 points:** Predominant Quadrant A (Logical-Mathematical)

**From 6 to 12 points:** Predominant Quadrant B (Organized-Analyst)

**From 12 to 18 points:** Predominant Quadrant C (Emotional-Sensitive)

**From 18 to 24 points:** Predominant Quadrant B (Intuitive-Imaginative)

**13.** Provide time for feedback and open discussion among students.

# Module 3: Neurotransmitters

## Objectives:

### Los estudiantes:

1. Learn what a neurotransmitter is and its significance for brain function
2. Identify the main neurotransmitters
3. Will be able to match neurotransmitters with their effects on the brain

### Materials:

1. Handout: *Neurotransmitters*
2. Pencil
3. Colored pencils, markers, crayons

### Instructions:

1. Begin this module by reviewing the previous two modules. It is suggested to ask some open-ended questions to encourage discussion.
2. Ask students/adolescents if they know what the term neurotransmitter means. You may also ask if anyone has heard the term before and/or what they think it means.
3. For the benefit of students, define the term using the following information:

“**Neurotransmitters** are chemical substances created by the body that transmit signals (meaning information) from one neuron to the next through contact points called *synapses*.” (García-Allen, n.d.).

“**Neurotransmitters** are chemical messengers that carry messages between neurons and cells.” (Dacer, 2000).

4. You can search for an image of neurotransmitters to support the definition provided.
5. Ask students if they know the importance of neurotransmitters. After providing a few minutes for discussion, proceed to mention some important aspects of neurotransmitters, such as:



- They control much of our state of mind
    - concentration
    - sleep quality
    - rest
    - memory
    - learning
    - response to stressful situations
  - They help with creativity and the generation of new ideas
  - They regulate our behavior
  - They regulate appetite
- 6.** Mention to the students that we have several neurotransmitters, but that some of them are the main ones.
  - 7.** Provide the worksheet titled: *Neurotransmitters*.
  - 8.** Ask different students to collaborate in reading each neurotransmitter. After reading each name, ask if they have heard of it before.
  - 9.** Divide students into subgroups, so that each group is assigned a neurotransmitter.
  - 10.** Once divided into subgroups, assign the neurotransmitter that they will be presenting.
  - 11.** Give each group the box with the information related to the assigned neurotransmitter.
  - 12.** Ask the subgroups to present their neurotransmitter to the rest of their peers in some creative way. These can be, but are not limited to, a poster, a song, a poem, dramatization, sales presentation, riddles, etc.
  - 13.** Give them a specific period of time to work on the assignment. Keep in mind that they will have to present it to the rest of the group.
  - 14.** If needed, you may assign more than one neurotransmitter per group if you do not have the number of subgroups for all neurotransmitters.
  - 15.** Ask the rest of the students to listen carefully to the presentations and once they have finished, to write down the information corresponding to the neurotransmitter in the box identified with the name of the neurotransmitter.



## **Section II: Substance Use Disorders**

# Module 4: What is a Substance Use Disorder?

## Objectives:

### The students will:

1. Learn the definition of the term addiction
2. Be able to identify the most common types of addictions
3. Learn about the process that leads to the development of an addiction

### Materials:

1. Handout: *The cycle of addictions*
2. Pencil
3. Notebook or paper for making notes
4. Computer and projector (suggested)

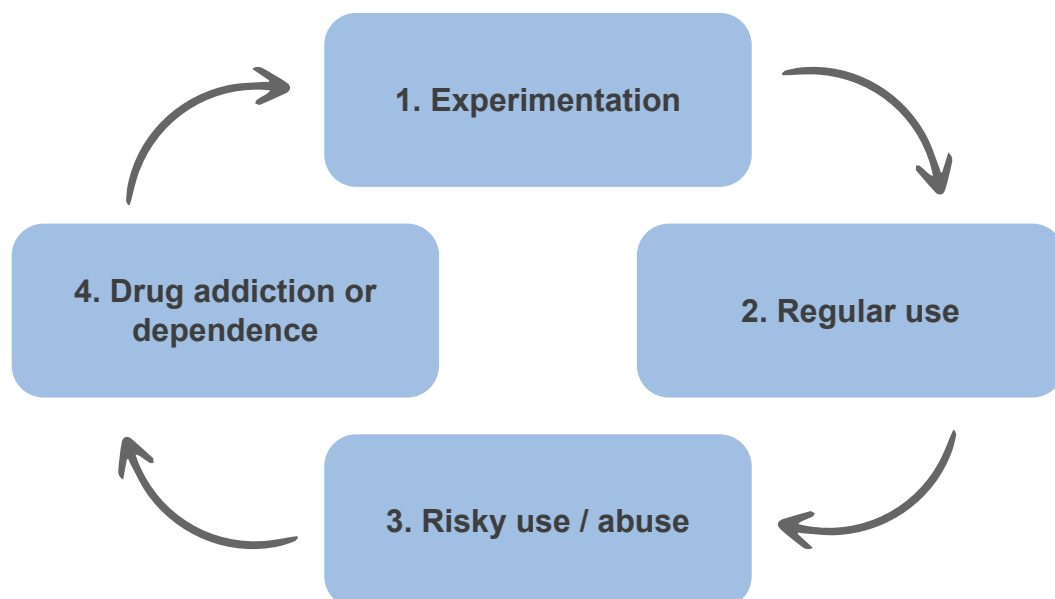
### Instructions:

1. Begin by exploring students' knowledge of what an addiction is. The following alternatives are suggested:
  - A. Brainstorming: Have students say aloud a word they associate with the word addiction. Write them down on a large piece of paper or on the board, if one is available.
  - B. Brainstorming: Write the word addiction inside an oval on the board or on a large sheet of paper.



