Neurobiology of Trauma and Sexual Assault

Adapted from OVC TTAC: Sexual Assault Advocate and Service Provider Training - Module 4: The Neurobiology of Trauma and Sexual Assault: Participant Manual

Purpose

This module introduces the basic elements of neurobiology and the parts of the brain affected by traumatic situations such as sexual assault. You will also learn about types of drastic survival reflexes and the relationship between sexual assault and memory.

Lessons

1. Brain Circuitry
2. Reactions in Traumatic Situations
3. Drastic Survival Reflexes During Sexual Assault
4. Roles of Brain Circuitries in Trauma, Memory, and Healing

Learning Objectives

By the end of this module, you will be able to:

- Describe the components of the brain related to trauma.
- Explain common ways the brain is affected during and after sexual assault.
- Recognize common ways a traumatic experience may affect a victim's behavior.
- Assist victims in understanding the neurobiology of trauma when appropriate.

Participant Worksheets

- Worksheet 4.1, Response Scenarios Case Studies
- Worksheet 4.2, How Would You Respond?

1. Brain Circuitry

Effects of Trauma on the Brain

Sexual violence, such as sexual assault, is almost always traumatic for victims. The effects of trauma on the brain can be devastating. Most of us do not really understand what happens in the brain when an individual is the victim of trauma, such as sexual assault.

This module will present an overview of what happens in the brain in a trauma situation. The brain is a truly complex organ, far too complex to cover in detail in this training. You will not need to memorize brain structures or processes. You will be introduced to some basic information about brain circuitries and structures and how they come into play when a traumatic experience occurs.

Disclaimer

Some mental health professionals, agencies, or entities may or may not agree with models of the neurobiology of trauma as scientific knowledge, models, and theories are rarely accepted unanimously.

Module Overview

This module will cover several areas of the brain and its circuitry to give you an overview of neurobiology and trauma. As an advocate or victim service provider, you should understand some of the basics of how trauma can affect the emotions and behavior of victims of crime. In particular, we will discuss:

- The brain and its basic functions, as related to the neurobiology of trauma.
- The prefrontal cortex of the brain—a significant brain region we will keep revisiting.
- Key circuitries in the brain affected by trauma.
- Emotional and brain responses when confronted with a traumatic situation.
- Traumatic events and memory.
- How advocates and victim service providers can use their knowledge of neurobiology to improve their assistance to crime victims.

The Brain's Basic Functions

The brain stem controls basic life functions (e.g., breathing, maintaining heart rate) and secretes adrenalin/epinephrine.

The Limbic System

The limbic system is a complex set of structures laying on both sides of the thalamus, just under the cerebrum, which includes the hypothalamus, hippocampus, amygdala, and several other nearby areas. It appears to be primarily responsible for our behavioral and emotional responses and has a lot to do with forming long-term memories.

- For our purposes today, the key structure is the amygdala, which controls memory, emotion, and fear (amygdala—pronounced uh-MIG-dah-luh).

The Cerebellum and Cerebrum

The cerebellum is associated with the regulation and coordination of movement, posture, and balance, while the cerebrum is associated with:

- Reasoning, planning, parts of speech, movement, emotions, and problem-solving (frontal lobe).
- Movement, orientation, recognition, and perception of stimuli (parietal lobe).
- Visual processing (occipital lobe).

The Prefrontal Cortex

The prefrontal cortex is one of the most richly connected regions of the cerebrum. The area on the visual covered by the yellow oval is called the prefrontal cortex. This part of our brain allows us to control, or at least guide, what happens in evolutionarily older brain regions, particularly the parts of the brain responsible for emotions, fear, and stress.

The prefrontal cortex is the part of the brain that makes us human.

The prefrontal cortex helps us hold thoughts and memories. It also helps us manage our emotions, reflect on our behavior, and carry out many important functions in situations that are not traumatic or extremely stressful.

It permits higher functioning and allows us to control—or at least manage—what happens in other brain regions, such as the limbic system, associated with forming memories.

