Brain Development, Teen Behavior, and Preventing Drug Use

LAKESHORE REGIONAL ENTITY

As the parent of a teen, have you found yourself looking at your child, wondering "Why would you do that?" From mood swings to risk taking, "normal" teenage behavior can be confusing and exasperating.

Research reveals that patterns of brain development during these formative years play a significant role in shaping teens' behavior. In other words, there's a biological reason why teens often act the way they do.

The science of brain development reveals why teens are responsive to new experiences and influences, both positive and negative. This makes the teen years a period of great promise, but also of potential risk, especially for addiction. That's why preventing and delaying substance use during this time is so important to their long-term health.

The Adolescent Brain

From early adolescence through the mid-to-late 20s, the brain develops somewhat unevenly. The parts of the brain to develop first are those that control physical activity (cerebellum), emotion (amygdala), and motivation (nucleus accumbens). The prefrontal cortex, which is responsible for impulse control, more reasoned thought, and good judgement, develops later.

This pattern of brain development helps explain some common traits of teen behavior:

- Difficulty holding back or controlling emotions
- A preference for high-excitement, exploration, and new activities
- Inadequate planning and limited judgment
- More risky, impulsive behaviors

With the prefrontal cortex – or one's 'voice of reason' – developing last, it's easier to understand why teens are so driven by emotion, excitement, and short-term reward. This leads to unpredictable – and sometimes – risky behavior.

Unfortunately, developing brains are also more susceptible than the brains of adults to damage from outside influences. This means substance use during the teen years creates a more distinct risk for immediate and lasting harm.

Effects of Substance Use on the Developing Brain

Finding ways to satisfy our different needs and desires is a part of life. It's one of the many skills being fine-tuned during the teen years. But when substances are used to fulfill needs and to feel good, it interferes with the body's development of its natural reward system.

The brain is made up of billions of nerve cells. Nerves control everything from when the heart beats to what your teen feels, thinks, and does. They do this by sending electrical signals throughout the body. The signals get passed from nerve to nerve by chemical messengers called neurotransmitters.

Some of the signals that neurotransmitters send cause feelings of satisfaction or pleasure. These natural rewards are the body's way of making sure we look for more of what makes us feel good. Seeking more of this pleasure helps to ensure we don't starve.

The main neurotransmitter of the 'feel-good' message is called dopamine. Substances overload the brain with dopamine – they cause the reward system to send too many 'feel-good' signals. In response, the brain tries to right the balance by letting fewer of the 'feel-good' signals through. As time goes on, the brain needs more and more of the substance to feel

its positive effects. This effect is known as tolerance, and it can be especially dangerous in the cases of drugs like heroin and cocaine.

The effects of substances on the brain don't just stop when the substance wears off. When a person stops taking a substance, dopamine levels remain low for some time. They may feel down, or flat, and unable to experience the natural pleasures in life. The brain will eventually restore the dopamine balance by itself, but it takes time. This can take anywhere from hours, to days, or even months, depending on the substance, the length and amount of use and the person.

Because teenagers have an over-active impulse to seek pleasure and less ability to consider the consequences, they are especially vulnerable when it comes to nicotine, alcohol, or drugs. And because the internal reward systems are still being developed, a teen's ability to bounce back to normal after using substances may be compromised due to how substances affect the brain, making teens more vulnerable than adults to developing addiction.