چالش های تکاملی در دوره بحران کووید

دکتر جعفر فیلی روانپزشک کودک و نوجوان

Development during adolescence

Brain does not keep getting bigger as you get older

But that doesn't mean brain is done maturing

The teen brain is ready to learn and adapt

Many mental disorders appear during adolescence

The teen brain is resilient

Teens need more sleep than children and adults

The limbic system

Develops years ahead of PFC

Rewards/punishments/ processing emotional experience and social information

Pubertal hormones target the amygdala directly

Cognitive control is not fully developed until adulthood

Dopamine and serotonin in limbic system

Make more emotional and more responsive to rewards and stress.

Dopamine: pleasure / attuning to the environment during decision-making.

Increased in the limbic system and PFC so became risk-taking and vulnerability to boredom.

Serotonin : regulation of mood and behavior, Known as “calming chemical,”

when stress, arousal or sensations become extreme, PFC overwhelmed. so, adolescents engage in risky behaviors and emotional outbursts

Adolescents as irrational one?

Adolescents than adults, choices by very different set of chemical influences.

Adolescent decisions are not always defined by impulsivity because of lack of brakes, but because of planned and enjoyable pressure to the accelerator.

Young people need to somewhat enjoy the thrill of risk taking in order to complete the incredibly overwhelming task of growing up.

Changes that affect on development of brain

amygdala: involved with emotions/ emotional responses, active during puberty

dopamine: pleasure / reward system; increases in the limbic system later in PFC

frontal lobes: impulse control, planning, and higher order thinking

limbic system: processing emotional experience / social information/ determining rewards/ punishments; develops years before PFC melatonin:

Changes that affect on development of brain

myelination: speed up processing information; increase PFC during adolescence

prefrontal cortex: decision making, cognitive control, and other higher order functions; prefrontal cortex develops further during adolescence

serotonin: "calming chemical," regulation of mood and behavior; increase in the limbic system during adolescence

synaptic pruning: increase connections in the brain

Neuronal plasticity and neurocircuitry

Possible significant neuronal changes that occur in the acquisition of new skills.

New skills initiate process of elaboration /stabilization synaptic circuitry as learning process.

Plasticity permits adolescents to learn and adapt in order to acquire independence.

however, plasticity also increases an individual's vulnerability toward making improper decisions because the brain's region-specific neurocircuitry remains under construction, thus making it difficult to think critically and rationally before making complex decisions.

Risk-taking behavior

Adolescents take risks to test and define themselves, both beneficial/harmful.

new skills are learned and new experiences prepare them for future challenges in their lives.

Risk-taking serves a means of discovery about oneself, others, and the world.

risk-taking behavior is a normal and necessary component of adolescence.

Hot cognition and cold cognition

Self-regulation

Management of emotions and motivation / directing and controlling behavior in order to meet the challenges of the environment and to work toward a conscious purpose / controlling the expression of intense emotions, impulse control, and delayed gratification.

Self-regulation

During this period, adolescents should not be overprotected, but be allowed to make mistakes, learn from their own experiences, and practice self-regulation.

When teens find themselves in emotionally arousing situations, with their immature prefrontal cortices, hot cognitive thinking comes into play, and these adolescents are more likely to take riskier actions and make impulsive decisions.

Results of brain development

Biological changes(physical and sexual changes)

Cognitive changes

Psychological changes

Social changes

Moral and spiritual changes

Brain maturation is influenced by:

heredity and environment/ prenatal and postnatal insult nutritional status, sleep patterns pharmacotherapy, and surgical interventions during early childhood/ physical, mental, economical, and psychological stress / drug abuse / sex hormones.

Chronic Stress and neurobiological and psychopathological Consequences

Occurs: mental/emotional/ physical demands beyond the regulatory capacity

The impact differ depending on: frequency/magnitude/duration of stress.

Chronic Stress and neurobiological and psychopathological Consequences

Covid 19 is acute or chronic stress?

Chronic Stress and neurobiological and psychopathological Consequences

Brain and body respond physiologically / behaviorally during changing social and physical environment.in order to adapt.

Allostasis: Physiologically respond to stressor achieving stability via activation of systems

Allostatic load or overload: pathophysiology when overused or their activity is out of balance with each other.

A good example of the biphasic actions of stress :protection vs. damage , in the immune system.

Chronic Stress and neurobiological and psychopathological Consequences

Central Role of the Brain

The brain is the organ that determines what is novel and possibly threatening and therefore "stressful" and it orchestrates the behavioral and physiological responses, whether health promoting or health damaging.

Chronic Stress and neurobiological and psychopathological Consequences

The neural circuits in a healthy brain are remodeled by experiences to enable behavioral responses that are appropriate to what the individual is experiencing, e.g., being more vigilant and anxious in a potentially dangerous environment.

The healthy brain is resilient and neural circuitry adapts to a new situation

Unhealthy brain may not be so plastic, or it may have maladaptive circuitry or plasticity and, as a result, is less able to adapt appropriately.

Chronic Stress and neurobiological and psychopathological Consequences

Health-Promoting and Health Damaging Behaviors

being “stressed out” may cause : being anxious / depressed /lose sleep at night / eat comfort foods and take in more calories than our bodies need / smoke or drink alcohol excessively / neglect seeing friends / reduce our engagement in regular physical activity for example, sit at a computer and try to get out from under the burden of too much to do.

Chronic Stress and neurobiological and psychopathological Consequences

Adrenal Steroid Receptors in Hippocampus:

Hippocampus: Episodic and spatial memory and mood regulation

Stress and glucocorticoids cause dendritic shrinkage and loss of spines.

Chronic Stress and neurobiological and psychopathological Consequences

Acute stress on amygdala: increased spine density basolateral amygdale neurons.

Chronic stress: expansion BlA dendrites /loss of spines/shrinkage dendrites medial A

These alterations: anxiety/PTSD like behaviors /social avoidance

Chronic Stress and neurobiological and psychopathological Consequences

Chronic stress on PFC and OFC: shrinkage of dendrites in medial PFC, expansion of OFC dendrites / increased vigilance/ cognitive rigidity.

The PFC under stress: loss of resilience/ impaired memory / extinction of fear memory.

Chronic Stress and neurobiological and psychopathological Consequences

Excitatory Amino Acids: particularly glutamate, key role in structural /functional changes.

Chronic stress causes shrinkage of apical dendrites of hippocampal neurons.

Conclusion

Covid-19 could have direct and in direct on adolescents brain


thank
you!