The prefrontal cortex can, directly and indirectly, influence the amygdala, hypothalamus, and other brain regions involved in emotions, stress reactions, and reflexive and impulsive behaviors.

Under normal conditions, the prefrontal cortex allows us to focus our attention where we choose and do what we choose—consistent with our goals and values—and to do so deliberately.

It allows us to do things of which we can be mostly conscious, like reflecting on our emotional reactions or deliberately directing our attention inward and outward.

Yet, the prefrontal cortex can become impaired or even shut down in traumatic situations like sexual assault.

We can say the prefrontal cortex is the center of executive functioning in the brain. Executive function describes the activity of a system that manages other cognitive systems in much the way an executive of a company would. In this sense, the prefrontal cortex is involved in managing complex processes like reason, logic, problem-solving, planning, and memory.

The prefrontal cortex contributes more than any other part of the brain to make us who we are as individuals. If you took away our prefrontal cortex, we would be ruled by our desires and impulses, lacking the ability to plan or think about the consequences of our actions.

Fear Circuitry

The brain is made up of many circuitries—connected brain areas that work together to perform specific tasks. Some areas may be far from each other in the brain, but they are connected by fibers that send information in one or both directions.

Scientists know much about brain regions and how they interact with each other, both to produce fear and regulate it. The amygdala is an essential part of the brain and the fear circuitry. We will talk more about the amygdala later.

- The fear circuitry plays a huge role in trauma and posttraumatic stress, as in the case of most victims of sexual assault.
- Fear is in multiple brain areas, not just one brain area.
- The circuitry of fear operates automatically and mainly outside of awareness. Our brains can detect a reminder of trauma and generate an emotional response and fear behaviors before we know what has happened—and sometimes without us knowing a trauma reminder elicited our response. For example, the perpetrator of a sexual assault may have worn a yellow sweater during the attack, creating fear in the victim whenever they see anyone wearing a yellow sweater. The victim may not even know what caused the fear.

Other Circuitries

Other brain circuitries are important, too.

Seeking Circuitry: Whenever there is something we fear and want to avoid, we also seek escape. Often, it is a quick fix that does not really solve the problem.

Therefore, you may have encountered victims of sexual assault who have substance use problems. Addictions are very common in traumatized people. When we sense fear, anxiety, sadness, or any unwanted experiences, we want to avoid whatever is threatening. Our brains seek to escape. Seeking, in this sense, does not necessarily refer to craving or attachment, just escape. As with fear circuitry, elements of seeking circuitry are not located in just one brain area. Again, scientists know much about the brain regions involved and how they interact with each other to produce seeking and regulate it.

The circuitry of seeking operates automatically and primarily outside of awareness. Our brains can respond to an unwanted feeling or experience and generate seeking behaviors, including addictive ones, sometimes without us realizing we developed an addictive habit.

Satisfaction Circuitry: Another circuitry relates to satisfaction. It overlaps and interacts with the seeking circuitry. The satisfaction circuitry produces the feeling of satisfaction when we get what

we seek and is central to feeling soothed and safe in one's body, connected to other people, and accepting of difficult experiences (not resigned). It is difficult to study opioids in the brain, so the satisfaction circuitry is not understood as well as the seeking circuitry; however, its existence is well-established, and new research is ongoing. Again, this circuitry gives us the feeling of satisfaction that comes with getting what we seek—at least when it is satisfying. It is central to experiences of feeling safe and soothed in our bodies, which are essential for healing from trauma.

Embodiment Circuitry: The final circuitry we will discuss is called the embodiment circuitry. The more common term in neuroscience is "interoceptive," which, broadly defined, refers to the process of receiving, accessing, and appraising signals originating in our bodies and what it feels like to be in our bodies (Hopper, 2016). It includes an area called the insular cortex, or insula, which is beneath other cortical areas. This is an extremely important brain region.

The insular cortex gets sensory data from all body systems. If we direct our attention to the feeling of what is happening in our body, the insular cortex is the region which passes this information on to our prefrontal cortex, where we can notice, reflect upon, and come to understand and accept what is happening in our body.

