

STRESS, RELATIONSHIPS, AND SUBSTANCE USE DISORDERS: AN INTRODUCTION TO NEUROSCIENCE-INFORMED COUNSELING

IRETA 2021
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Goals

- DISCUSS THE FOUNDATIONS FOR INCORPORATING NEUROSCIENCE INTO CLINICAL PRACTICE
- DESCRIBE A NEUROSCIENCE-INFORMED MODEL OF SUD TREATMENT
- APPLY A MODEL OF STRESS, RELATIONSHIP, AND SUD

Goals

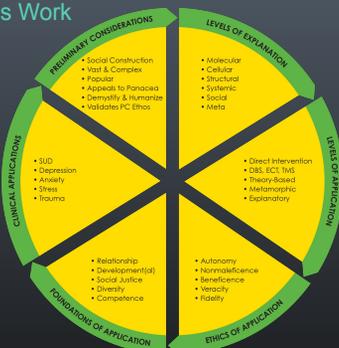
WHAT DO YOU WANT FROM TODAY?

TAKE A MOMENT

Poll Questions 1 & 2

1. I AM FAMILIAR WITH NEUROSCIENCE-INFORMED COUNSELING (NIC) PRACTICE (NEUROCOUNSELING)
 - a. YES
 - b. NO
2. I FEEL CONFIDENT IN MY ABILITY TO INTEGRATE NIC INTO MY WORK WITH INDIVIDUALS WITH ADDICTION*
 - a. YES
 - b. NO
 - c. UNSURE

Framing Today's Work



Assumption 1

Approach new neuroscience findings with caution, as this knowledge emerges quickly. Stick with tried-and-true methods of building relationships and using interventions.

Assumption 2

Neuroscience views the “mind” as mere biological processes; in practice, however, it may still be useful to describe the mind’s influence on the brain and vice versa

Assumption 3

A wellness orientation is the bedrock of counseling, yet “well” people don’t often come to us for counseling; therefore, we must approach clients where they are: experiencing pathos while pursuing wellness

Assumption 4

Neuroscience is inspiring, but it cannot suddenly provide the answer to all our clients’ suffering. More information about the brain is not tantamount to more knowledge or the wisdom in how to use it.

Assumption 5

Like many contemporary psychodynamically oriented counselors conclude, insight is rarely sufficient to produce lasting change. Regardless of the illuminating power of neuroscientific research, we must support our clients in exploring and experimenting with different behaviors.

Assumption 6

Integrating neuroscience with counseling and then applying it does not require a comprehensive knowledge of biology, chemistry, or neurobiology. It does require a commitment to grappling with certain concepts and rigor in application. This includes understanding the difference between primary sources in neurobiology and translational and/or applied work

Accessibility of Neuroscience

Level	Source	Examples from Neuroplasticity
4	Scientific papers on lab-based research with animal models	Hebb (1949) studied plasticity in the lab by examining molecular changes that produce behavioral changes.
3	Neuroscience texts that summarize this research	Sweatt (2016) synthesized the research on plasticity or metaplasticity that takes laboratory science into translational science.
2	Theory-based applications of this knowledge	Seigel (2020) described using the mind to change the brain (neuroplasticity).
1	Applied texts and articles that integrate neuroscience with counseling	Bickel et al. (2011) described a technique using memory training to increase hippocampus volume in the brains of substance misusers.

So, What is it?

COUNSELING PRACTICE THAT USES THE FINDINGS OF NEUROBIOLOGY AS A LENS TO BETTER UNDERSTAND AND IMPROVE HUMAN EXPERIENCE. IT'S APPLICATION FOR HELPERS IS MOST APPROPRIATELY IMPLEMENTED THROUGH LINGUISTIC DEVICES LIKE METAPHOR TO UNDERSTAND HUMAN FUNCTIONING THROUGH THE BRAIN AND NERVOUS SYSTEM.

5-4-3-2-1 Heuristic

- ONE BRAIN
- TWO HEMISPHERES
- THREE LEVELS OF FUNCTIONING
- FOUR LOBES
- FIVE SYSTEMS
 - CENTRAL NERVOUS SYSTEM
 - PERIPHERAL NERVOUS SYSTEM
 - SYMPATHETIC NERVOUS SYSTEM
 - PARASYMPATHETIC NERVOUS SYSTEM
 - ENTERIC NERVOUS SYSTEM

Neuroscience-Informed Practice

Poll Question 3

WHAT IS YOUR PRIMARY MODEL OF ADDICTION*?