- C. Ask students what comes to their minds when they see that word?
  - D. Write down the answers around the oval. Mark with an asterisk (\*) those that repeat or are similar to the ones already written down.
2. Read the answers provided.

3. Proceed to formally define what is the meaning of an addiction.
  - A. A state of dependence produced either by the habitual taking of drugs or by regularly engaging in certain behaviors (Oxford Dictionary).
  - B. Addiction is defined as a chronic, relapsing disorder characterized by compulsive drug seeking and use despite adverse consequences.† It is considered a brain disorder, because it involves functional changes to brain circuits involved in reward, stress, and self-control (*National Institute in Drug Abuse – NIDA*).
  - C. An inability to stop doing or using something, especially something harmful (Cambridge Dictionary).
4. Ask students:
  - A. How can we create/develop an addiction?
  - B. What things could lead to addictions?
5. Validate student responses.
6. Share with students that one of the addictions they will be discussing at this point is substance addiction, which is known as a substance use disorder.
7. Explain that a substance use disorder refers to:
  - A. Addiction is defined as a chronic, relapsing disorder characterized by compulsive drug seeking, continued use despite harmful consequences and long-lasting changes in the brain (*National Institute in Drug Abuse – NIDA*).
  - B. Mention that it also integrates the different types and forms of marijuana use (street marijuana, synthetic marijuana and non-prescription medical marijuana that can be used in the form of oil, gummies, evaporated, smoked, etc.).
8. Project, provide copies to students/adolescents, or draw the following diagram. In the meantime, mention that substance addiction occurs in four stages.





9. Proceed to explain the characteristics of each stage. It is suggested to ask students what they think happens at each stage before providing specific details.

**Table 2: Stages in the substance/drug addiction process**

Stages	Characteristics
<p><b>1. Experimentation</b></p>	<ul style="list-style-type: none"> <li>• Experimentation is defined as the voluntary use of drugs without experiencing any negative social or legal consequences.</li> <li>• Experimenting may occur once or several times.</li> <li>• They can be used for fun or to help cope with a situation or problem.</li> <li>• It can have two possible outcomes:               <ul style="list-style-type: none"> <li>◦ It is consumed only once and no more since there is no desire to continue using it.</li> <li>◦ It becomes the beginning of a serious problem that leads them to the second stage.</li> </ul> </li> </ul>
<p><b>2. Regular use</b></p>	<ul style="list-style-type: none"> <li>• It is possible to enter this stage without having developed an addiction as such.</li> <li>• People at this stage are able to stop substance use on their own.</li> <li>• The concern is the risk of increased use/abuse of the substance.</li> <li>• There is also a common risk of exhibiting problematic behaviors while under the influence of substances, such as erratic driving, violent responses/acts, and symptoms of depression and/or anxiety.</li> </ul>
<p><b>3. Risky use / Abuse</b></p>	<ul style="list-style-type: none"> <li>• The line between stage 2 and stage 3 is a very thin one.</li> <li>• This stage is characterized by the continuity of substance use despite having already presented problems and/or social and/or legal consequences.</li> <li>• The warning signs of addiction tend to appear at this stage: cravings, preoccupation related to the substance of use/abuse, symptoms of depression, irritability, and fatigue (sometimes when there is no access to the substance).</li> </ul>

Stages	Characteristics
<p><b>4. Drug Addiction and Dependency</b></p>	<ul style="list-style-type: none"> <li>• Physical dependence on the substance becomes evident.</li> <li>• Characteristics of addiction become clearer: withdrawal symptoms, compulsive use of the substance despite having had negative consequences in several life areas, being at risk of losing significant relationships, money and/or employment, among others.</li> </ul>

Adapted from: <https://casapalmera.com/blog/the-four-stages-of-drug-addiction/>

10. Provide the students with an opportunity to express what they think and/or feel.
11. Ask guided questions to confirm learning.
12. Please note that this module may be a bit long and could result in a lengthy discussion. We suggest dividing it into two parts if necessary.



# Module 5: Marijuana: Myths and Realities

## The students will:

## Objectives:

1. Learn the facts about marijuana
2. Learn the difference between myth and reality
3. Be able to express arguments for and against a variety of issues
4. Understand the importance of having evidence-based perspectives
5. Succeed in using their critical thinking skills to establish their own views

## Materials:

1. Handout: *Myths and Realities* (Table)
2. Handout: *Myths and Realities* (Examples to cut out)
3. Pencil
4. Scissors
5. Glue

## Instructions:

1. Begin by communicating to students that one of the objectives of this module is to learn facts about marijuana.
2. Explore with students what they know about marijuana.
3. Define the concept of marijuana. The following information from the National Institute of Health is suggested (NIH):
  - A. Marijuana refers to the dried leaves, flowers, stems and seeds of the *Cannabis sativa* or *Cannabis indica* plant. The terms "cannabis" and "marijuana" are often used interchangeably. Extracts from the plant can be processed as wax or into hashish oil. Cannabis products contain the mind-altering chemical delta-9-tetrahydrocannabinol (THC). They may also contain more than four hundred other chemicals.

