Section 2: *Brain Matters*

How Bipolar Disorder Affects

Learning,

Development

& School

http://www.bpchildren.org/files/Download/TeacherNotesWeek2.pdf

How does Childhood BP Affect a Student at School?

- **Core Symptoms**
- **Cognitive Effects**
  - Memory
  - Attention
  - Executive Functions
- **Treatment Side Effects**
- **Co-Morbidity**
  - Up to 90% also have ADHD (up to 40% in teenage onset)
  - Up to 56% also have anxiety disorder
  - Learning Disabilities (50% have disorders of written expression)

What About Social Skills?

- Impaired facial processing.
- Impaired understanding of the emotional meaning of speech. (prosody)
- May or may not understand social appropriateness. (up to 11% also have Aspergers)
- Impacted by active mood states.

Factors Affecting Development & Individual Functioning

- Age of onset: early onset means fewer milestones met while healthy
- Severity of Illness: More time spent in active mood states means more interference with development.
- Co-occurring conditions
- Response to treatment
- Medication compliance
- Skill of treating physician
- Support level at school and home

Brain Abnormalities

- **Structural** – Physical structure of the brain is abnormal
- **Functional** – Structure may be in tact but the use of this part of the brain is abnormal
- **Chemical** – Imbalance in chemical messengers

English Please

Anterior = Before. Closest to the head or front.

Cingulate = Belt. A particular zone or 'belt like' area of the brain.

Cortex = Bark The outer region.

Gyrus = Circle The crest or rounded ridge of a fold in the brain.

Gray Matter = Made up of cell bodies and responsible for information processing.

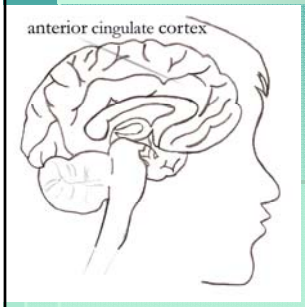
Lobe (or Lobule) = A well-defined portion or division. (Lobule – subdivision of a lobe.)

Superior – Above or upward.

White Matter – Made up of nerve fibers which have a protective coating that is white in appearance. White matter helps different parts of the brain communicate with each other and the rest of the body.

Brain Areas which may be Impacted

Anterior Cingulate Cortex

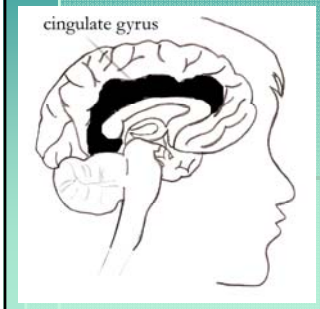


Linked to:
- Decision making
- Cognitive function=memory & attention
- Perceptual awareness
- Emotion

All 3 abnormality types present
- Changes in gray matter
- Lower glutamine levels
- Decreased response to emotional faces
- Increased DNA fragmentation

Brain Areas which may be Impacted

Cingulate Gyrus

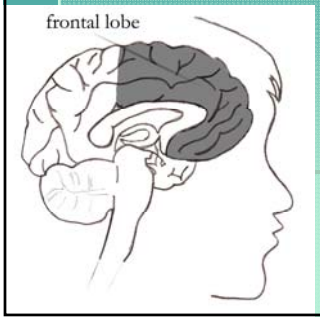


Linked to:
- aggression
- emotional response to stimuli

Smaller Gray matter in the left anterior.

Brain Areas which may be Impacted

Frontal Lobe

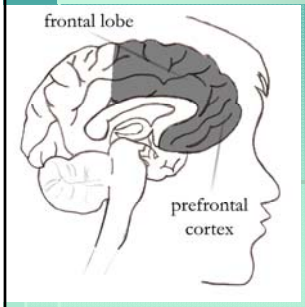


Linked to:
- Higher thinking skills = Reasoning, judgment, impulse control, problem solving, attention, socializing, language

White matter lesions that progressively get worse over time with repeated episodes.