1. MEDICAL MODEL (BRAIN DISEASE)
2. MORAL MODEL (DISEASE OF WILL)
3. SELF-MEDICATION MODEL
4. LEARNING MODEL
5. AA MODEL
6. OTHER

Challenge # 1 Defining Addiction

The Moral Model—addiction results from a character deficit or moral failing

The Learning Model—addiction as learned behavior, from the social environment, cognitions, and other models

The Disease or Medical Model—addiction as an illness for which abstinence is the only cure

The Self-Medication Model—addiction as developing from un(medically)treated psychological dysfunction

The Social Model—similar to feminist or multicultural models of therapy, explains addiction as a result of sociological factors, such as oppression and limited resources

Challenge # 1 Defining Addiction

The AA Model—views addiction as a combination of the aforementioned single-focused factors, including using recovery culture for support (i.e., "90 meetings in 90 days")

The Dual-Diagnosis Model (Co-occurring)—views addiction as discrete from a coexisting psychological disorder

The Biopsychosocial Model—genetic foundations, psychological factors in a social context as addiction explanation

The Harm Reduction Model—reacting to abstinence-only models, views addiction as the result of normal urges, so the goal is to seek to minimize negative impact

The Multivariate Model—addiction as a combination of single-focused and multi-focused model components

Challenge # 1 Defining Addiction

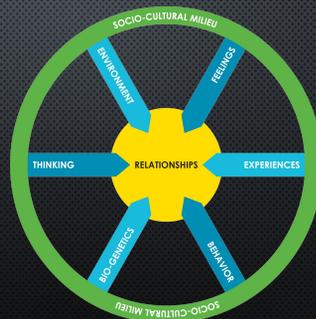
- A pattern of substance misuse consisting of any 2 of 11 symptoms (DSM-5)
- “a reward deficit and stress surfeit disorder” (Koob, 2013)
- “an attachment disorder (Flores, 2004; Unterrainer et al., 2017)
- A relational disorder (Luke et al., 2018)
- Dysfunction in negative and positive valence systems (RDoC)

ADDICTION

*THE MAN TAKES A DRINK;
THE DRINK TAKES A DRINK;
THE DRINK TAKES THE MAN*

Challenge # 1 Defining Addiction

NEUROSCIENCE
PERSPECTIVE



Sociocultural Milieu

Individuals grow in concentric rings of culture and social influence, from the outside in: global, national, racial, ethnic, community, family, spirituality, and unique individual self - in context

- Crossley et al. (2018) - social and environmental effects on the brain
- Farah (2018) - SES effects on the brain
- Clark-Polner and Clark (2014) - relational context for social neuroscience

Children and adolescents internalize culture-based attitudes and behaviors, whether about substance use itself or coping with stress through substances (Luke & Schimmel, in press)

Relationships

Humans exist in and are defined by their relationships - even if they have none.

- Gennaro et al. (2019) - embodied and psychophysiological approaches
- Tschacher and Meier (2019) - “Physiological synchrony in psychotherapy”
- Reeck et al. (2016) - social regulation of emotion

“Early relationships can set the stage for addiction, in addition to exacerbating addiction through relational exploitation” (Luke et al., 2018).

“Healthy early relationships inoculate the brain to stress, which serves as a protective factor later in life. When the stress management circuits are incomplete or damaged, vulnerability to addiction is increased” (Luke, 2020, p. 254).

Biology (Genetics, physical health)

All that is human, arises from neurobiological processes (Kalat, 2019) - involves genetics, passed down from previous generations, and biological functions, including sleep, diet/nutrition, exercise, and overall physical health. Fifty percent genetic predisposition to addiction; neurobiological adaptations from prolonged substance use.

