Treating the Personality in the Addictive Personality: A Neuroplastic Approach

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Abstract

• The co-occurrence of Borderline Personality Disorder (BPD) and Substance Use Disorders (SUD) is well-documented and poses specific treatment challenges. While BPD is often conceptualized as the behavioral manifestation of early life events amenable to intensive psychotherapy rather than to biological approaches, more recent research suggests that BPD is a disabling brain disease well as a personality disorder.

• Neglecting the neurobiological underpinnings of BPD, may render psychotherapeutic intervention only partially successful thereby reinforcing the cycle of affective instability that often characterizes BPD.

• This presentation suggests that some individuals with BPD, who also have specific deficits in certain brain structure and function, might benefit from a neuroplastic approach to BPD and Substance Use treatment.
Presentation Goals

1. Review the co-occurrence of BPD and SUD

2. Describe the etiology and developmental course of BPD.

3. Describe the effects of substance abuse on brain structure and cognitive functioning.

4. Describe the brain structure and cognitive functioning of individuals with BPD

5. Define neuroplasticity and its relevance for the disease model of addiction.

6. Integrate traditional psychotherapy for BPD with a bio-behavioral, neuroplastic approach.
Part 1: BPD and Substance Abuse

• Review the co-occurrence of BPD and SUD.

• Describe the etiology and developmental course of BPD.
Addictions and Personality Disorder

What’s Common?

> Chronic and maladaptive ways of dealing w/ one’s environment.

What’s Different?

> Etiology, age of onset, manifestation

> PD: childhood events; contribute to onset and maintenance of addiction.

• Treating underlying PD: important component of a holistic recovery program.
Addiction is like other diseases

• Genetic predisposition (40-60%)

• Lifestyle choices

• Environmental factors
Hypothesis about the cause(s) of addiction

• Genetic predisposition (biological, neurochemical)
  • No single/discrete addiction gene
  • 40-60% of predisposition to addiction is genetic

• Environmental predisposition: @ 50% (pruning)
  • Poor coping skills
  • Poor modeling
  • Poor goodness of fit
  • Family stressors
  • Childhood developmental trauma
  • Genetic and/or environmental limitations to pro-social coping.

• Effect on brain functioning?
Self-medicating Hypothesis

- Painful affect (environmental, psychological, social learning) and related genetics (biological, behavior).

- Drug of choice: interaction between the psychopharmacologic action of the drug and the dominant painful feelings with which they struggle. (biological, psychological).
  
  - Narcotic addicts: seek relief from disorganizing and threatening rage and aggression.
  
  - Cocaine addicts seek relief from depression, hypomania, and hyperactivity.

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Addiction and Personality Disorder Co-morbidity: Which came first?

• 50% to 75%: chance of co-occurring SUD and PD
  • Most personality disorder traits are obvious in adolescence.

• Alcohol dependent:
  • 20.8% obsessive compulsive, 10.4% paranoid, 9.4% dependent.

• Cocaine, opiate, marijuana and alcohol abusers:
  • 21% antisocial, 14.5% narcissistic, 11.3% borderline.
Characteristics of Personality Disorders

- Early onset (habit → neural pathways)
- Consistent and across situations (habit → neural pathways)
- Resistant to change (habit → neural pathways)
- Ineffective and frustrating
- Poor relationships
- Mood swings and anger
Social / public manifestations of Personality Disorders

Poor social relationships

Narcissistic: demanding, fearful bravado

Obsessive Compulsive: rigid, intolerant, odd, fearful

Dependent: clinging, demanding or avoidant

Paranoid: fearful, untrusting

Borderline: approach-avoidant, suspicious yet needy, emotionally volatile
What is Common: BPD and SUD

• Impulsive, self-destructive behaviors.

• Mood swings: severe depression to manic periods of intense energy.

• Manipulative, deceitful actions.

• Lack of concern for personal health and safety
  • pursuing dangerous behavior in spite of the risks.

• Instability in relationships, jobs and finances.
Borderline Personality Disorder (BPD)  
(Emotional Dysregulation Disorder)

Includes behaviors associated with other PD.

Distorted self-perception + unstable relationships.

Highly manipulative, dependent, dramatic, impulsive -> what is the goal of this?

Maladaptive way of coping with fear and emotional pain
  • Fear of Abandonment?