- B.** Marijuana, also called weed, herb, pot, grass, bud, ganja, Mary Jane and a host of other street terms, is a gray-greenish mixture of dried and crushed leaves and flowers of cannabis sativa, the hemp plant. Marijuana can also be used to brew tea and, especially when sold or consumed for medicinal purposes, is often mixed into (edible) foods such as brownies, cookies, or candy.
  - C.** The most potent forms of marijuana include sinsemilla (from special attention female plants) and concentrated resins containing high doses of marijuana's active ingredients, such as honey-like hash oil, soft, waxy budder and firm, amber-like shatter. These resins are becoming increasingly popular with recreational and medical users.
  - D.** The main psychoactive (meaning, mind-altering) substance in marijuana, which is responsible for most of the intoxicating effects people seek, is delta-9-tetrahydrocannabinol (THC). This substance is found in the resin produced by the leaves and buds, mainly of the female cannabis plant. The plant also contains more than 500 other chemicals, including more than 100 compounds that are chemically related to THC and are known as cannabinoids.
  - E.** Mention that the different types and forms of marijuana use (street marijuana, synthetic marijuana, non-prescription medical marijuana used in oil, gummies, evaporated, smoked, etc.) are also included.
- 4.** Mention that another objective of this module is to differentiate between myths and realities.
  - 5.** Ask students/adolescents, what is a myth?
  - 6.** Write down the key words on the board or on a large sheet of paper.
  - 7.** Ask students/adolescents: what is reality?
  - 8.** Write down the key words on the board or on a large sheet of paper.
  - 9.** Ask students: So how can we tell the difference between myth or reality?
  - 10.** Validate the answers provided.
  - 11.** Define the terms:
    - A.** Myth: a story from ancient times, especially one that was told to explain natural events or to describe the early history of a people; something that many people believe but that does not exist or is false. (Oxford Dictionary).
    - B.** Reality: the true situation and the problems that actually exist in life, in contrast to how you would like life to be; a thing that is actually experienced or seen, in contrast to what people might imagine. (Oxford Dictionary). \*(You may use another definition or definitions if you consider it more appropriate.) \*

- 12.** Emphasize that reality is something true, that exists and can be verified, while myths are imaginary and alter the truth.
- 13.** Give students the handout: Myths and Realities (examples to cut out).
- 14.** Tell students that on the handout they will find several expressions associated with the use of marijuana.
- 15.** Ask a few students to read one at a time aloud.
- 16.** Give students the handout: Myths and Realities (Table).
- 17.** Provide instructions as written on the handout.
- 18.** Make materials available, if necessary.
- 19.** Provide a time limit for completing the task. Suggested time is 15 minutes.
- 20.** Once that time has elapsed, discuss the answers.
- 21.** This can be done in several ways:
  - A.** Reading one of the options and asking students whether it is myth or reality.
  - B.** Asking a student which one they placed first in the myth column.
  - C.** Asking a student which one they placed first in the reality column.
- 22.** It is suggested to confirm the answers as correct or incorrect, explaining the reasons.
- 23.** Conclude the module by asking students the importance of corroborating repeated information.
- 24.** Mention that it is important to know the facts about an issue before stating the information as true.
- 25.** State that everyone is entitled to their own views but that the responsible way to do so is to corroborate information from professional or valid sources.

# Module 6: The Effects of Marijuana Use on the Brain

## Objectives:

### The students will:

1. Review the concept of cause and effect
2. Learn validated information about how marijuana use affects the brain
3. Be able to offer their opinions about the information shared

### Materials:

1. Worksheet: *Cause and Effect*
2. Pencil
3. Colored pencils, markers, crayons

### Instructions:

1. Begin by reviewing with students/adolescents the concept of the cause-and-effect relationship.
2. Divide the students/adolescents into subgroups. It is suggested that there be 3 to 4 students/adolescents per group, depending on the group size.
3. Hand out the worksheet *Cause and Effect* to each subgroup.
4. Discuss the instructions at the top of the worksheet.
5. Provide time for the students/adolescents to mention and discuss examples of cause and effect.
6. Review with students/adolescents the importance of the brain and what was previously learned.
7. Discuss some of the ways in which marijuana use can affect the brain.
8. It is suggested to present them in strips, cardboard or projected.
  - A. Marijuana affects brain development.
  - B. During pregnancy, use may be linked to problems with attention, memory, problem solving and behavior in offspring.

- C.** It can directly affect brain function, particularly the parts of the brain responsible for memory, learning, attention, decision-making, coordination, emotions, and reaction time.
  - D.** The impact of marijuana use on the brain depends on many factors, such as:
    - i.** Amount of tetrahydrocannabinol (THC) in marijuana (in other words, its concentration or potency)
    - ii.** Frequency of consumption
    - iii.** The age of first use and whether other substances (e.g., tobacco and alcohol) were used at the same time
- 9.** After presenting each of these, allow students space to express their opinions and/or ask questions.

# Module 7: How Can Marijuana Use Affect Adolescents?

## Objectives:

### The students will:

1. Learn about the effect of marijuana use in adolescents
2. Share impressions about the information they have learned
3. Present the information in a summarized manner to the rest of the group

### Materials:

1. Pencil
2. Worksheet: *How does marijuana use affect adolescents?*
3. Blank paper

### Instructions:

1. Begin by reviewing the previous module.
2. Mention that this module is aimed at learning how marijuana use affects adolescents.
3. Divide the group into 3 subgroups.
4. Explain that each subgroup will be given a card with information about how marijuana use affects adolescents (see worksheet).
5. Each subgroup will read the assigned information, discuss it, summarize the most important points, and then present them to the rest of the group.
6. Provide time for the rest of the group to provide feedback on the information.