Consequently, this circuitry is a key to healing from trauma, depression, addiction, and many other problems.

While you do not need to be an expert in neurobiology, you'll be better able to understand what a victim needs after a sexual assault if you understand the brain's circuitries related to seeking, satisfaction, and embodiment.

2. Reactions in Traumatic Situations

Traumatic Situations: Amygdala Control

The limbic system, which includes the amygdala, is one of the most important regions of the brain during a traumatic event.

Notice on the visual how the arrows from the amygdala to other brain regions are the largest. That means the amygdala has the most central and powerful role in coordinating the brain's responses during traumatic experiences.

We will talk more in a minute about how the amygdala determines what you pay attention to during a traumatic experience and how it triggers emotional reflexes and emotional habits in victims.

For now, the key points are scientists know a lot about how the amygdala controls the brain in traumatic situations, during traumatic experiences there is a loss of prefrontal cortex regulation, and most of the brain's reactions happen automatically and outside of our awareness.

In traumatic (and high-stress) situations…

…the fear circuitry (particularly the amygdala) causes several things to happen, including—

- Loss of Prefrontal Regulation. Chemicals from the brain stem impair (and may shut down) the prefrontal cortex, so information is not processed or not processed fully.
- Bottom-Up Attention. Attention is automatically captured by anything perceived as dangerous, threatening, or needed for survival.
- Emotional Reflexes. Reflexes are automatic and include freeze, tonic immobility, flight, fight, and dissociative responses, as well as bodily responses like your heart pounding quickly.

The Amygdala and Attention

Examine the visual.

It is the amygdala that automatically draws one's attention to the threat.

This is what happens during an assault. From the moment the fear kicks in, the fear circuitry, not the prefrontal cortex, is mostly or entirely determining where your attention goes.

Attention can latch onto things that, in the moment, the fear circuitry determined were critical to survival. For example, a victim might focus on a picture on the wall or a ceiling crack during an attack to escape the awful sensations.

Why was the victim focused on something inconsequential?

Later, looking back on the assault, the victim and others—including loved ones, investigators, prosecutors, judges, and juries—might not understand why the victim focused on something so mundane.

The point is we have no right to second-guess what the victim's fear circuitry focused attention on during the assault and, thus, what is encoded into memory.

This is how human brains are wired to respond to being attacked or assaulted, based on hundreds of millions of years of evolution in mammals and the species from which they evolved.

When we encounter a dangerous situation and the amygdala and fear circuitry trigger survival reflexes in the body, the following happens:

- Pupils dilate, let in more light, and sharpen vision.
- The heart beats faster and pumps more blood.
- Blood pressure increases.
- The breathing rate increases to supply the body with more oxygen.
- Increased blood flow is sent to muscles and away from internal organs.

All of this lets us do things we could not do under ordinary circumstances—so we can survive what we perceive as a life-threatening experience, such as encountering a predator.

The following are the characteristics and neurobehavioral basis of the defense cascade, "a continuum of innate, hard-wired, automatically activated defensive behaviors" (Kozlowska et al., 2015) in response to threats:

- Arousal: Muscles tense; breathing and heart rate increase as the body prepares for action
- Fight or Flight: Active defense response for dealing with a threat
- Freezing: Fight-or-flight response put on hold
- Dissociation: Disconnections of awareness from emotions and even sensations in one's body
- Tonic Immobility: Inability to move or call out; shut down in the face of fear
    - A variation is collapsed immobility, with the loss of muscle tone and changes in consciousness.
- Quiescent (Dormant) Immobility: After the threat or danger has passed, a state of dormancy that promotes rest and healing

"Fight or flight" is misleading.

"Fight or flight" is misleading and gets in the way of understanding how human brains are wired to respond to being assaulted.

This phrase seems to indicate if someone is "brave," "a real man," or "a true soldier," they would react to assault by fighting back and only cowards try to escape—but this is simply not how our brains evolved or how they are wired.