Alcohol and drugs can exacerbate rage and depression (opposites).
BPD Causes: Theories not Proofs

• Dysfunctional family environment
  • Neglect and abandonment (actual or perceived)
  • Sexual, physical, psychological trauma

• Hereditary Factors
  • Parents, siblings

• Neurological factors and Brain Chemistry
  • Especially dysregulation of mood, behavior, emotions
  • Abnormal processing of neurotransmitters such as serotonin
Signs and Symptoms of BPD -1

• Frantically **avoid abandonment** – both real and imagined
  • overly dependent?
  • overly disengaged?

• **Unstable sense of self**: trauma, early relationships, neurochemistry, combo?

• **Difficulty maintaining interpersonal relationships**
  • Therapeutic transference, 12 Step Fellowship

• **Suicidal** behavior or self-injurious acts
Signs and Symptoms of BPD -2

- **Fluctuating mood**
- Chronic feelings of **emptiness** and depression

**Paranoia**
*What is the content of the paranoia?*

- Difficulty controlling **anger**
*Catharsis? Executive functioning?*
How does BPD cause problems?

• Interferes with interpersonal relationships

• Self-harm

• Creates stress and conflicts
  • Family, workplace, friends

• Catastrophize and crises
  • Abuse, criminal, hospitalization, employment
The Familiar Cycle of Failure
(Cycle = habit = neural circuitry)

> Assess oneself to be incapable (Bandura)

> Feel depressed or anxious or angry about this self-assessment

> SUD to Escape these feelings

➢ Creates new round of Depression, anger and helplessness

➢ Self-punishing behavior > Why punish myself??
  ➢ (repetition compulsion: is this the neurobiology of habit)
Why fear Success?

Higher goals and standards may exceed my ability, expose my weakness
- Emotional / relationship demands.
- Putting yourself out there: possible rejection.
- End familiar and predictable cycle of failure: move to the unknown.
- Success if unfamiliar.

• Do I have the skills
  to be successful?
  to maintain success?
Self Medicating Borderline Personality Disorder

• Dulls fears, anger and delusions

• May not realize SUD is an attempt to deal with their personality disorder.

• But, they realize they feel better when they are intoxicated / high.

• Short-term relief to a life-long issue; risk developing a SUD.
Goal of Abstinence in Treatment

• “Activity (SUD) is the antidote to anxiety”
  • SUD allows escape from anxiety; underneath anxiety is fear.

• Clarity to focus on cognitive distortions that lead to SUD

• Face the terrifying feelings that one tries to escape (mindfulness)
Part 2: SUD and Cognitive Functioning

• Describe the effects of substance abuse on brain structure and cognitive functioning.

• Describe the brain structure and cognitive functioning of individuals with BPD.
Brain regions injured by alcohol/drug abuse

- Brain Stem
- Cerebral Cortex
- Limbic system
- Cerebellum
- Hypothalmus
SUD and the Brain

• Target the brain’s reward system by flooding it with dopamine.

• Previously enjoyable activities no longer produce the same amount of pleasure as the drug:
  • Walking in the park with your spouse: X
  • Good food, sex, physical activity: 4X
  • Drugs: 1000X
The Limbic ("Border") System

The limbic system coordinates:
- emotions such as fear and aggression.
- basic drives such as hunger and sex.
- the formation of episodic memories.

**The hippocampus ("seahorse")**
- processes conscious, episodic memories.
- works with the amygdala to form emotionally charged memories.

**The Amygdala ("almond")**
- consists of two lima bean-sized neural clusters.
- helps process emotions, especially fear and aggression.
Limbic System: Brain’s Reward Center

Addictive drugs provide a shortcut to the brain’s reward system by flooding the nucleus accumbens with dopamine.

The hippocampus creates memories of this rapid sense of satisfaction, and the amygdala creates a conditioned response to certain stimuli.
Limbic System: the brain’s reward circuit

• Hippocampus and septal area: controls memory, emotions, ability to feel pleasure.

• Feeling pleasure motivates us to repeat behaviors that are critical to our existence.

• Perception of positive + negative emotions, explains mood-altering properties of drugs.

• Affect of alcohol: may experience some memory loss, have exaggerated states of emotion.

