Major Depressive Disorder: Cognition, Memory, and the Brain

Learning and Memory
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Information and Contact

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Overview

1. Major Depressive Disorder (MDD) overview
2. MDD and cognition
3. MDD and memory
4. MDD, memory, and the brain

See last slide for references / going further
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Epidemiology and Burden

• One of the most common psychiatric illness
  – ~20% lifetime prevalence
  – >30 million adults will experience episode sometime in their lives

• Massive societal burden
  – Estimated >$300 billion lost in USA yearly
Clinical Information

• Diagnosed using clinical interview according to the *Diagnostic and Statistical Manual of Mental Disorders (DSM)*
• Must exhibit either sustained negative affect or loss of pleasure (anhedonia)
• Constellation of behavioral, emotional, and cognitive symptoms
  – Psychomotor agitation or retardation
  – Marked weight loss or gain
  – Insomnia or hypersomnia
  – Decreased or increased appetite
  – Fatigue
  – Extreme feelings of guilt or worthlessness
  – Concentration difficulties
  – Suicidal ideation
• Symptoms for two-week period
  – Clinical depression is not a temporary negative mood state in healthy individuals!
Recurrence

• Highly recurrent
  – 75% of depressed individuals have more than one episode

• Important research questions:
  – What specific factors may increase an individual’s risk for developing repeated depressive episodes?
  – Can resilience be facilitated?
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Cognitive Theories of Depression

• An individual’s thoughts, inferences, attitudes, and interpretations, and the way in which they attend to and recall events, can increase their risk for the development and recurrence of depressive episodes.
Cognitive Theories of Depression

• Memory representation (schemas) lead individuals to filter environmental stimuli such that their attention is directed toward information that is congruent with their schemas (i.e., in MDD = negative)
• Schemas in MDD focus on themes of loss, separation, failure, worthlessness, rejection
• Interpreting neutral and ambiguous stimuli in schema-congruent manner
• Biases as vulnerability factors for onset and recurrence
Cognitive Theories of Depression

• Dysfunctional schemas may be activated by stressors -> specific negative cognitions (automatic thoughts) regarding the self, world, and future (cognitive triad)

• Vicious cycle of negative automatic thoughts, processing biases, and depressed mood
Cognitive Psychology and MDD Overview

• Gain a more comprehensive understanding of difficulties in cognitive functioning that can result in emotion dysregulation and sustained negative affect that are central to depression

• This understanding of depression cognition promises to help advance theories of depression and ultimately improve treatments for this disorder
The Academic Field of Cognitive Psychology and MDD

- Study how individuals with MDD differ in the content of their thoughts and how cognitive deficits and biases in the processing of information may contribute to this content
- Tools: self-report measures and behavioral tasks
- High-level summary: what do we know?
  - Individuals with MDD are characterized by negative automatic thoughts and biases in attention, interpretation, and memory
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MDD & Memory Topics

1. Enhanced recall of negative material
2. Overgeneral autobiographical memory
Enhanced Negative Memory Recall in MDD

• Preferential recall of negative compared to positive material is one of the most robust findings in the entire depression literature

• Meta-analysis of studies assessing recall performance found that individuals with MDD remembered 10% more negative words than positive words

Happy / love / joy
Sadness / hate / death
Theory Enhanced Negative Memory Recall

• Negative schemas facilitate strengthening of congruent material, i.e., negative material (and not positive material!)
Overgeneral Autobiographical Memories (OAG) in MDD

• Autobiographical memory (AM) is episodic memory of personally experienced events that occurred at a particular time and place

• Recall of relatively generic memories, despite instructions to recall specific events

• Example: asked to recall a happy event, a person who exhibits OGM may say, “when I was on vacation last month” instead of remembering a single incident, e.g., “my high school graduation”
OAG Theory

• Capture and rumination
  – mnemonic information used in retrieval activates ruminative thinking, leading to capture and inability to retrieve detailed memory

• Functional Avoidance
  – Episodic memory may threaten affective disturbance so episodic memories may be ‘avoided’ in order to reduce the possibility of emotional pain

• Executive capacity and control
  – Impairment in executive capacity and control that limits an individual’s ability to remain focused on retrieval in the face of distraction
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Neural Correlates of Negative Memory Bias

• Lesion and fMRI suggest that amygdala is important for enhancing memory for emotional material

• Amygdala facilitates memory for emotional stimuli through modulation of the hippocampus

• In this study Hamilton & Gotlib assessed whether amygdala activity was associated with enhanced memory for negatively valenced material

Hamilton & Gotlib 2008 *Biological Psychiatry*
Neural Correlates of Negative Memory Bias

Hamilton & Gotlib 2008 Biological Psychiatry
Neural Correlates of OAG: Background

• Healthy individuals: AM retrieval involves hippocampus, anterior cingulate cortex, dorsolateral and ventrolateral prefrontal cortex
• These regions have been previously implicated in MDD
• Do these regions exhibit functional abnormalities during AM retrieval in individuals with MDD?

Young et al. 2012 Psychological Medicine
Neural Correlates of OAG: Results

• Comparing AM recall between depressed and control participants
  – Less activity in the MDD group in the hippocampus, parahippocampus, anterior cingulate cortex, insula, and ventrolateral and dorsolateral prefrontal cortex

Young et al. 2012 Psychological Medicine
Summary

• MDD is a devastating disorder, both for the individual and for society
• Cognitive theories of MDD posit that cognition contributes to the development, maintenance, and recurrence of depression
• MDD is characterized by heightened memory for negative material and for over-general autobiographical memories
• Abnormalities in function in a variety of brain regions contribute to MDD-related memory abnormalities
References and Further Reading

• **Cognition and MDD**

• **Autobiographical Memory and MDD**

• **Negative Memory, MDD, and the Brain**

• **Autobiographical Memory, MDD, and the Brain**