- Berger et al. (2009) - epigenetics as heritability of traits and teleology
- Panksepp (2016) - individual genetically based variation in response to the environment
- Lin et al. (2017) - - interaction of genetics, lifestyle, and environmental factors
- Bonnert et al. (2018) - - relationship between avoidance behavior and IBS in adolescents

Environments (Past and Present)

Environment includes both previous and current living situations and can be physical and emotional. Early environments shape the development of all humans, facilitating or blocking growth in core domains of experience like cognition, emotion, relationships, and behavior (Suleiman & Dahl, 2017)

- Koob and Volkow (2016) - identify low socioeconomic status, lack of social support systems, parental drug use and poor quality of parenting, parental depression, and sibling and peer influences, drug availability, school, neighborhood characteristics, advertising, the media, and, of course, stress.
- Prochazkova and Kret, (2017) - role of modeling and mimicry in one's environment
- Suleiman and Dahl (2017) - how environmental context influences neural development and subsequent behavior

Experiences (Past and Present)

Events exert influence human behavior and perception, in part by activating genetic coding that affects later functioning; in other words, experiences can be longer lasting and more influential than previously recognized.

- Park et al. (2017) and Ramamurthy and Krubitzer (2018) - animal models of experience-dependent plasticity
- Rogers et al. (2019) - implications of environment on brain function
- Clayton et al. (2019) - role of acute experiences on long-term memory

“Trauma, avoidance, and modeling of behaviors are all key experiences that can influence the development of addiction, either through learning itself or through gene expression” (Luke, 2020).

Thinking/Cognition

Encompasses language, perception, attention, memory, etc. (Pulvermüller et al. (2014). Also includes *self-talk* related to experiences and environments; cognitive control over impulses; cause and effect thinking; delay discounting

- Rodman et al. (2019) - role of cognitive appraisal to reduce depression in childhood maltreatment
- Pulvermüller et al. (2014) - “thought circuits” in understanding cognition
- Matheson and Barsalou (2018) - role the brain, body, and immediate environment in combination have on cognition.

Behavior(s)

Feature of human experience that is often the target in counseling, both as a referent for counseling and as a goal. Is behavior primarily a response to a stimulus or a psychological phenomenon in which some mediating variable (e.g., will, cognitive) affects the outcome of a given stimulus (Luke, 2020, p. 22).

- Kandel's (1976) - seminal work on the neurobiological basis of behavior
- Hebb's Rule (1949) - neurobiology of learning
- Ledoux et al. (2017) - neurobiology of avoidance behaviors

Feelings/Affect/Emotion

Specific or diffuse, future-oriented, and subjective experience of fear or impending doom/problems. “Antecedent feelings to addiction can include loss, grief, anxiety, depression, sadness, and the like; subsequent feelings include guilt, relief, fear, shame, etc.” (Luke, 2020).

- Koenig (2019) - role of “neurovisceral regulatory circuits” as they relate to children's and adolescents' affective resilience
- Panksepp et al. (2017) - core emotions: Positive: SEEKING (enthusiastic interest), LUST (passionate sexual arousal), CARE (devoted nurturance), PLAY (prosocial joy). Negative: RAGE (anger), FEAR (threat-induced anxiety), PANIC (the psychological pain associated with separation distress)

Challenge #2: Locating Addiction

Biological

- 50% heritability
- Biological response to substances (allergy)
- Metabolism

Cognitive Risk Factors

- Limited impulse control
- Unfinished cognitive development
- Diminished executive functioning

Behavioral Risk Factors

- Impulsivity
- Early aggression

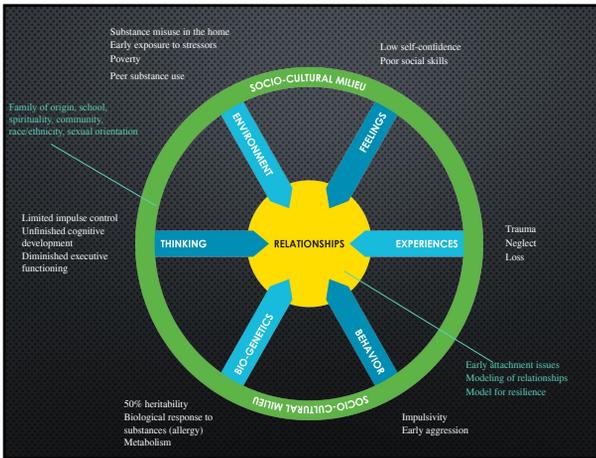
Emotional/Psychological

- Low self-confidence
- Poor social skills

Family Environment Risk Factors

- Substance misuse in the home
- Early attachment issues
- Early exposure to stressors
- Poverty
- Peer substance use