• Activated by healthy, life-sustaining activities (eating, socializing) also by drugs of abuse.
Dopamine and the Limbic System

• Interacts w/neurotransmitter, glutamate, hijack the brain’s system of reward-related learning.

• Normal: Limbic system links human survival activities (eating and sex) with pleasure and reward.

• Normal: Limbic system links pleasure and reward with motivation and memory.

• Addictive substances and behaviors stimulate the same circuit — and then overload it.

• Addiction: nerve cells in the nucleus accumbens and the prefrontal cortex (the area of the brain involved in planning and executing tasks) links liking something with wanting it \(\rightarrow\) addictive behavior: pursuit.
The Reward Circuit

How the Brain Responds to Natural Rewards and Drugs
Cerebral Cortex

- Processes sensory information, thoughts.
- Initiates voluntary muscle movements and some control over lower-order brain centers.
- Frontal cortex: thinking center of the brain: plan, solve problems, and make decisions.
SUD and Cerebral Cortex

• Impair thought processes, leading to potentially poor judgement.

• Depresses inhibition: talkative and more confident.

• Blunts the senses and increases the threshold for pain.

• As the BAC increases, these effects get more pronounced.
Brain Stem

- **The brain stem (medulla)**
  - controls basic functions critical to life: heart rate, breathing, sleeping.
  - affects results in sleepiness, if excessive can lead to coma and death.
  - risk for injury.

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The Cerebellum: muscle movement

- Coordinates muscle movement and balance.
- High BAC: uncoordinated muscle movements, loss of balance.
Hypothalamus: Automatic Functions + Hormones

Location of hypothalamus

cerebrum
corpus callosum
thalamus
Pineal gland
mid brain
pituitary
pons
spinal cord
hypothalamus
medulla oblongata

cerebellum
SUD and Hypothalmus

• Alcohol depresses nerve centers in the hypothalamus that control sexual arousal and performance.

• With increased alcohol consumption, sexual desire increases - but sexual performance declines.

• Dehydration and kidney failure
Neurobiology of BPD: MRI Studies

1. variations in the CA1 region of the hippocampus and subiculum
   \textit{spatial navigation, mnemonic processing and control of the response to stress}

2. smaller-than-normal orbitofrontal cortex (by 24\%, compared with healthy controls)
   \textit{sensory integration, representing the affective value of reinforcers, decision-making, expectation}

3. > normal volume of the right inferior parietal cortex and the right parahippocampal gyrus
   \textit{inaccurate perception of visual information, body image distortion, math/language problems.}

4. an enlarged third cerebral ventricle
   \textit{childhood developmental delay}
Neurobiology of BPD: MRI Studies

5. Females: < size of the medial temporal lobe and amygdala 
   Related to PTSD, BPD, lying, heightened fear reaction.

6. Males: < gray matter concentration in anterior cingulate

7. < gray matter on the orbitofrontal cortex right side
   Reduces risky behavior inhibition even when presented w/ negative consequences.
Neurobiology of BPD: MRI Studies

8. < grey matter concentration: involved in muscle control, and sensory perception (seeing, hearing), memory, emotions, speech, decision making, and self-control.

9. Under-development of hippocampus, caudate, and dorsolateral prefrontal cortex (working memory, cognitive flexibility, planning → DBT and MI requires this.)

10. Deficits in inhibiting lying.
Neurobiology of BPD: Magnetic resonance spectroscopy

11. Smaller frontal lobe. *Related to cognitive (movement and speech), emotional or behavioral deficits.*

12. Adolescents w/ bipolar disorder: more likely to develop substance use disorders if they have lower gray matter volume. → *early childhood trauma effects?*
13. > levels of N-acetyl aspartate (NAA; found in neurons) and creatinine in L amygdala.

14. Avg > 19% in NAA concentration in dorsolateral prefrontal cortex.
Neuronal Loss / < NAA Levels

- Alzheimer disease
- epilepsy, amyotrophic lateral sclerosis
- schizophrenia
- multiple sclerosis,
- AIDS
- traumatic brain injury, stroke
- non-neuronal brain tumors such as glioma.
BPD: Functional magnetic resonance imaging (fMRI)

1. > amygdala activation, longer return to baseline. (stay emotionally unregulated)

2. > functional connectivity in the L fronto-polar cortex and L insula.