We evolved to freeze first and then flee. So even if a person does fight when attacked by a predator, it is not because they want to win the fight; they just want to escape.

We evolved knowing if we fight a giant predator with menacing jaws and sharp teeth or claws, we will lose. The same applies when the predator is human and carries a gun, knife, or other threat.

Sometimes, an assault victim may fight back in a sustained way against a more powerful or armed perpetrator, but that is extremely unusual.

It is essential sexual assault victims and those who work with them understand this, because victims often feel ashamed they did not fight back. Even otherwise supportive family members and friends may not understand. They may have incorrect expectations for how the victim should have responded—or how they would have responded if it happened to them.

Freeze, Flight, or Fight—The Primary Purpose

The freeze reaction usually happens at the beginning of a trauma and is usually brief.

Freezing is a fight-or-flight response put on hold. Freezing occurs when the amygdala—a crucial structure in the brain's fear circuitry—detects an attack and signals the brainstem to inhibit movement. It happens in a flash, automatically, and beyond conscious control.

Signs of a freeze reaction in a victim include:

- Brief response when the victim perceives danger.
- Being highly alert.
- Having a heightened attentional state that is receptive to a wide array of information in the external environment.
- Not moving, because this could provoke or worsen the attack and because it would absorb brain resources initially needed to focus on assessing the situation.
- Readiness to burst into action suddenly.

3. Drastic Survival Reflexes During Sexual Assault

During the initial freeze response, or at any time during an assault, the prefrontal cortex will be affected, impairing rational thought processes.

The brain's fear circuitry may automatically determine escape is impossible. The victim attempts to escape and survive when there is no apparent (physical) escape.

Looking back later, the victim and others—that is, their prefrontal cortexes—may recognize escape was possible (e.g., through an open door), but what matters is what the fear circuitry concluded at the time.

When escape is perceived as impossible, the fear circuitry can trigger some drastic "survival reflexes." Advocates and victim service providers should be aware of these survival reflexes in victims because they can affect how the victim sees themself after the assault.

Dissociation

Dissociation is one of these automatic survival reflexes over which the victim has no control. Dissociation involves disconnections of awareness from emotions and even sensations in one's body. It includes experiences such as feeling like you are unreal, or the situation is unreal, feeling like you're in a fog or a movie, or feeling disconnected from your body.

The following quotation is from a research participant describing her dissociative experience when reminded of an assault she experienced years before: "It was silence, looking at her through a glass wall, so it couldn't affect me, couldn't touch me."

When a victim experiences dissociation during a traumatic event, they may feel as if they are "on autopilot," such that the victim goes through the motions without feeling any sense of control or choice and only later realizes they did things they never consciously intended or decided to do. This can mean participating in sex acts, not because the victim chose to, let alone consented or wanted to, but because they were in a terrifying dissociative state.

Dissociation, particularly dissociative autopilot, can be a huge source of shame and confusion to victims. They may be upset with themselves for not resisting and even actively participating in unwanted and terrible sexual acts.

Loved ones, investigators, and others may misinterpret dissociative autopilot as consent and willing participation.

Perpetrators and defense attorneys may point to such behavior as evidence there was consent and no assault—when nothing could be further from the truth.

Remember, it is critical for you to help victims who dissociated during an assault to understand this is a brain-based, automatic survival reflex.

Tonic Immobility

Another survival reflex is tonic immobility, a brain-based response that is more than 300 million years old.

It is found in birds, sharks, and mammals, including humans. For example, the chicken shown on the visual is in a state of tonic immobility after being restrained by a person.

Tonic immobility differs from freezing, in which movement is possible but not engaged in while assessing the situation and avoiding an even more dangerous attack.

With tonic immobility, the victim is paralyzed, unable to move, and unable to speak or cry out, even if they want to.

Tonic Immobility may overlap with disassociation when escape is or appears impossible.

Tonic immobility is understood as an extreme version of “shutting down” in the face of an overwhelming threat or trauma.

An estimated 70 percent of victims experience significant tonic mobility, and 50 percent report extreme tonic immobility during the assault (Möller et al., 2017).