# Section III: Managing the Effects of Marijuana Use





# Module 8: Managing the Effects of Marijuana Use on My Body

## Objectives:

### The students will:

1. Learn about some of the effects of the use of marijuana on the body
2. Debate about important facts related to the use of marijuana and its effects on the body

### Materials:

1. Worksheet: *The use of marijuana and its effects on the body*
2. Pencil

### Instructions:

1. Mention the objectives of this module.
2. Divide students into subgroups, as evenly as possible.
3. Distribute the worksheet *Marijuana use and its effects on the body*.
4. Read the instructions aloud.
5. Provide time to clarify doubts or questions.
6. Allow 15 to 20 minutes for subgroups to complete the assignment.
7. Once the time has elapsed, ask students to focus on the group discussion.
8. Assign each group to read and respond to each statement. Allow each group to explain the reasons for their answers.
9. Clarify any doubts or questions that come up.
10. It is suggested to use information from the *National Institute on Drug Abuse* as a reference source.

Marijuana can make the heart to beat faster and can make blood pressure higher immediately after use. It could also lead to increased risk of stroke, heart disease, and other vascular diseases. Most of the scientific studies linking marijuana to heart attacks and strokes are based on reports from people who smoked marijuana (as opposed to other methods of using it). Smoked marijuana delivers tetrahydrocannabinol (THC) and other cannabinoids to the body. Marijuana smoke also delivers many of the same substances researchers have found in tobacco smoke—these substances are harmful to the lungs and cardiovascular system.

It is hard to separate the effects of marijuana chemicals on the cardiovascular system from those caused by the irritants and other chemicals that are present in the smoke. More research is needed to understand the full impact of marijuana use on the cardiovascular system to determine if marijuana use leads to higher risk of death.

In many cases, marijuana is smoked in:

- Joints (hand-rolled cigarettes),
- Bongs (pipes or water pipes),
- Bowls, or
- Blunts (cigars or cigar wrappers that have been partly or completely refilled with marijuana).

Smoked marijuana, regardless of how it is smoked, can harm lung tissues and cause scarring and damage to small blood vessels.

Smoke from marijuana has many of the same toxins, irritants, and carcinogens (cancer-causing chemicals) as tobacco smoke. Smoking marijuana can also lead to a greater risk of bronchitis, cough, and mucus production, though these symptoms generally improve when marijuana smokers quit.

More research is needed to understand the specific effects marijuana smoking may have on lung cancer and other respiratory diseases like emphysema (lung condition that causes shortness of breath) and chronic obstructive pulmonary disease.

Even though pain management is one of the most common reasons people report for using medical marijuana in the United States, there is limited evidence that marijuana works to treat most types of acute or chronic pain.

A few studies have found that marijuana can be helpful in treating neuropathic pain (a specific type of chronic pain caused by damaged nerves). However, more research is needed to know whether marijuana works better than other options to manage pain.

Edibles, or food and drink products infused with marijuana, have some different risks than smoked marijuana, including a greater risk of poisoning. Unlike smoked marijuana, edibles can:

- Take from 30 minutes to 2 hours to take effect, so some people may eat too much, which can lead to poisoning and/or serious injury.
- Cause intoxicating effects that last longer than expected, depending on the amount ingested, the last food eaten, and medications or alcohol used at the same time.

- Be unpredictable. The amount of tetrahydrocannabinol (THC), or the concentration or strength, is very difficult to measure and is often unknown in edible products. Many people who use edibles can be caught off-guard by their strength and long-lasting effects.

Children, adults, and pets can mistake marijuana products, particularly edibles, for regular food or candy. Consuming marijuana can make children very sick. They may have problems walking or sitting up or may have a hard time breathing. Since marijuana use has been legalized in some states, accidental marijuana poisonings in children have increased, sometimes requiring visits to the emergency room or hospitalization.

The known risks of secondhand exposure to tobacco smoke—including risks to the heart and lungs—raise questions about whether secondhand exposure to marijuana smoke causes similar health risks. Secondhand marijuana smoke contains many of the same toxic and cancer-causing chemicals found in tobacco smoke and contains some of those chemicals in higher amounts.

Secondhand marijuana smoke also contains tetrahydrocannabinol (THC), the compound responsible for most of marijuana's psychoactive effects (or the "high"). THC can be passed to infants and children through secondhand smoke, and people exposed to secondhand marijuana smoke can experience psychoactive effects, such as feeling high. Recent studies have found strong associations between reports of having someone in the home who uses marijuana (e.g., a parent, relative, or caretaker) and the child having detectable levels of THC. Children exposed to THC are potentially at risk for negative health effects. More research is needed to understand how secondhand marijuana exposure may affect children. Other research shows that marijuana use during adolescence can impact the developing teenage brain and cause problems with attention, motivation, and memory.

# Module 9: Managing the Effects of Marijuana Use on My Behaviors

## Objectives:

### The students will:

1. Learn what mental health is and the importance of maintaining it
2. Be able to understand the effects of marijuana use on mental health
3. Learn the most common diagnoses associated with marijuana use

### Materials:

1. Handout: *The importance of mental health*
2. Pencil

### Instructions:

1. Allow students to choose a working partner.
2. Distribute among students the handout: The importance of mental health.
3. Provide a space for working pairs to perform the task.
4. Once the time has elapsed, discuss the questions aloud.
  - A. What is mental health?
  - B. What have you heard about it?
  - C. How do they know their mental state of health?
  - D. Who works in mental health?
5. Provide students with information about mental health. It is suggested that the following reference from the World Health Organization be used:
  - A. Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.
  - B. Mental health includes a person's emotional, psychological, and social well-being. It also determines how a human being handles stress, relates to others, and makes decisions.