   *Create new solutions, stratify/hierarchy the value of new stimuli → MI, DBT*

3. < connectivity in L cuneus, L inferior parietal, R middle temporal lobes.
BPD: Functional magnetic resonance imaging (fMRI)

4. > frontal hypometabolism: executive dysfunction (*i.e.* *Alzheimer’s*)

5. hypermetabolism: motor cortex, medial, anterior cingulate, occipital, temporal poles.

   *Disorganization, OCD/Schizophrenic-like*

6. > connectivity between the amygdala during fear stimulus. (trauma *hx*)
BPD: Functional magnetic resonance imaging (fMRI)

7. deactivation of opioid system in L nucleus accumbens, hypothalamus, hippocampus.

8. hyperactivation of L medial prefrontal cortex during social exclusion.
   *Feel guilt, remorse, interpret reality*

9. > mistakes differentiating emotional and neutral facial expressions.
Diffusion tensor imaging (DTI)

- bilateral decrease in fractional anisotropy (FA) in frontal uncinated, and occipital frontal fasciculi.
- decrease in FA in the genu and rostrum of the corpus callosum
- decrease in inter-hemispheric connectivity between right and left anterior cingulate cortices
Part 3: Neuroplasticity and Hope for Recovery

• Define neuroplasticity

• Describe the relevance of neuroplasticity for the disease process model of addiction.
You can teach an old dog new tricks

“I was wrong...you can teach an old dog new tricks.”
What is Neuroplasticity?

• The ability of elements in the brain to show structural and functional changes in response to **internal and external events**.

• **Neuroplasticity**
  • structural plasticity (new neurons born, growth, shrinkage of neurons)
  • functional synaptic plasticity (enhancing/diminishing the functional connection between neurons)
  • + molecular and cellular mechanisms that accompany these changes.
Neuroplasticity: repetition, habit, feedback

• Repetitive activation of synapses and neural pathways lead to synaptic strengthening.
Neuroplasticity

What is it?

- 'Neurons that fire together wire together'
- The brain's ability to reorganize itself by forming new neural connections
Neuroplasticity: The Brain Can Change!

How’s it work? (The Science)

- **Synaptic plasticity** – changes in the strength of synapse connections
- **Synaptogenesis** – Creation and removal of whole synapses
- **Neuronal migration** – Neural connections moving to different areas of the brain
- **Neurogenesis** – Creation of neurons

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Recall: Plasticity = susceptible to experience-based changes.

- No evidence to suggest any brain area is not plastic.
- Areas of brain that are sensitive to external stressors: cortex, amygdala and hippocampus – areas critical for learning and memory.
Neuroplasticity: life cycle, pros, and cons

- Maladaptive neuroplasticity due to drug and alcohol brain trauma.
- Early childhood development and maturation.
- Age-related cognitive decline.
- Adaptive recovery from TBI and stroke recovery.
- Phantom limb.
- Hormonal variations and season-induced behavior changes.

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Neuroplasticity and Critical Periods: Age

Almost all adult brain areas are less plastic than those in a young child's.

Critical period: language development and the auditory-vestibular system and depth perception

Adult Plasticity: Postero-lateral parietal cortex: planned movement and spatial reasoning.
Neuroplasticity and Critical Periods: Age

**Hippocampus** (learning and memory): capable of neurogenesis.

- Learning and exercise: > hippocampal neurogenesis.
- Depression, advancing age and sleep deprivation <.

Cannabinoids: > neurogenesis without a demonstrable enhancement in cognition.

Cerebellum (involved primarily in motor coordination).

Subventricular zone: planning and modulation of movement
Part 12:
The Cingulate Gyrus
Measuring Neuroplasticity

1) Functional correlates of neuroplasticity: recovery of skills

2) Biochemical testing, EEG and fMRI studies + Transcranial Magnetic Stimulation.

3) **Gold standard**, microscopically demonstrate morphological changes:
   - a) new synaptic connections (synaptogenesis), the "pruning" of old synapses.
   - b) the formation of new neurons (neurogenesis).
Summary: Brain Wellness
The brain can recover from certain trauma depending on

- Type of trauma
  - Degenerative, acquired/acute, chronic,
- Extent and location of the trauma
- Extent of the trauma and injury
- Extent and location of unaffected
- Time between trauma and treatment
- Type of treatment/intervention
Part 4: Neuroplasticity and Hope for Recovery

• Integrate traditional psychotherapeutic treatment of BPD with a bio-behavioral, neuroplastic approach.
MI Assumptions

• Ambivalence impedes change >>>> Resolution of ambivalence (clarity) promotes change.