(from Volkow & Boyle, 2018)



Challenge #2: Locating Addiction

- The amygdala is the seat of emotional memory and interprets sensory input in terms of risk assessment (Garrett & Hough, 2018).
- The hippocampus governs memory storage and retrieval, including short-term memory, which has been implicated in substance disorder treatment (Bickel & Marsch, 2001; Bickel, Yi, Landes, Hill, & Baxter, 2011)
- The nucleus accumbens is associated with reward pathways, as well as connections between desire and subsequent behaviors (Tops, Koole, IJzerman, & Buisman-Pijlman, 2014).
- The ventral tegmental area (VTA) contains dopaminergic neurons associated with reward processing and seeking (Everitt & Robbins, 2013).
- Studies of mesolimbocortical Dopamine System (MDS) support views of substance use disorders not solely as reward based but as a progression from positive reinforcement to negative reinforcement (Salamone & Correa, 2012). (Luke et al., 2018, pp. 173–174).

How is it treated?

- Motivational Interviewing (MI) and Motivational Enhancement Therapy (MET)
- Cognitive Behavioral Therapy
- Family Based Therapies (FBT)
- Behavior Therapies (contingency management)
- 12 step programs (AA, NA)
- Medication
- Varies based on substance and co-occurrence

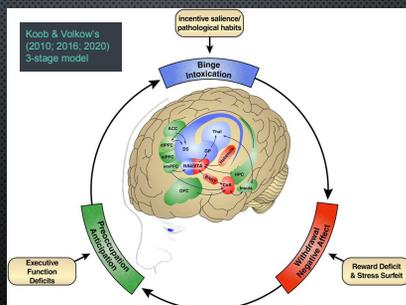
(Chung & Bachrach, 2019)

How is it treated? Family

- Conflict Management (Wang et al., 2021)
- Medication compliance
- Communication Skills Training
- Family-based intervention compliance (i. e., “good-enough parenting”)
- Cognitive and behavioral intervention compliance: follow through on appropriate limits and support, contingencies of reinforcement

How is it treated?

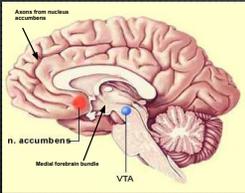
Reward deficit, Stress Surfeit



NEUROBIOLOGY OF ADDICTION

- CONNECTIONS BETWEEN STRESS, TRAUMA, RELATIONSHIPS, AND ADDICTION
- ITS EXCRUCIATING TO BE WITHOUT ONE'S DOC

ADDICTION AND THE MESOLIMBIC CORTICAL DOPAMINE SYSTEM (MDS)

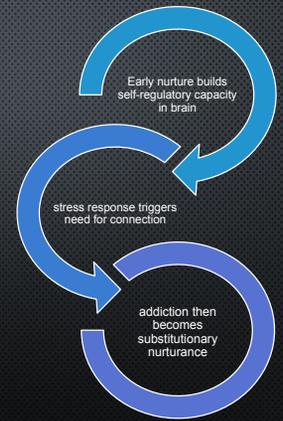


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Mesolimbocortical Dopamine System (MDS) – one view of the brain's reward system – positive reinforcement versus negative reinforcement is a key contrast for treatment.

Structures interact with the production and reception of dopamine. Reward is learning: "When this happens ___ I feel good" and turns into "When this does not happen ___ I feel pain"

NURTURE-STRESS-ADDICTION CYCLE



SUBSTITUTIONARY NURTURANCE

SUBSTANCES OFTEN DAMAGE RELATIONSHIPS SO THAT EVEN LESS RELATIONSHIP REWARD MAY BE AVAILABLE TO ADDICTED INDIVIDUALS, DRIVING THEM BACK TO DRUGS, WHICH FUNCTION AS RELATIONAL SUBSTITUTES, FURTHER ISOLATING THEM AND GIVING THEM LESS PRACTICE IN RELATING AND RELEARNING HOW TO GET REWARDS FROM THEM.

