*Mechanisms of Addiction and Recovery: Treatment Implications*

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I am indebted to all the graduate and undergraduate students in my HABITS laboratory at UMBC for their assistance and support.
1. Understanding Use Disorders and Addiction Mechanisms as Multidimensional
2. Neuroadaptation: Brain and Biology
3. Impaired Self-Regulation
4. Salience and Narrowing of Behavior
5. How can we address these mechanisms in supporting recovery?
*Habitual patterns of intentional, appetitive behaviors

*Become excessive, problematic and produce serious consequences

*Stability of these problematic behavior patterns over time

*Interrelated physiological, psychological and social components

*Addicted individuals have difficulty modifying and stopping these patterns of behavior (smoking, alcohol, marijuana, heroin or process addictions like gambling, sex, etc.)

DiClemente, 2018
Both acquisition of and recovery from an addiction require a personal journey.

Through an intentional change process marked by personal decisions and choices.

Each journey is influenced at various points by many biological, psychological, and social factors.

Defining Addiction should help us understand the problematic nature of the journey.

The dilemma facing individuals with severe use disorders.

How to change the addictive behavior.
The Stages of Change for Addiction and Recovery

Processes, Context and Markers of Change

Dependence

Recovery

Sustained Change

Addiction
As individuals move through stages of initiation they move from thinking about doing it, to experimenting, to developing a pattern of behavior (social drinker, binge drinker, daily drinker, non drinker) that becomes habitual or consistent over time.

Many patterns are normative and socially acceptable, do not create problems or get judged excessive or use disorders.

Addiction is best represented as a well maintained, problematic pattern of engagement best equated with a severe use disorder or dependence.

Once an individual has created such a maintained, stable pattern of this nature, interventions move from prevention of initiation to recovery from addiction.

**Addiction and Stages**
Many of us have moved through stages of initiation to achieve a regular pattern of consuming alcohol, smoking, gambling. So it is critical to be able to distinguish among patterns of engagement in the behavior:

- Use, Misuse, Abuse, Dependence, or
- DSM Mild, Moderate, Severe Use Disorders

Trajectories of engagement can change over time (social use to misuse to dependence) and depend on developmental and contextual factors and influences (e.g., time limited heavy binge drinking pattern in college; money spent gambling).

Motivation focuses on how individuals move into and out of these different patterns of behavior;

Addiction focuses on the end state

Stages of Change are Pattern Neutral
Currently best defined as a Severe Use Disorder

It is both an ENDING and a BEGINNING

It is the end state of a process of INITIATION

It is the beginning of a process of RECOVERY

Let’s look at this well maintained state of being addicted or having a severe use disorder and how we define it
How do we define severity of patterns of use?

* Consumption/Engagement, Consequences, Context, and Control are frequently used to define severity of a pattern of use

* Problems with all these single factor ways of defining severity

* Patterns can change so need to identify both current and lifetime severity (critical for harm reduction and recovery; NESARC Study)

* Differs whether assessing risky behaviors or use disorders (NIAAA low risk guidelines or DSM-5)

* Severity and Patterns of Use
* DSM V - number of symptoms/indicators (6 of 11)
* Quantity and Frequency (PDA, DDD)
* Consequences/Problems attributable to drinking/drug use
  * Physical, social, legal, or psychological
* Craving
* Co-morbidity (multiple problems)
* Environment (Use by Peers and Saturation of Environment [IPA])

* How Do You Measure Addiction Severity?
Client Perception of Problem and Need for Treatment

A = Client’s Rating of Problem
B = Client’s Rating of Desire for Treatment

Legend:
0-Not at all, 1-Slightly, 2-Moderately, 3-Considerably, 4-Extremely

ASI Evaluation
**AT A GLANCE: THE SIX DIMENSIONS OF MULTIDIMENSIONAL ASSESSMENT**

ASAM's criteria uses six dimensions to create a holistic, biopsychosocial assessment of an individual to be used for service planning and treatment across all services and levels of care. The six dimensions are:

