Making the Neurobiology of Addiction More Accessible to Students

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Thank You

• Thank you for choosing our session
• Thank you for attending the conference and supporting NAADAC
• Thanks for being an addiction professional and dedicating your resources in the form of your
  ✓ Intelligence, compassion
  ✓ Passion, creativity
  ✓ Time, energy, intent
• We value sharing this practice and this profession with you
• Our hope is that the time that we share together today, and any information, ideas, or resources shared will be of service and benefit to you, especially as you try to positively impact recipients of services
Plans For Today

**Learning Objectives**
1. Identify two key strategies for successfully integrating content on the neurobiology of addiction into courses
2. Recognize at least three ways that understanding aspects of the neurobiology of addiction informs conceptualization and intervention for substance use and addictive disorders
3. Locate resources on the neurobiology of addiction for classroom use

**Structure**
- Comments and perspectives on approaching neurobiology in the classroom
- Strategies to making learning and applying information more accessible
- Perspectives from a recent student and early career clinician
- Brief review of some possible materials

Presented by: John Paulson, LCSW, LCAC, MAC, NCSE and Kelsey Teel
Kelsey’s Educational Journey & Background

• Studied at University of Southern Indiana (Evansville, Indiana)
• B.S. in Psychology (Graduated May 2020)
• Masters of Social Work (Graduated May 2022)
• Post-master’s certificate in Addiction Sciences
• Undergraduate internship at Counseling For Change (outpatient addictions)
• MSW generalist internship at Ozanam Family Shelter
• MSW clinical internship at Stepping Stone (residential addictions)
• Currently working as residential therapist at Stepping Stone (residential addictions)

Kelsey’s Perspective, Experience Specific To This Topic

• Physiological Psychology (undergraduate requirement, 16 weeks, face-to-face)
• Psychopharmacology (undergraduate elective, 16 weeks, online)
• Psychopharmacology (graduate elective, 5 weeks, online)
• Clinical Assessment and Psychopathology (graduate requirement, 16 week, online)
General comments

• Many of you already know this, likely know it better than we do
• Our hope is to offer some perspectives and suggestions that we hope will either support what you already know and do or will provide some additional ideas
• We try to choose materials that will not only expand students’ understandings but inform them in practice
• We try to choose materials that will not only be useful to students, but ones that they could use in the field with clients (You Tube-sorry video companies)

Two Guiding Suggestions

• Emphasizing key terms while also translating (i.e., using terms that might be more relatable, easier to remember or with which to connect to other ideas or principles)
  ✓ Sati Bhavana (to cultivate/develop mindfulness)
  ✓ Antagonist medications-clogging the pipes
  ✓ Agonist/partial agonist medications-tickling the receptors
• Using broad models as maps, organizing systems
• Find your own that make sense for you and your students
Brain 101

- Each organ in the body has a job(s) that it coordinates, function(s) for which it is responsible.
- The brain is an organ. Its job is a complicated and complex one, to coordinate behavior.
- While there is no way to point to one spot and say it is exactly the place where a behavior happens, there are some localized areas.
- Different regions tend to specialize in different tasks.
- Each of these regions coordinates and works with others.
- Like an orchestra.
- Like a factory.

Lock & Key

- Neurotransmitters as communication, like “words” and neurotransmission as “communication.”
- Synapse as comparable to space between people as they speak.
- Neurotransmitters and receptors as unique “lock and keys.”
The Common Thread of Anxiety

Cues
- Internal: Sensations, emotions, thoughts, memories
- External: People, places, sights, sounds, smells, etc.

