Impulsive Behavior: A Neurological Perspective

Dr. Nicol Moreland-Torres
Neuropsychology & Statistics
BCJODYSC
New Mexico
Stroop Task

Yellow
Impulse Control: Neuroresponsive Forebrain

- Higher Order Function
- Forebrain Activity
- Highly interconnected to other brain structures:
  - Emotional
  - Anger
  - Sexual
- Not fully developed until ~25
- Some of YOU have not mastered this type of control!
Forebrain Development

• Pre-Natal Development
  – Neural Tube
  – Cell Differentiation: Proliferation, Migration
  – Hemisphere Differentiation

• Post-Natal Development
  – Connectivity
  – Pruning

• Toddler Development
  – Learning
  – Pruning

• Teen Development (Data Nightmare!)
  – Learning and Memory
  – Hormone Fluctuations
  – Emotional Fluctuations
  – Intelligence
  – Judgments

• Young Adult Development
Synaptogenesis

- Synaptogenesis is the process of synapse formation, rapid during early years, continues throughout life.
- Pruning and selective cell death to get rid of neurons and synapses.
- What determines whether synapses will be formed and maintained and whether neurons will live or die? Experience!!
- Expectant vs. Dependent synaptogenesis
- Drug and/or Ingestion during pregnancy
• The frontal lobes are involved in motor function, problem solving, spontaneity, memory, language, initiation, judgment, impulse control, and social and sexual behavior.
Forebrain

- Pre Frontal Cortex actively maintains representations of context information in working memory.

- These context representations serve as a "top-down" source of excitatory activation that biases the local competitive interactions between mutually incompatible thoughts or actions (e.g., between two alternative response options or between two alternative perceptual interpretations of a stimulus).

- These internally maintained context representations are especially critical in situations in which a dominant, but inappropriate, response must be inhibited.
Pre-Frontal Cortex

• The cognitive abilities dependent on PFC include:
  – inhibitory control
  – cognitive flexibility
  – working memory and reasoning.
  – we study their neural bases, their genetic and neurochemical modulation, their modification by the environment, and how they can become derailed in disorders.
Physical evidence of normal differences in brain maturation is compelling:

- The evidence undermines current practice by pulling the rug out from under those who are "diagnosing" (and labeling) children as having "mental disorders" such as ADHD, "oppositional defiance disorder," "mood swings" "generalized anxiety disorder“

- These disorders are diagnosed in children who lack self-control, lack mature attention spans, and are given into emotional swings.

- These and other signs of immaturity are normal. Maturity is arrived at individually, not according to someone's charts or schedules.
Mitigating Factors

• Several internal (in-vivo) and external (environmental) experiences can alter normal Pre-Frontal Development, including:
  • Proliferation
  • Migration
  • Synaptogenesis
  • Differentiation
  • Dendritic Arborization (chemical level)

• Internal:
  – Chemical alterations brought on by parental drug and alcohol abuse and depression (or some other pathology).

• External:
  – Environmental experience.
What does this Mean for Youth and Delinquent Behavior

1. Could be a Mental Health Issue
2. Could be part of natural maturation
3. Could be caused by Drug & Alcohol use
4. Could be caused by early Trauma
5. Could be caused by exposure to chemicals in-utero – neuropsych problem
Some possible consequences of poor executive function in adolescence

• **Ask yourself: Does this child have:**
  • Emotional difficulties
    – aggression
    – mood swings
    – suicidal ideation
  • Risk taking/impulsive behavior
    – alcohol/drug use
    – unprotected sex
    – constant poor judgment
  • Compulsive behaviors
    – alcohol/drug abuse
    – preoccupations with appearance
    – self-mutilation
  • Attention problems
    – distractibility
    – poor academic planning
    – **Lack of sleep**
• 18 year old female
• Overdose of pills combined with alcohol in a suicide attempt.
• History of drug abuse, run away behavior, aggressive outbursts and school failure.
• She responded positively to a combination of Tegretol and desipramine and psychotherapy.

Take Home Message:

- Why we are busy “Assessing” children let us not get too aggressive with wanting to “Diagnose”.
- Most juvenile behaviors are normal behaviors that have been reinforced by the child’s cohort.
- We have changed and adolescent behavior has not. In a zero tolerance environment almost any behavior can been viewed as “delinquent”.
- Remember there is a continuum of behavior, good and bad.
- We must be able to tell the difference between normal and pathologic.