<table>
<thead>
<tr>
<th>DIMENSION 1</th>
<th>Acute Intoxication and/or Withdrawal Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exploring an individual's past and current experiences of substance use and withdrawal</td>
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<thead>
<tr>
<th>DIMENSION 2</th>
<th>Biomedical Conditions and Complications</th>
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<tbody>
<tr>
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<td>Exploring an individual's health history and current physical condition</td>
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<table>
<thead>
<tr>
<th>DIMENSION 3</th>
<th>Emotional, Behavioral, or Cognitive Conditions and Complications</th>
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<tbody>
<tr>
<td></td>
<td>Exploring an individual's thoughts, emotions, and mental health issues</td>
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<tr>
<th>DIMENSION 4</th>
<th>Readiness to Change</th>
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<tbody>
<tr>
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<td>Exploring an individual's readiness and interest in changing</td>
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</table>

<table>
<thead>
<tr>
<th>DIMENSION 5</th>
<th>Relapse, Continued Use, or Continued Problem Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exploring an individual's unique relationship with relapse or continued use or problems</td>
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</tbody>
</table>

<table>
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<tr>
<th>DIMENSION 6</th>
<th>Recovery/Living Environment</th>
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<tbody>
<tr>
<td></td>
<td>Exploring an individual's recovery or living situation, and the surrounding people, places, and things</td>
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REFLECTING A CONTINUUM OF CARE

Note:
Within the five broad levels of care (0.5, 1, 2, 3, 4), decimal numbers are used to further express gradations of intensity of services. The decimals listed here represent benchmarks along a continuum, meaning patients can move up or down in terms of intensity without necessarily being placed in a new benchmark level of care.

Attempts to connect severity with the Continuum of Care
* All these attempts offer important dimensions to consider
* All have their limitations:
  * Single dimensions of the behavior are inadequate
  * Collection of categories or symptoms seems arbitrary
  * Not certain whether multiple dimensions indicate
    * severity of the Addiction or
    * severity of serious other problems of the individual (co-morbidity, consequences)
* No unifying conceptual framework or perspective

* Understanding Addiction Severity
The challenge is to create a new view that acknowledges the multidimensionality of addictive behavior patterns that can

Aid us with diagnosis

Understand better how severity influences motivation both in initiation and in recovery

Offer specifics for treatment planning and matching

A New View of Addiction Severity
* Critical Assumptions
  * **Quantity and Frequency** must be part of how we define severity
  * **Dimensions and not categories** are needed to understand severity
  * **Highlight critical mechanisms** based on how the addictive behavior is operating in life of the individual
  * **Include biological, psychological and behavioral factors**
  * **Include Context** of Individual’s life so view of severity and recovery can be comprehensive

* Creating a New View of Addiction Severity
What follows is one attempt to create a multidimensional approach to assess addiction severity.
* Although open to interpretation and difficult to clearly measure **quantity and frequency** of use are important for assessing relative risk

* Quantity and Frequency are clearly related to motivational goals (cutting down) and as indicators of change (creating a different pattern of use)

* Amazingly quantity and frequency are not at all or only very indirectly included in DSM V and in many other views of severity

* Not in ASI or ASAM criteria

* Use Patterns are critical to Understanding Addictive Behaviors
<table>
<thead>
<tr>
<th>Risk Level</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Risk</td>
<td>0 to 2.9 drinks</td>
<td>0 to 1.4 drinks</td>
</tr>
<tr>
<td>Medium Risk</td>
<td>3.0 to 4.3</td>
<td>1.5 to 2.8</td>
</tr>
<tr>
<td>High Risk</td>
<td>4.4 to 7.1</td>
<td>2.9 to 4.3</td>
</tr>
<tr>
<td>Very High Risk</td>
<td>7.2+</td>
<td>4.4+</td>
</tr>
</tbody>
</table>

*WHO Alcohol Risk Levels for Men and Women*

Woods et al. 2018 Lancet
* **No Risk**

* **Low Risk** (within guidelines; sporadic; controlled use)

* **Infrequent High Risk** (infrequent binge drinking or problematic marijuana use)

* **Frequent High Risk** (frequent binge drinking, marijuana, or heroin use)

* **Extensive High Risk** (recurrent/daily excessive drinking, marijuana use, heroin use)

* **Defining Use Patterns**
A small set of mechanisms characterize the end state of addiction and can be used to indicate severity

My candidates are the following:

* **Neurobiological Adaptation** - brain and biological adaptations to frequent exposure to addictive behavior/substance (a brain disease)

* **Reduced/Impaired Self-Regulation** - The sense of loss of control and compromised self-regulation despite consequences that are the hallmark of addictions (a behavioral out of control disease)

* **Salience and Narrowing of Behavioral Repertoire** - The addictive behavior becoming so valued a reinforcer that the behavior becomes more ubiquitous and potent in the life of the individual (a crisis of values)

DiClemente, 2018

* **Mechanisms of Addiction Severity**
* The more the addictive behavior pattern impacts different Domains of Functioning, the greater the severity of the addiction.