6. Ask students about the importance of taking care of/maintaining good mental health.
7. Allow a few minutes for an oral discussion.
8. Mention that marijuana use can affect mental health.
9. Add that they may cause a person to develop a mental health disorder.
10. Define what a mental health disorder is. It is suggested to use the following information:
  - A. Mental health disorders alter a person's way of thinking, behavior, and mood.
  - B. Mental illnesses or disorders represent the highest percentage of health problems in the United States.
  - C. The best-known disorders are depression, schizophrenia, and bipolar disorder.
11. Share the following information. You can distribute it among the students so that they can collaborate in the oral reading.
  - A. Marijuana use has also been linked to depression; social anxiety; and thoughts of suicide, suicide attempts, and suicide.
  - B. People who use marijuana are more likely to develop temporary psychosis (not knowing what is real, hallucinations, and paranoia) and long-lasting mental disorders, including schizophrenia (a type of mental illness where people might see or hear things that are not really there). The association between marijuana and schizophrenia is stronger in people who start using marijuana at an earlier age and use marijuana more frequently.



# **Module 10: The Effect of Marijuana on the Brain: Sharing What We Have Learned (Closing Module)**

## **Objectives:**

### **The students will:**

1. Create promotional material for other adolescents
2. Incorporate what they have learned through the modules
3. Present their promotional material to their peers
4. Display their promotional material in their schools and/or study centers

### **Materials:**

1. Construction paper, white paper and/or poster paper
2. Pencil
3. Colored pencils, markers, crayons
4. Scissors
5. Glue
6. Other decorative materials

### **Instructions:**

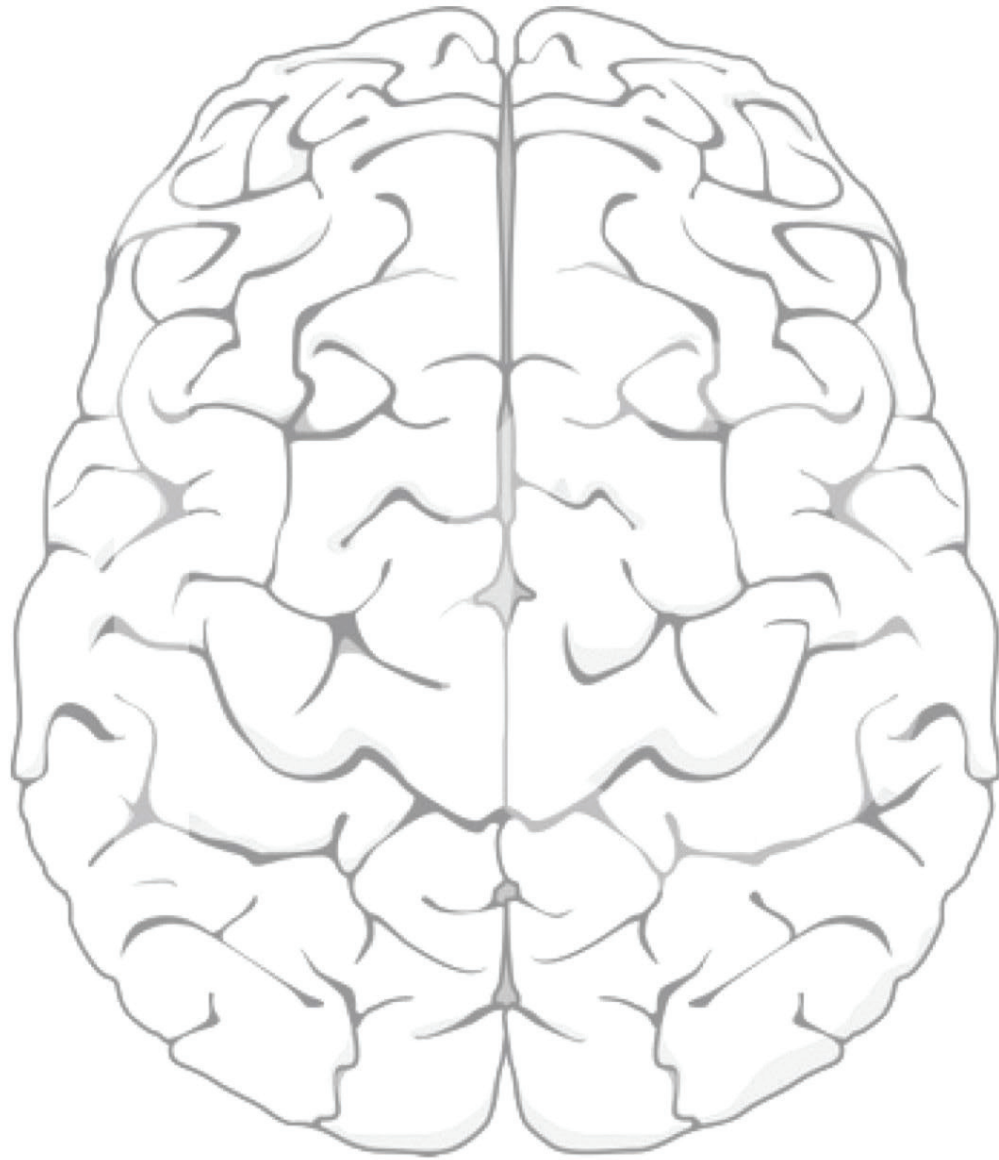
1. Review with students the previously discussed topics.
2. Ask students to mention the most significant aspects of each topic discussed. It is suggested to select one or two per topic).
3. Request students to share ideas of how they could share what they have learned with other adolescents.
4. Select from the options presented by the students and explain those that are feasible to carry out in the period of time they have available.
5. Divide students into subgroups. You can use random means such as assigning a number from 1 to 4 to each student. Then, everyone with 1 becomes a subgroup, everyone with 2 becomes another subgroup, and so forth.
6. You can also create subgroups according to the promotional material you want to create.
7. Provide a time limit for the creation of the final product.