• Cognitive skills:
  • Perceptual accuracy
  • Cause/effect
  • Cognitive flexibility and creating hierarchies
  • Consequential thinking
  • Visioning: planning and goal setting
  • Predicting outcomes
  • Managing Cognitive dissonance
Motivational Interviewing

- 1. Asking Permission: Respect for clients.
- 2. Open-Ended Questions
- 3. Evoking Change: Visioning the Future
- 4. Reflective Listening
- 5. Normalizing
- 6. Questions to Elicit/Evoke Change Talk
- 7. Evoking Change through Empathy
- 8. Futurizing
- 9. Therapeutic Paradox
Treatment Challenges: BPD and SUD

• Transference (relationship) challenges
  • Unrealistic demands placed on therapist
  • Approach - avoidance of constant contact with their treatment team.
  • Needy, dependent, overwhelm therapist with their emotional needs.
  • Unpredictably angry, hostile, paranoid toward therapist.

“Effect reflects intent”: Does the client want you to feel the way he/she does?
Therapist: emotionally exhausted, incompetent: Is this the internal experience of the BPD patient?

Recall: What is your working hypothesis?
Treatment Planning: Goals

• What recovers: structure or function?

• Goal: recover functioning

• Repair the old structure? Or Create new?

• Neurogenesis
Components of Effective DD treatment

Comprehensive Evaluation that includes:
• Assessment of preserved cognitive skills, and deficits
• Assessment of personality disorder symptoms
• Suicide risk
• Crisis management plan

• Stable and supportive milieu that includes:
  • Stable, supportive treatment environment
  • Individualized care from a coordinated team of professionals familiar with the issues of borderline personality disorder and addiction
  • Continuum of care with step-down and community-based support
Specific Treatment Challenges

• Compliance: drop out rate, relapse
• Relationship with therapist and staff-splitting
• Turbulent relationships in milieu and 12 Step fellowship
• Mixed results from medication
• Suicidal thoughts, attempts, threats

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Medication Management Challenges with SUD / BPD

• Noncompliance

• Overdose

• Demands for frequent changes in medication

• Failure to accurately report medication effectiveness / ineffectiveness

• Resistant to medication or demand medication at the start of treatment
Therapist Skills

• Understand personality disorder (education, experience, training)

• Maintain boundaries

• Provide consistent, nonjudgmental support (does not mean approval)

• Prevent acting on negative countertransference
Dialectical Behavior Therapy (DBT)

- Dialectical (poles): acceptance yet change.

- Marsha Linehan, PhD: treatment of psychological pain resulting in severe self-injury including suicide.

- Dr. Linehan’s personal history of self-injurious acts and 2+yr inpatient hospitalization in her late teens.

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Neuroplasticity, DBT, and Motivational Interviewing

• Motivate to make significant **changes** in the client’s life.
  • Psychological causes of addiction

• Teach **new** skills like mindfulness training to manage mood and triggers.
  • Social learning theory

• **Change** the behavioral response to environmental cues and social connections that promote substance abuse. (people, places, and things)
  • Operant conditioning
Neuroplasticity, DBT, and Motivational Interviewing

- Reduce the craving to drink or abuse drugs
  - Learning theory, classical conditioning, operant conditioning, biological

- Identify, pursue new meaningful, self-affirming activities that create interpersonal connections.
  - Psychological causes of addiction, social learning theory

- Create and achieve manageable recovery goals (i.e. staying sober for 24 hours)
  - Behavioral
DBT for use with individuals who have SUD

• DBT is a method (treatment) for the client to achieve self-acceptance while simultaneously accepting the need for change.

• The dialectic (poles): ACCEPTANCE and CHANGE.