* Consequences and not simply salience.

* Key Domains:
  * **Biological** - Needing the substance to manage physical withdrawal, craving, serious physical consequences (COPD, HPC, Neuropsychological consequences, organic brain syndromes)
  * **Psychological** - the addictive behavior becomes a valued psychological coping mechanism, a way to manage negative emotions, the love affair with the addiction
  * **Social** - How integrated the addictive behavior into the social context and network, into meeting social and interpersonal needs (sex, fun, social events, work)

* **Identifying Consequences in Critical Domains of Functioning**
* Quantity frequency Risk levels

* Three critical mechanisms
  * Neuroadaptation
  * Impaired self-regulation
  * Salience and narrowing of range of behavior

* Important consequences, collateral problems and co-occurring conditions in three domains of functioning (biological, psychological, social)

*Three critical dimensions for assessing Addiction Severity*
## Defining Severity of Addiction

<table>
<thead>
<tr>
<th>Use Patterns</th>
<th>Indicators</th>
<th>Domains</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Risk</td>
<td>• Neurobiological Adaptation</td>
<td>Social</td>
</tr>
<tr>
<td>Low-Risk</td>
<td>• Reduced Self Regulation</td>
<td>Psychological</td>
</tr>
<tr>
<td>Infrequent High Risk</td>
<td>• Salience/Narrowing</td>
<td>Physical</td>
</tr>
<tr>
<td>Frequent High-Risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extensive High-Risk</td>
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</tbody>
</table>
**Neurobiological Adaptation**

- Ability to use more/tolerance
- Emotional/stress regulation tied to use
- State dependent learning
- Compulsive use
- Altered thresholds of stress & pleasure
- Increased strength and scope of cues
- Negative emotional states when use is blocked
- Possible withdrawal & other rebound effects
- FMRI indicators

[Severity scale: Mild to Severe]
Stages of the Addiction Cycle: Associations with Neurocircuits & Addictions Neurochemical Assessment


Modified from: Kwako LE et al. (2015)
Reduced Self-Regulation

* Use becomes more automatic
* Difficulty controlling or cutting back
* Using to cope and self-regulate
* Continued use despite consequences
* Impulsivity increases
* Upset if use is interfered with
* Underestimating consequences
* Both ECF and Affect Regulation effects

Mild | Severe
Increased Salience and Narrowing of Behavioral Repertoire

* More highly valued & meaningful; Alcohol/Drug Expectancies
* Integrated into lifestyle (related to life domains)
* Meets more basic needs
* Difficult to imagine life without it
* Feel conflicted when incongruent with other values
* Decreases in other important activities
* More time using; arranging for use
* Social interactions and networks narrowed to similar users

Mild  Severe
Defining Severity of Addiction: Binge

Use Patterns
- Low-Risk
- Infrequent High Risk
- Frequent High-Risk
- Extensive High-Risk

Indicators
- Neurobiological Adaptation
- Reduced Self Regulation
- Salience/Narrowing

Domains
- Social
- Psychological
- Physical
Defining Severity of Addiction: College Drinking

Use Patterns

- Low-Risk
- Infrequent High Risk
- Frequent High-Risk
- Extensive High-Risk

Indicators

- Neurobiological Adaptation
  - X
- Reduced Self Regulation
  - X
- Salience/Narrowing
  - Mild
  - Severe
  - X

Domains

- Social
- Psychological
- Physical
Implications of for Recovery and Treatment
* Quantity and Frequency (PDA and DDD) as well as greatest quantity at a single session are critical for understanding the change burden and thus:

* Relevant for setting goals and change targets
* Related to pros and cons analysis and perceptions of vulnerability
* Critical for Preparation stage planning tasks
* Relevant for support systems analysis
* Often has a complicated non linear relationships with motivation and treatment outcome

* Intervention Implications: Quantity and Frequency
If measured accurately, could indicate need for *medications and type of medication* that might be a helpful motivational factor or support

Connects with genetic vulnerability with implications for *goal setting and decision making*

Indicator of needed intensity of treatment and need for *hospital detox and residential care*.