Danger/Threat to physical or psychological integrity, safety, security and/or success. Can be:
- Present (Immediate)
- Predicted
- Perceived

Fear-alert to present, current danger or threat
Anxiety- anticipation/ prediction of preparation for future danger or threat

Fear/ Anxiety alerts us to danger/threat, tunes us into environment and creates motivation to take action to keep ourselves safe
- Fight, flight or freeze response

Escape/ Avoidance
- Escape: Getting away from current danger
- Avoidance: Changing behavior to avoid possible, predicted, perceived, present danger/threat

Experiential/ Behavioral escape and avoidance leads to tension reduction, promotes sense of safety and security, removes or avoids sense of danger/threat, resulting in negative reinforcement which strengthens the entire behavior chain

Fight or Flight Response

- saliva flow decreases
- skin blood vessels constrict; chills & sweating
- heart beats faster & harder
- stomach output of digestive enzymes decreases
- muscles become more tense; trembling can occur
- blood vessels blood pressure increases as major vessels dilate
- eyes pupils dilate
- lungs quick, deep breathing
- bowel food movement slows down
Reward pathway

- **Limbic System**—located in the mid-brain, area that regulates **emotions** and **drives**

- **Drives**—priorities and behaviors/activities that help us to individually and collectively as a species to **survive and succeed**, including drives towards:
  - Satisfying hunger and thirst
  - Reproduction
  - Parenting
  - Seeking shelter and safety
  - Hygiene
  - Social Affiliation (relationships)
  - Play

**Reward pathway**

**Dopamine Pathways**
- Frontal cortex
- Nucleus accumbens
- VTA
- Functions:
  - Reward (motivation)
  - Pleasure, euphoria
  - Motor function
  - Time tuning
  - Compulsion
  - Perseveration

**Serotonin Pathways**
- Hippocampus
- Functions:
  - Mood
  - Memory processing
  - Sleep
  - Cognition

**Neuroendocrine Pathways**

- Hypothalamus
- Adrenal gland
- NE+ through out the body

**Neural Pathways: Fight-or-Flight Response**

- Cortex
- Locus coeruleus
- Sympathetic nervous system
- Adrenal medulla
- Adrenal gland
- NE

**Handbook of Clinical Psychopharmacology for Therapists**, (ninth Ed.)

Reward pathway

Wanting, Seeking, Priority System [as opposed to “Pleasure/Reward” system]

A scientific term for addiction is a pseudo-drive, (pseudo is “false”, meaning addiction is a false drive), “hijacking” the priority and motivation system and re-orienting priorities

- Now it becomes moved to the top of the priority list
- Euphoria/pleasure/high from drug use, Wanting
- Satisfying hunger and thirst/Reproduction
- Parenting, Seeking shelter and safety
- Hygiene, Social Affiliation (relationships), Play
- And the rest are reduced or ceased
- People with addiction begin to neglect priorities in their lives

Compassion-Focused Therapy (CFT)

- Approach developed by British Psychologist Dr. Paul Gilbert
- Part of the “third-wave” of Contextual CBT-based approaches
- Not really meant to be a stand alone, protocol-based “Therapy” model
- More a set of principles and strategies that target core processes observed to be the cause and/or complicating factor for a multitude of psychological conditions (Compassionate mind training)
- Transtheoretical, transdiagnostic

“Shame and self-criticism are transdiagnostic problems. People who experience them may struggle to feel relieved, reassured, or safe. Research suggests that a specialized affect regulation system(s) underpins feelings of reassurance, safeness and well-being. It is believed to have evolved with attachment systems and, in particular, the ability to register and respond with calming and a sense of well-being to being cared for. In compassion-focused therapy it is hypothesized this affect regulation system is poorly accessible in people with high shame and self-criticism, in whom the ‘threat’ affect regulation system dominates orientation their inner and outer worlds. Compassion-focused therapy is a multimodal approach that draws from evolutionary, social, developmental, and Buddhist psychology, and neuroscience. One of its key concerns is to use compassionate mind training to help people develop and work with experiences of inner warmth, safeness, & soothing via compassion & self-compassion”


“CFT and compassionate mind training arose from several observations. First, people with high levels of shame and self-criticism can have enormous difficulty in being kind to themselves, feeling self-warmth, or being self-compassionate. Second...problems of shame and self-criticism are often rooted in histories of abuse, bullying, high expressed emotion in the family, neglect and/or lack of affection. Individuals subjected to early experiences of this type can become highly sensitive to threats of rejection or criticism from the outside world and can quickly become self-attacking...there are clients who engage with cognitive and behavioral tasks of a therapy and become skilled at generating alternatives for their negative thoughts and beliefs, but who still do poorly in therapy... ‘I understand the logic of my alternative thinking, but it doesn’t really help me feel much better’ or ‘I know I’m not to blame for the abuse, but I still feel that I am’”