• Four basic aspects to DBT:
  • mindfulness,
  • interpersonal relations,
  • emotion regulation,
  • distress tolerance.
1. Mindfulness (tolerance / acceptance of the present)

Focus on the present as opposed to the past or future. *(behavioral)*

Aware and accept one’s internal and external experiences without judging the experience. *(psychological)*

Accept (not avoid or judge) but not approve. *(psychological)*
2. Effective Interpersonal relations

Set limits and safeguard self and relationships.

(learning theory, psychological)

Apply new effective strategies for:

1. asking for what one needs
2. saying no
3. coping with interpersonal conflict.

(learning theory, psychological)
3. Distress Tolerance

- Learn to bear pain skillfully. (learning theory)

- Accept (non-evaluative and nonjudgmental) both self and the current situation. (psychological). Does not mean approval.

- Tolerate and survive crises; accept life as it is in the moment.

- Strategies:
  - Distracting, self-soothing, improving the moment, compare pros and cons.
  - Acceptance skills include radical acceptance, turning the mind toward acceptance, and willingness versus willfulness.
Distress Tolerance (continued)

• Develop coping skills during crises and when emotions overwhelm immediate problem-solving skills (death, sickness, loss of job, etc.) but still need to persevere and live through the crisis without making it worse by impulsive actions. (getting high or drunk).

• Delay the gratification of symptom relief.
4. Emotional Regulation

- Identify and label emotions.
- Identify obstacles to changing emotions (MI).
- Reduce vulnerability to “emotion mind”.
- Increase positive emotional events.
  - Increase mindfulness to current emotions.
- Take opposite action.
- Apply distress tolerance techniques.
- Reduce the fear of emotions.
Neuroplasticity: The Brain Can Change!
<table>
<thead>
<tr>
<th>Brain region</th>
<th>SUD Brain/Cognitive Effects</th>
<th>BPD Brain/Cognitive Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain Stem</td>
<td>1. Basic life functions: respiration, involuntary movements, heart rate.</td>
<td>NA</td>
</tr>
<tr>
<td>DBT</td>
<td>Mindfulness, Emotional Regulation, Distress Tolerance</td>
<td>NA</td>
</tr>
<tr>
<td>MI</td>
<td>NA</td>
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</tr>
<tr>
<td>MI</td>
<td>Perceptual Accuracy, Cognitive Flexibility, Problem Solving Skills</td>
<td>Perceptual Accuracy, Cognitive Flexibility, Problem Solving Skills, Stratifying/Hierarchies, Managing Cog Dissonance</td>
</tr>
</tbody>
</table>
| Limbic System | 1. Hypersensitivity to drugs/alcohol.  
2. Rapid memory consolidation.  
4. Mood fluctuations.  
5. Links to prefrontal cortex to start pursuing drug/alcohol pleasure. | 1. Verbal memories  
2. Stress response  
3. Distortion of spatial relationships including body image (w/parietal).  
4. Inaccurate sensory integration.  
5. Lying  
6. PTSD startle reaction.  
7. Slow return to baseline (remain highly emotional longer).  
8. Exaggerated fear.  
9. Guilt, remorse interfere with decision-making. |

| DBT | Emotional regulation  
Mindfulness  
Interpersonal Relations  
Distress tolerance | Emotional regulation  
Mindfulness  
Interpersonal Relations  
Distress tolerance |

| MI | Managing Cog Dissonance  
Cause-effect thinking  
Planning, goal-setting  
Future: visioning | Perceptual Accuracy  
Cause-effect thinking  
Cog Dissonance  
Predicting Outcomes |
| Cerebellum | 1. Muscle movement, balance and coordination.  
2. With other regions, spatial orientation. | 1. Unusual muscle movement/coordination.  
2. Disorganized (Sz) |
|---|---|---|
| **DBT** | Mindfulness  
Distress Tolerance | Mindfulness  
Distress Tolerance |
| **MI** | Perceptual Accuracy  
Planning  
Cause-effect | Perceptual Accuracy  
Planning  
Cause-effect |
2. Dehydration | NA |
| **DBT** | Mindfulness | NA |
| **MI** | NA | NA |
References

Animation and Video

References

Print Publications

1. Theories of Addiction – What is the Meaning of Addiction


References

4. Prevalence of Personality Disorders among Alcoholics and Drug Addicts: An Overview. Verheul R. · van den Brink W. · Hartgers C. Amsterdam Institute for Addiction Research, Amsterdam, The Netherlands


References


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