The onset of tonic immobility is sudden, usually after a failed struggle; the immobility also terminates suddenly.

This reflex response can last from seconds to hours. It does not impair alertness or memory encoding.

Tonic immobility can also overlap with dissociation and may include:

- Trembling or shaking.
- Stiff, rigid muscles.
- Feeling cold.
- Feeling numb to pain.
- Fixed or unfocused staring or intermittent eye closure.

Collapsed Immobility

Collapsed immobility is another reflex that differs from tonic immobility and dissociation.

Collapsed immobility results from a massive parasympathetic input to the heart that causes extreme decreases in heart rate and blood pressure. This can cause faintness, sleepiness, or even loss of consciousness. Consistent with the name, collapsed immobility causes muscle tone to be lost; as a result, the body goes limp.

If you were to pick up the possum on the visual, the body would be limp and floppy, not rigid like an animal in a state of tonic immobility (Kozlowska et al., 2015; Baldwin, 2013).

Collapsed immobility is often accompanied by the experience of mental defeat—feeling totally overwhelmed and helpless. It may be triggered by seeing blood, a skin puncture, a knife, or other sharp objects.

Evidence suggests collapsed immobility is more likely in those who faint while having blood drawn. Like blood phobia, the evidence suggests it is more likely to occur in women than men.

Collapsed immobility is not as common as tonic immobility, but it is not uncommon.

Like tonic immobility, collapsed immobility can be a source of confusion and shame for victims, who look back at what happened and think they should have escaped or fought back.

It can be disturbing to family members and friends, as well as investigators, prosecutors, judges, and juries. Their confusion can lead to doubt, blaming, and even shaming of victims.

So again, it is extremely important sexual assault victims who had these reactions during an assault, and those who work with them, understand they are normal, brain-based responses rooted in hundreds of millions of years of evolution; it is how human brains are wired.

Brain-Based "Counter-Intuitive Behaviors"

Other people often tell you and the victims you work with a victim's reported behaviors during the assault "don't make sense."

Here we have the four major responses that lead people—not only friends, family members, and partners, but also police investigators, prosecutors, judges, and juries—to doubt the victim was actually sexually assaulted:

- Did not resist
- Made no attempt to escape
- Did not scream
- Was an "active participant"

Defense attorneys try to use these brain-based trauma responses to undermine the victim's credibility by describing such responses as "evidence of consent." Sadly, victims may also view

these same responses as evidence they were cowardly or weak in their response to the assault—however, these responses make perfect sense if you understand the neurobiology of trauma responses during an assault.

As an advocate who learned these are entirely normal, brain-based responses—responses studied by researchers and given names such as dissociation, tonic immobility, and collapsed immobility—you can help victims to understand and feel validated in their experiences.

You can teach victims these are normal, brain-based responses and are well understood by people who research and work with sexual assault victims.

Understanding these brain-based responses may have substantial positive effects on victims and their experiences with friends, family members, law enforcement, and the legal system.

Brains During Most Sexual Assaults

Look at the differences in response and brain activity between most perpetrators and most sexual assault victims who experience intense distress and fear during the assault.

In the typical perpetrator, the prefrontal cortex, or thinking brain, is in control—definitely more in control than the emotional brain, even if the perpetrator is acting compulsively.

So the perpetrator is thinking clearly and able to carry out a planned sexual assault and to use their prefrontal cortex to direct and modify assaultive behaviors that are practiced, even habitual.

For the victim, the fear circuitry kicks in, and the victim is terrified and overwhelmed. The perpetrator's actions drive thoughts.

Emotional reflexes control behaviors.

We will conduct an activity exploring survival responses.

4. Roles of Brain Circuitries in Trauma, Memory, and Healing

The Brain During Trauma

What happens to memory during a traumatic situation? Why are some sexual assault victims unable to recall what happened, or why do they remember some things and not others?

Typically, the amygdala neurons encode fear memory traces (or fragments) while the hippocampus learns about the context of the fear, but when faced with threatening experiences, this emotionally arousing information increases amygdala activity. This activity correlates with more deeply remembered memory traces in the amygdala.