8. This module can be divided into two parts (two separate sessions) to give you additional time if you do not have enough time in one day.
9. Once the allotted time has elapsed, ask students to present the final products.
10. Identify options for using the products.

## Section IV: Worksheets



**Worksheet: The Brain**



## Worksheet: Neurotransmitters

Acetylcholine

Dopamine

Noradrenaline

Serotonin

Adrenaline

GABA



## Reference Sheet: The Most Common Neurotransmitters

### **Acetylcholine**

- Ability to retain, store and retrieve information.
- Memory problems and even, in extreme cases, senile dementia.

### **Dopamine**

- Pleasure seeking and emotions as well as alertness.
- Demotivation and depression.

### **Noradrenaline**

- Attention, learning, sociability, sensitivity to emotional cues and sexual desire.
- Demotivation, depression, loss of libido, and withdrawal into oneself.

### **Serotonin**

- Blood clotting, sleep onset and sensitivity to migraines.

### **GABA**

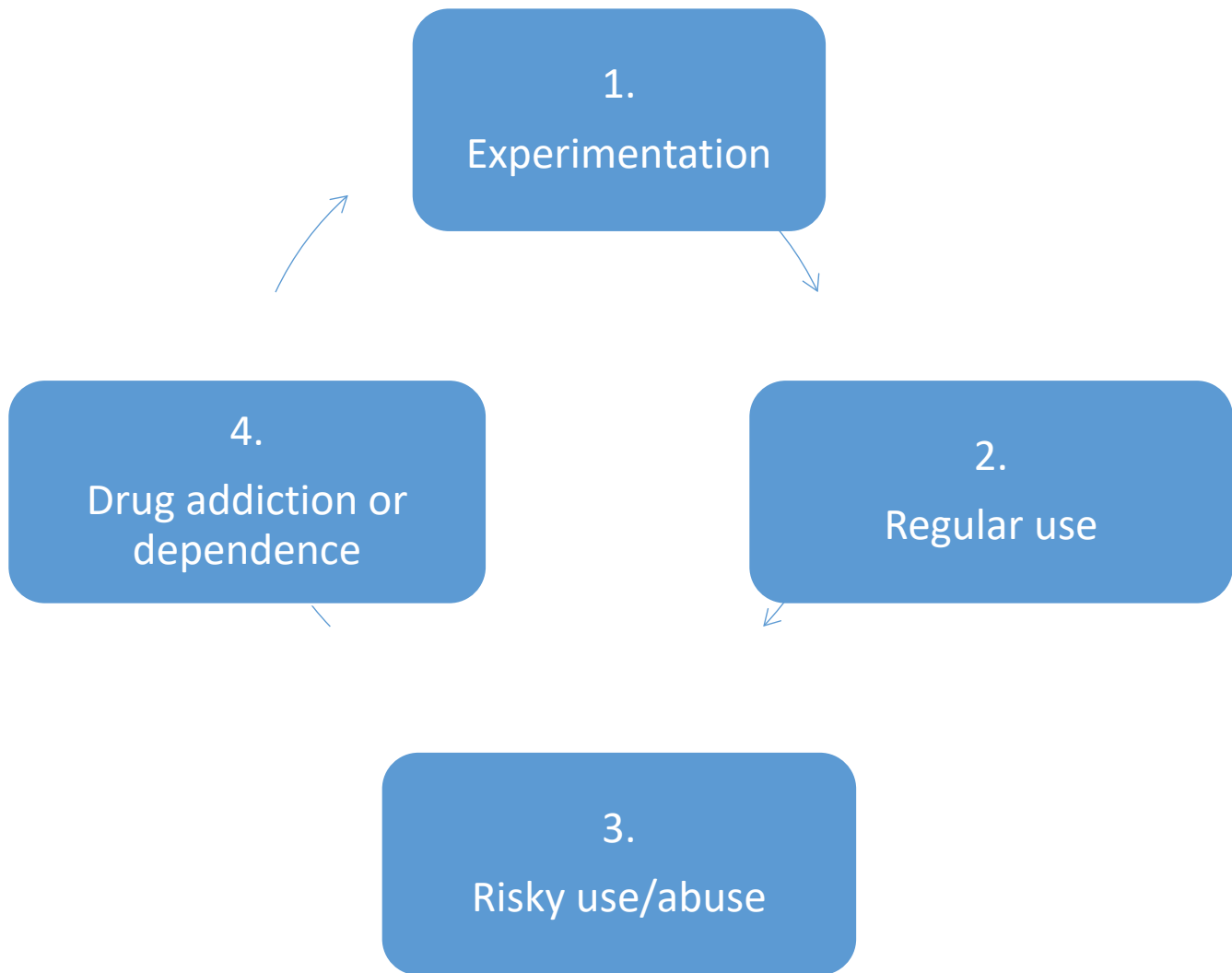
- Slows down the transmission of nerve signals [helps to keep systems under control].
- Difficulty falling asleep and anxiety.

### **Adrenaline**

- Allows reaction to stressful situations.
- Fatigue, lack of attention, insomnia, anxiety and depression.

Translation of <https://es.slideshare.net/Lupiick/fisiologa-neurologa-neurotransmisores>

Handout: The Cycle of Addictions



**Handout: Myths and Realities (Table)**

**Instructions:** Below, you will find a table with two columns. The first column is identified as **MYTH**. The second column is labeled **REALITY**. On the handout titled **Myths and Realities (Examples to cut out)** you will find several strips inside rectangles with broken lines. Each stripe contains one piece of information. You must determine whether the information provided in the strip is a myth or a fact. Cut out each strip and place it in the corresponding column of the table.