“Sensitized strategies and phenotypes for threat detection & protection can become major influences on the ways in which a person perceives & navigates the world. The clinician will identify, historically plot & validate the functions and origins of safety strategies (partly to de-shame them). In CFT the focus is on understanding the functions of a person’s symptoms & difficulties in terms of safety strategies. The first aspects of compassion grow out of this part of the formulation because it helps the client recognize that their pathology & symptoms are ‘not their fault’ but have often emerged with safety strategies. From here it is possible to begin to develop compassionate and validating reflection on the fact that they needed to develop these safety strategies...in CFT once individuals stop criticizing, condemning, and blaming themselves for their symptoms, thoughts, & feelings, they are freer to move towards taking responsibility and learning to cope with them” [like & consistent with DBT, ACT, CBT, etc.]

• Three primary affect regulation systems:
  ✓ Threat & Protection/Defense
  ✓ Drive & Excitement; Acquisition & Achievement
  ✓ Contentment, Soothing, & Social Safeness; Rest & Digest

• Symptoms, and strategies/solutions come from and are consistent with these systems & forces
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Student Perspective-Not Helpful in the Classroom

- Lecturing verbatim from book
- Too much reading/book chapters
- Studying the brain in depth first
- Overwhelmed with terms
- Overemphasis on how a neuron is structured and how it signals messages
- Unsupportive instructor

Student Perspective-Helpful in the Classroom

- Lectures/Discussions that include applied knowledge and real-life examples
- Incorporation of videos
- Weekly “What I learned” assignments
- Take-home exams/ Assessment of knowledge
- VoiceThread presentation on a medication
- Additional resources and information
- Opportunity to give feedback to professor
Student Perspective-Acquisition of Knowledge

- WHY do I need to know this?
- Application of knowledge/Examples
- Medication assisted treatment
- Competent about medication
- Ability to communicate with a team of providers
- Neurotransmitters
  - The role they play
  - How it effects thought and behavior

In Practice

- Understanding triggers
- Neurotransmitters and the role they play
- Common effects among specific drug classifications
- Withdrawal symptoms and Post-acute withdrawal symptoms (PAWS)
- Reward/Limbic system
- Process addictions
- Impacts of stress and emotional processing circuits
- Medical model of addiction
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Triggers & Craving

- From HBO's documentary series Addiction (2007) (12 minutes)
- YouTube: HBO the Science of Relapse [with CC]
- https://www.youtube.com/watch?v=NSRC7ixFEvA

Translation to Clients

- Gives the insight and understanding behind why this material is important
- Understanding addiction as a disease helps to remove stigmas and decreases shame, and feeling
- Increases hope and self-efficacy
- Provides clients with sense of feeling “normal” in group therapy using Seeking Safety treatment intervention self-compassion, recovery thinking
- Using a concept of “repairing, rethinking, retraining”
- “Dare to re-wire the brain for self-compassion” Ted Talk

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Neurobiology & Self-Compassion

- You Tube: Dare to Rewire Your Brain for Self-Compassion | Weiyang Xie | TEDxUND
- https://www.youtube.com/watch?v=eiEMVA8AJw
- (16 minutes)

Two Additional Resources
Making the Neurobiology of Addiction More Accessible to Students

Khan Academy

- General information on the mesolimbic system and biology of addiction
  - https://youtu.be/YzCYuKX6zp8
  - (8 minutes)

Dr. Kevin McCauley

- YouTube: Dr. Kevin McCauley: "New Perspectives on Addiction & Recovery"
  - (2019)
  - https://youtu.be/lbzlNfWDAPw
  - [Little over an hour]
- Pleasure Unwoven
- Memo to Self
References


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