Brain Areas which may be Impacted

Pre-frontal Cortex

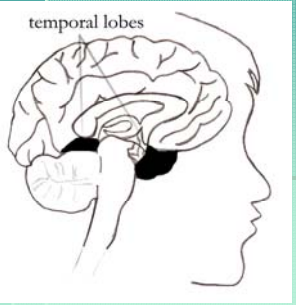


Linked to:
- Planning
- Sequencing
- Working memory
- Judgment
- Social Control

All 3 abnormality types present
- Lower ratios of N-acetylaspartate (NAA)/Creatine
- Abnormal amounts of gray matter
- Abnormal activation

Brain Areas which may be Impacted

Temporal Lobe

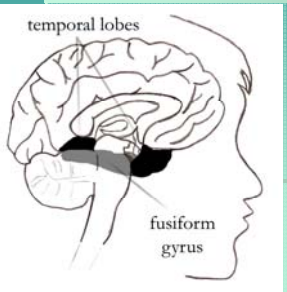


Linked to:
- Processing sound information
- Higher level auditory processing
- Processing complex visual stimuli such as faces
- Forming memories
- Understanding emotional context

Several components but overall structure abnormal
- Reduced average volume
- Increased gray matter on the left side

Brain Areas which may be Impacted

Fusiform Gyrus

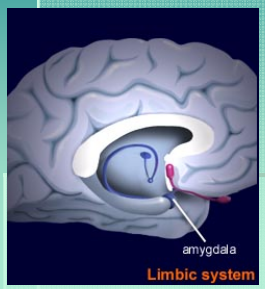


Linked to:
- Emotional context
- Face recognition
- Social interaction

Abnormalities
- Overactive
- Increased gray matter

Brain Areas which may be Impacted

Right and Left Amygdala

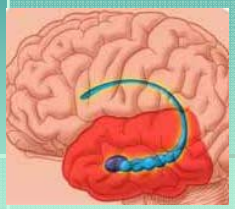


Linked to:
- facial processing
- fight or flight response

Abnormalities
- Reduced gray matter
- Abnormal development of the left Amygdala
- Increased activation to emotional faces

Brain Areas which may be Impacted

Hippocampus

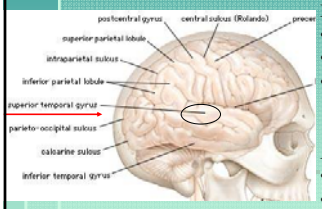


Linked to:
- formation of memories
- associations

Abnormalities
- reduced volume especially in girls

Brain Areas which may be Impacted

Superior Temporal Gyrus

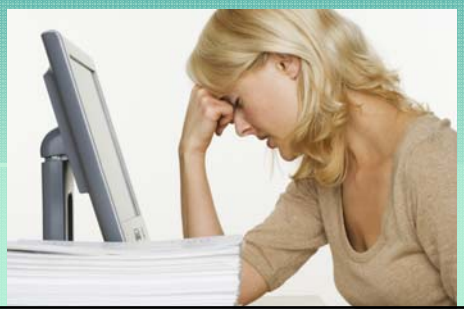


Linked to:
- insight
- music
- processing speech

Abnormalities
- reduced white matter
- smaller total volume on the left

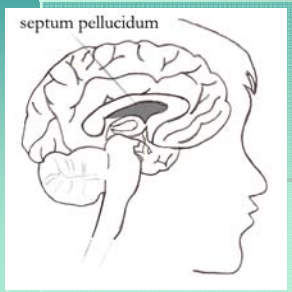
Brain Areas which may be Impacted

Time Out!!



Brain Areas which may be Impacted

Septum Pellucidum

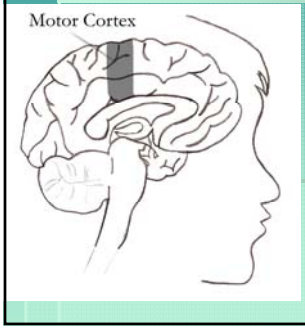


Linked to:
- Modulating emotional expression

Abnormalities
- The cavity separating two membranes which would normally fuse during infancy is found to be present and enlarged in adults who had childhood onset of bipolar disorder.