Stress and fear heighten activation of the amygdala. This reinforces and intensifies traumatic memories while at the same time impairing hippocampal function, which is involved in episodic or explicit memory. Victims whose memories are not integrated into their hippocampus and cortical circuitry have implicit or limbic memory traces (or fragments). This happens because the

amygdala activates the hypothalamic-pituitary-adrenal axis, resulting in a flood of neurohormones that interfere with hippocampal learning. This is why people have trouble remembering specific details after a stressful situation and say things like, “It was all a blur” (Haskell & Randall, 2019).

Hippocampus Function Altered

The function of the hippocampus also is altered, resulting in the following effects (Joëls et al., 2012):

- The context of the assault and the elements of the event are poorly woven into a whole.
- The sequence of events is poorly encoded.
- Emotional memories, however, are well encoded, particularly for experiences surrounding the onset of fear/terror (e.g., when the victim realized they were being or were going to be sexually assaulted).

Attention, Trauma, and Memory

Memory is the capacity for storing and retrieving information. Three processes are involved in memory: encoding, storage, and recall.

First, we receive the information (e.g., from what we see, hear, and understand). Then, we convert the information so it can be stored in various parts of the brain. When encoding an event, we focus more attention on aspects our brain appraises as important and less on those deemed insignificant. What we pay attention to largely determines what gets encoded into memory.

During states of intense fear and distress, in which the prefrontal cortex is impaired, and the fear circuitry determines attention, “bottom-up” attention latches onto specific stimuli.

Cognitive models highlight the nature of traumatic memory: fragmented, associated with intense arousal, readily primed and triggered, and poorly contextualized into memory (Ehlers & Clark, 2000).

When this happens, there is much less encoding of more complex contextual information, such as how objects are arrayed in a room or how events are sequenced over time (Joëls et al., 2012).

Knowing this can help advocates and victims understand why memories of sexual assault are often fragmented and missing information about how a room was configured or the exact sequence in which things occurred.

Even though the victim and others (including investigators, attorneys, judges, and juries) may believe the victim “would have to” remember how certain things were arrayed in space and time, the victim simply was not noticing or encoding such information during a traumatic assault.

What Gets Encoded Into Memory

For all the reasons we covered, memories of sexual assault tend to be fragmentary images, sounds, and body and other sensations, as well as strong emotions like disgust and horror.

Traumatic memories have few peripheral details (because those were things given little attention memory encoding resources), little or no time-sequence information, and few or no words or narrative, particularly soon after the trauma and early in recovery.

Exactly how are traumatic memories encoded? How does the brain affect the kinds of memories assault victims have later, including when meeting with investigators and prosecutors and testifying in court?

Remember, during a sexual assault, the fear circuitry takes control of the brain's response. Fear circuitry impairs the prefrontal cortex and releases stress hormones that impact the body and brain.

The combination of fear circuitry control and prefrontal cortex impairment leads to bottom-up attention—attention which is automatically captured or focused on those aspects of the experience which the fear circuitry perceives as dangerous, threatening, or essential to survival and coping.

Fear circuitry and stress hormones change the way the hippocampus functions. Notably, the hippocampus is a key structure for encoding memories. It weaves together details and contextual and time information.

During a traumatic experience, the hippocampus is altered in ways that decrease the encoding of most of what is happening, particularly contextual and time information (Schwabe et al., 2012; Joëls et al., 2012).

The focus on danger from bottom-up attention and the altered hippocampus causes the victim's memories to be fragmentary.

The memories retrieved can be unpredictable, incomplete, and disorganized.

However, some aspects are often recalled accurately, such as the onset of fear, central details, survival reflexes, and other "islands of memory" (Schwabe et al., 2012; Joëls et al., 2012.)

"Islands of Memory"

In these "islands of memory," the micro-islands contain fragmentary sensations, and the larger islands contain key periods of memory during the assault. These key periods include when fear kicks in, typically right before, during, and after the onset of the assault.