<b>MYTH</b>	<b>REALITY</b>

## **Handout: Myths and Realities (Examples to cut out)**

Many things are natural, but they are still poisonous.

If I get caught with marijuana, I won't get in any trouble.

Many studies show that marijuana use can have lasting effects on the developing adolescent brain, especially when used at an early age.

Marijuana is not addictive.

Marijuana helps young people relax when they are stressed or anxious.

Adolescent marijuana use has been linked to mental health problems in adolescents, such as depression and increased suicidal ideation.

Driving under the influence of marijuana is dangerous. The skills necessary for driving, such as reaction time, motor coordination, concentration, judgment, and alertness, are impaired by marijuana use.

Marijuana use does not affect driving a vehicle. Some adolescents report that they drive better when they use it.

Marijuana is natural so it is not harmful.

The active ingredient THC (delta-9-tetrahydrocannabinol) stimulates brain cells to release dopamine. Dopamine gives a "feeling of pleasure" or "high." This is one of the reasons why adolescents use it over and over again, which can lead to addiction.

Possession of Drugs by Minors is a misdemeanor offense that can result in imprisonment and significant financial penalties. In some states, the amount of cannabis you are caught with can result in a distribution charge that carries penalties of up to 5 years in prison. Learn about the penalties in your country.

**Handout: Myths and Realities (Table) \*\*Answer keys\*\***

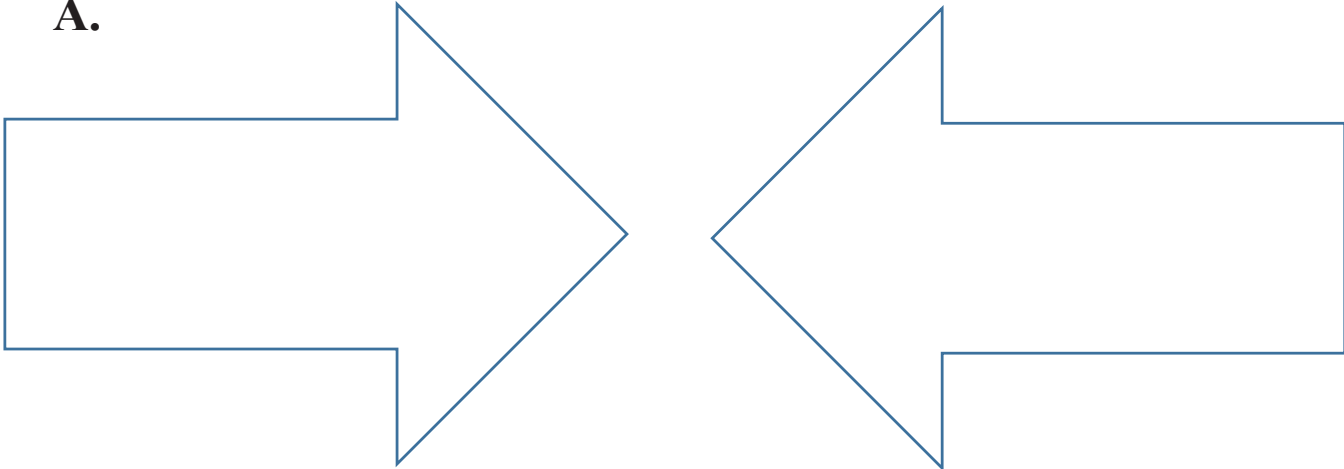
**Instructions:** Below, you will find a table with two columns. The first column is identified as **MYTH**. The second column is labeled **REALITY**. On the handout titled **Myths and Realities (Examples to cut out)** you will find several strips inside rectangles with broken lines. Each stripe contains one piece of information. You must determine whether the information provided in the strip is a myth or a fact. Cut out each strip and place it in the corresponding column of the table.

MYTH	REALITY
<p data-bbox="175 559 730 654">Marijuana is natural so it is not harmful.</p> <p data-bbox="175 681 730 760">Marijuana is not addictive.</p> <p data-bbox="175 809 730 953">Marijuana use does not affect driving a vehicle. Some adolescents report that they drive better when they use it.</p> <p data-bbox="175 1041 730 1156">Marijuana helps young people relax when they are stressed or anxious.</p> <p data-bbox="175 1223 730 1367">If I get caught with marijuana, I won't get in any trouble.</p>	<p data-bbox="852 559 1512 654">Many things are natural, but they are still poisonous.</p> <p data-bbox="852 670 1572 836">Many studies show that marijuana use can have lasting effects on the developing adolescent brain, especially when used at an early age.</p> <p data-bbox="852 864 1572 1057">The active ingredient THC (delta-9-tetrahydrocannabinol) stimulates brain cells to release dopamine. Dopamine gives a "feeling of pleasure" or "high." This is one of the reasons why adolescents use it over and over again, which can lead to addiction.</p> <p data-bbox="852 1086 1564 1278">Driving under the influence of marijuana is dangerous. The skills necessary for driving, such as reaction time, motor coordination, concentration, judgment, and alertness, are impaired by marijuana use.</p> <p data-bbox="852 1307 1555 1473">Adolescent marijuana use has been linked to mental health problems in adolescents, such as depression and increased suicidal ideation.</p> <p data-bbox="852 1528 1572 1827">Possession of Drugs by Minors is a misdemeanor offense that can result in imprisonment and significant financial penalties. In some states, the amount of cannabis you are caught with can result in a distribution charge that carries penalties of up to 5 years in prison. Learn about the penalties in your country.</p>