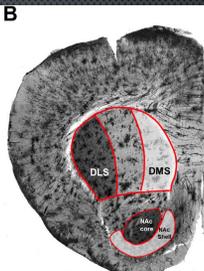
HABIT AND GOALS

"A HYPOTHESIS THAT ENCOMPASSES MANY OF THESE MALADAPTIVE BEHAVIORS IS THAT THE DEVELOPMENT OF DRUG ADDICTION INVOLVES A TRANSITION FROM INITIAL, VOLUNTARY AND GOAL-DIRECTED DRUG USE TO HABITUAL AND COMPULSIVE DRUG USE (EVERITT ET AL., 2008; EVERITT AND ROBBINS, 2013). INTERESTINGLY, BOTH CHRONIC AND ACUTE STRESS FACILITATE HABITUAL LEARNING AND BEHAVIORS (I.E., BEHAVIORS THAT ARE INFLEXIBLE OR INSENSITIVE TO A REDUCTION IN REWARD VALUE), AT THE EXPENSE OF GOAL-DIRECTED OR SPATIAL LEARNING AND MEMORY" (TAYLOR ET AL., 2014, P. 231).

10-23 S. B. Taylor, et al., "Chronic Stress May Facilitate the Recruitment of Habit and Addiction-Related Neurocircuits Through Neuronal Restructuring of the Striatum," *Neuroscience*, vol. 260, pp. 231-242. Copyright © 2014 by SAGE Publications.

STRESS, ADDICTION, & THE BRAIN

Behavior	Striatal Regions Involved	
	Dorsal Striatum	Ventral Striatum
Goal directed learning and memory	DMS	----
Initial rewarding effects/ acquisition of drug taking	DMS	NAc shell
Habitual learning and memory	DLS	-----
Drug-seeking/ compulsive and habitual drug taking	DLS	NAc core



Taylor, S. B., Anglin, J. M., Paolde, P. R., Riggert, A. G., Olive, M. P., & Conrad, C. D. (2014). Chronic stress may facilitate the recruitment of habit- and addiction-related neurocircuits through neuronal restructuring of the striatum. *Neuroscience*, 280(Mar), 231-242. doi.org/10.1016/j.neuroscience.2014.09.029

STRESS, ADDICTION, & RELATIONSHIPS

~THE MAN TAKES A DRINK (GOAL-DIRECTED BX IN DMS),
 ~THE DRINK TAKES A DRINK (HABITUAL BX IN DLS),
 ~THE DRINK TAKES THE MAN (STRESS-INDUCED DEPENDENCE)

TREATMENT FOUND IN NEW DEFINITION

Addiction is a relational disorder that manifests itself in disordered cognitions, behaviors, emotional processing, social functioning and intimacy.

Its origin may be traced to difficulties in receiving nurturance from primary caregivers, resulting in deficits in social and emotional regulation

These disordered brains lead to compensatory behaviors that limit pain and "outsource" neural regulation to substances, behaviors, or pathological relationships

TREATMENT

TREATMENT CAN BE A BASE WHERE THE INDIVIDUAL WITH AN ADDICTION CAN RELEARN STRESS TOLERANCE AND EMOTIONAL REGULATION, AND WHERE THEY CAN BOTH CONSCIOUSLY AND UNCONSCIOUSLY EXPERIENCE HOW RELATIONSHIPS CAN PROVIDE REWARDS FOR THEM.

IT CAN SUGGEST THAT PEOPLE TURN TO ADDICTION WHEN THEY ARE OVERWHELMED BY HOW IMPERFECT, FRUSTRATING, BORING, EMPTY, AND LONELY LIFE AND HUMAN RELATIONSHIPS CAN APPEAR.

IT CAN ALSO PROVIDE GLIMMERS OF REWARD THAT MAY HELP ADDICTED INDIVIDUALS TO TOLERATE THESE NEGATIVE ASPECTS, SO THAT THEY ARE ABLE TO EXPERIENCE OTHER, EQUALLY AUTHENTIC AND REAL ASPECTS OF HUMAN LIFE AND HUMAN EXPERIENCES—LAUGHTER, UNDERSTANDING, COMPASSION, AND CONNECTION.

MEMORY & RELATIONSHIPS

DELAY DISCOUNTING REFERS TO THE DECREASE IN VALUE OF A REWARD AS A FUNCTION OF THE DELAY TO ITS RECEIPT.

AN INDIVIDUAL'S RATE OF DISCOUNTING CAN BE MEASURED BY ASSESSING PREFERENCES BETWEEN A SOONER, SMALLER REWARD OR A LATER, LARGER ONE.

Bickel and colleagues, 2001, 2011, 2016