For that initial phase, contextual and time-sequence information may be very well encoded (sometimes even particularly so if it seemed like everything was happening in slow motion).

These islands also contain memories that were part of the survival reflexes—freezing, dissociation, tonic immobility, and collapsed immobility—or the shift from one reflexive state into another; for example, moving from dissociation into collapsed immobility just before becoming dizzy or passing out.

Alcohol, Drugs, and Memory

In addition to the assault itself, alcohol and drug use can affect an assault victim's memory. A low to moderate dose or level of intoxication impairs the ability of the victim to encode the context of the situation, but it does not impair the victim's coding of sensation.

A high dose or level of intoxication impairs both context and sensations, and in a severe blackout, no information is encoded at all. The victim remembers nothing (Doss et al., 2018).

If a victim does recall memories after a blackout, they are trying to make the gaps into a memory from information they gather later. These are not actual memories.

Remembering the Experience

The state of the brain at the time of remembering affects which encoded aspects of the memory will be retrieved.

For example, if a victim feels unsafe and judged by a police investigator who doesn't understand the impacts of sexual assault and doesn't believe the victim, then they may not be able to use their prefrontal cortex to understand questions and retrieve the memories the investigator wants.

On the other hand, if the victim is feeling traumatized by remembering and/or by the investigator, this may trigger the automatic retrieval, in a bottom-up way, of fragmentary sensations and emotions are nearly as intense as the assault itself.

Even under the best conditions, someone who was assaulted is likely to have a hard time putting the fragments they can remember into words, let alone into a coherent story.

To make things even more complex, someone may remember in a dissociated way—which can be how they experienced the original trauma or a response to remembering it this time—and that involves its own impairments and problems.

For example, the more dissociated someone is, the less activated their embodiment circuitry tends to be, and the less the memory feels real, true, or valid to them.

This also can be contagious: If someone is talking about a terrible trauma, but it sounds like they are reading a grocery list, it can cause the listener—including a victim advocate, police investigator, prosecutor, judge, or jury member—to doubt the reality of what happened and the credibility of the victim.

In short, the state of the brain during remembering will shape the remembering experience in a powerful way, and this can have very significant consequences—particularly if people involved do

not understand these are normal experiences and behaviors caused by how the brain responds to trauma.

Life as a Minefield of Potential Trauma Triggers

Because the language areas of the brain are impaired or shut down during trauma, the memory may have few words, or no narrative or "story" associated with it—at least at first, before the victim begins healing from the trauma and can add words and tell it as a story, however incomplete.

Traumatic memories are often associated with powerful emotions with little or no language. Therefore, when victims of sexual assault try to remember the trauma, they often have trouble; however, those memories can pop up later when they do not expect them or want them.

Also, because of the associative nature of memory and the strength of associations made during a trauma, all kinds of things can get linked to the trauma.

Thick eyebrows like the perpetrator's, an angry or threatening tone of voice, maybe walls the color of those in the room where the assault occurred—all can trigger remembering, including the emotional reflexes linked to it.

In short, life can become a minefield of potential trauma memory triggers.

A Better Understanding

When you have some knowledge about just how profoundly neurobiology contributes to a victim's trauma, you'll have a much better understanding of why victims of sexual assault respond the way they do—why their memories are fragmented or incomplete, why they may have appeared to "cooperate" during the assault, or why other behaviors might at first seem to "make no sense" are actually normal (or at least not rare) brain-based responses.

You will understand why victims need to feel safe talking about such experiences and being understood as having responses and memories that make sense.

Your empathy for the victims will empower them. Victims who feel safe are more cooperative, better able to remember, and in a better position to recover and heal.

Your deeper understanding of the experiences of victims will also make it easier for you to support their physical and psychological needs and assist them, whether they choose to move forward with reporting or not.

Remember: No matter how the victim responds, a victim's response to a traumatic event is individual and should, as far as possible, be viewed as a normal reaction to an abnormal event.

We will conduct an activity exploring responses to survival reflexes.