Brain Areas which may be Impacted

Motor Cortex

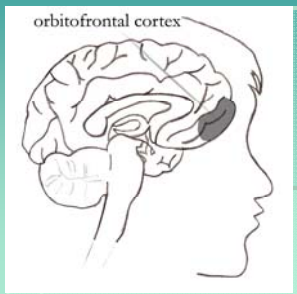


Linked to:
- Motor movement

Abnormalities
- Increased gray matter

Brain Areas which may be Impacted

Orbitofrontal Cortex



Linked to:
- Mood
- Motivation
- Responsibility
- Addiction

Abnormalities
- Abnormal gray matter volumes

Brain Areas which may be Impacted

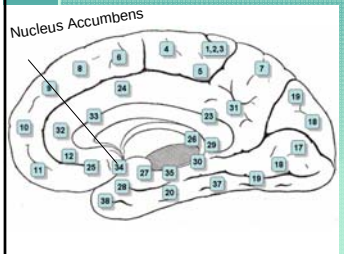
Striatum

Linked to:
- Motor activity
- Learning by habit
- Cognitive function

Abnormalities
- Abnormal volume changes that progress with age

Brain Areas which may be Impacted

Right Nucleus Accumbens

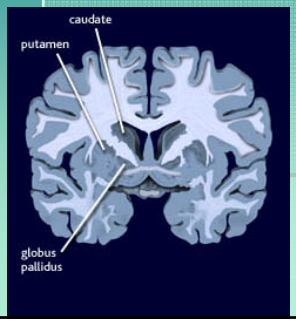


Linked to:
- Modulation of desire, inhibition and satisfaction

Abnormalities
- Larger volume especially pronounced in pre-puberty

Brain Areas which may be Impacted

Putamen

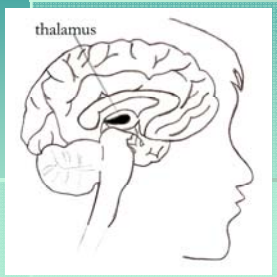


Linked to:
- Motor control
- Sensory motor integration

Abnormalities
- Enlarged
- Increased activation

Brain Areas which may be Impacted

Thalamus

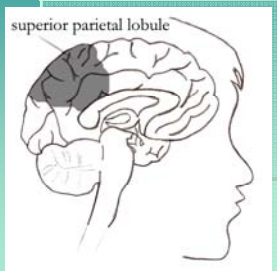


Linked to:
- Processing sensory information and translating that information for the cortex
- Sleep/wake cycle
- Regulating arousal levels

Abnormalities
- Overactive

Brain Areas which may be Impacted

Superior Parietal Lobule

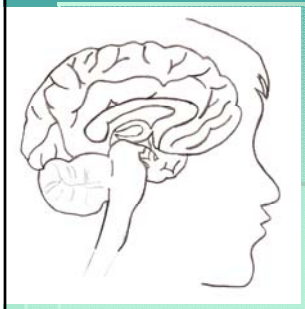


Linked to:
- Spatial orientation

Abnormalities
- Decreased gray matter

Brain Areas which may be Impacted

Whole Brain



Abnormalities
- Smaller total volume

Brain Functions Impacted

- Decision making
- Emotion/Mood
- Response to stimuli
- Aggression
- Impulse control
- Planning
- Reasoning /Judgment
- Desire/Satisfaction
- Attention
- Problem solving
- Language
- Socializing
- Inhibition
- Facial processing
- Memories
- Associations
- Motor movement
- Spatial orientation
- Motivation
- Responsibility
- Addiction
- Planning
- Sequencing
- Social control
- Sensory motor integration
- Perception

What problems can this create in the school setting?

Difficulty

- initiating tasks
- maintaining attention
- organizing materials
- planning ahead
- memorizing facts
- interacting socially
- remaining seated
- sensory processing
- Frequent trips to the nurse
- Frequent absenteeism
- Crying spells
- Sleeping in class
- Angry outbursts
- Panic attacks
- Loud talking

Review on section 2:

Affects on Learning, Development and School

Q and A