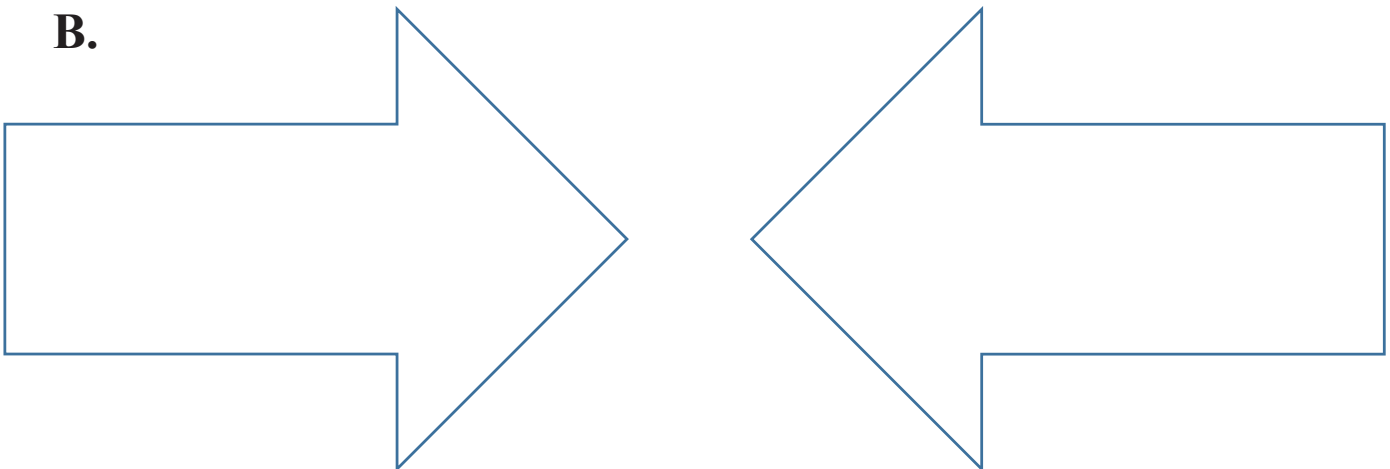
**Worksheet: Cause and Effect**

**Instructions:** Below, you will find a diagram divided into two parts (A and B). For each of the two parts, provide an example of a cause-effect relationship. Spend a few minutes discussing as a subgroup some cause-effect examples. You should provide each cause in written form. In addition, you should illustrate and color each example.

**A.**



**B.**





Worksheet: How does Marijuana Use Affect Adolescents

Marijuana use before the age of 18 can affect the way the brain creates connections for functions such as attention, memory, and learning.

The effects of marijuana on attention, memory, and learning can last a long time or even be permanent. Young people who use marijuana may have lower performance in school and difficulty remembering things. When compared to adolescents who do not use marijuana, those who use marijuana are more likely to drop out of high school or may not get a college degree.

Like other drugs of abuse, marijuana use interferes with judgment, which can lead to dangerous behaviors. For example, someone who has used marijuana may drive a car while under the influence of the drug or travel with someone who has used the drug and get into an accident or may engage in risky sexual behavior and contract a sexually transmitted infection.

**Worksheet: The Use of Marijuana and its Effects on the Body**

**Instructions:** Below, you will find several statements. Read them. Discuss them with your classmates. Then, determine whether the statement is true or false. Write the letter C on the line provided for those statements that are true. Write an F on the line provided for those statements that are false. For those statements that you identify as false, provide an explanation.

\_\_\_\_\_ 1. Secondhand marijuana smoke can cause psychoactive effects, such as euphoria.  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_ 2. Research shows the effectiveness of marijuana for the treatment of pain.  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_ 3. Edibles, or food products infused with marijuana, are safe.  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_ 4. Children, adults, and pets may mistake marijuana products, particularly edibles, for regular food or candy.  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_ 5. Secondhand marijuana smoke contains many of the same chemicals and cancer-causing substances found in tobacco smoke.  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_ 6. The effects of edibles (gummies, popsicles, brownies, etc.) are rapid and do not cause serious effects.  
\_\_\_\_\_  
\_\_\_\_\_

**Worksheet: The Use of Marijuana and Its Effect on the Body (Answer keys)**

**Instructions:** Below, you will find several statements. Read them. Discuss them with your classmates. Then, determine whether the statement is true or false. Write the letter C on the line provided for those statements that are true. Write an F on the line provided for those statements that are false. For those statements that you identify as false, provide an explanation.

\_\_\_\_\_ 1. Secondhand marijuana smoke can cause psychoactive effects, such as euphoria. **True.**

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\_\_\_\_\_ 2. Research shows the effectiveness of marijuana for the treatment of pain. **False. More evidence is needed to corroborate/confirm this information.**

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\_\_\_\_\_ 3. Edibles, or food products infused with marijuana, are safe. **False. The risks may be different, but they can also be a risk.**

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\_\_\_\_\_ 4. Children, adults, and pets may mistake marijuana products, particularly edibles, for regular food or candy. **True.**

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\_\_\_\_\_ 5. Secondhand marijuana smoke contains many of the same chemicals and cancer-causing substances found in tobacco smoke. **True.**

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\_\_\_\_\_ 6. The effects of edibles (gummies, popsicles, brownies, etc.) are rapid and do not cause serious effects. **False. The effects can take between 30 minutes and 2 hours and can lead to intoxication or serious injury.**

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**Worksheet: The Importance of Mental Health**

**Instructions:** Working in pairs, discuss the questions below. Write the final answers in the spaces provided.

**What is mental health?**

**What have you heard about it?**

**How do they know their mental state of health?**

**Who works in mental health?**



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