Physical problems and conditions related to our bodies and brains adapting to drinking (nutritional, liver, DTs, Organic brain syndromes) and other addictions *enhance or hinder motivational considerations* (concern, cons, commitment)

* Intervention Implications: Neurobiological Adaptation
* Reduced self-regulation *moderates successful treatment* and change

* Premorbid, comorbid, or consequence of excessive drinking or substance use (ADHD, reduced self-care, impulsivity)

* Impaired self-control needs *more scaffolding* (more types of support when exhausted or impaired (TC, 90 in 90, residential)

* Critical for *treatment planning, implementation, adherence, and maintenance*

* Interferes with *commitment and planning* with greater need for *relapse prevention* coping strategies

* **Intervention Implications: Reduced Self-Regulation**
*Scaffolding: A strategy for Managing Self Control Deficits*
* Recognize that impaired self regulation disrupts the client’s process of change
* Provide “scaffolding” - external support systems that can support the change process
* Provide a way the client can build and rebuild self-control muscle
* Make sure the building is well built before you take down the “scaffolding”
* Need for **community reinforcement approaches** (social skills, activities, employment, family reconnection)
* Need for **new environment** to support decision making, commitment, action planning
* Changes needed at **systems levels of support** personal change journey
* More **intensive treatment** as salience and narrowing increase
* **Case Management** may be needed to provide more comprehensive support for change

**Intervention Implications:**
Salience and Narrowing
SAMHSA’s working definition of recovery from mental health and substance use disorders is

“A process of change through which individuals improve their health and wellness, live a self-directed life, and strive to reach their full potential” (SAMHSA, 2012).
* Domains of functioning can be connected to drinking typologies to distinguish patterns of drinking (college student, social drinking, coping drinking, craving/compulsive drinking)

* Specificity related to salience and how much quality of life is compromised and how to tailor treatment types and strategies

* Related to breadth of cues and type and quantity of coping skills and activities needed in treatment planning

* Identification of contextual problems that also need treatment (Physical, Mental Health, Domestic Violence, HIV risk)

* Intervention Implications: Domains of Influence
Multiple Targets and Untreated Problems Complicate the Process of Change

The Context of Change: A Figure Ground Perspective

How do these further complicate the change process?
Defining Severity of Addiction

Use Patterns

- Low-Risk
- **Infrequent High Risk**
- Frequent High-Risk
- Extensive High-Risk

Indicators

- Neurobiological Adaptation
- Reduced Self Regulation
- Salience/Narrowing

Domains

Social

Psychological

Physical

<table>
<thead>
<tr>
<th>Mild</th>
<th>Severe</th>
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<tbody>
<tr>
<td>X</td>
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</table>
Defining Severity of Addiction

Use Patterns
- Low-Risk
- Infrequent High Risk
- Frequent High-Risk
- Extensive High-Risk

Indicators
- Neurobiological Adaptation
- Reduced Self Regulation
- Salience/Narrowing

Domains
- Social
- Psychological
- Physical

Mild Severe

- Low-Risk
- Infrequent High Risk
- Frequent High-Risk
- Extensive High-Risk
Probably both patients could have 6 or more DSM criteria and be diagnosed with a severe use disorder

Same treatment?

Same need for support?

So What?
*Recovery represents a series of tasks that are critical to moving through the stages to sustained change

* Motivation is behavior and goal specific so pattern of use and severity are critical to goal setting

* Neuroadaptation severity affects decision making, commitment, planning, relapse

* Self-regulation severity reduces self-control critical for coping and needed to manage addictive behavior and to reduce use, sustain change, and prevent relapse

* Salience severity interacts with ambivalence, decision making, commitment, support, planning, and implementing action plans and both relapse and recycling

* How does Addiction Severity interact with Motivation
**Stage of Change Labels and Tasks**

**STAGE**

* Precontemplation
  * Not interested
* Contemplation
  * Considering
* Preparation
  * Preparing
* Action
  * Initial change
* Maintenance
  * Sustained change

**TASK**

* Interested, concerned and willing to consider
* Risk-reward analysis and decision making
* Commitment and creating a plan that is effective/acceptable
* Implementing plan and revising as needed
* Consolidating change into lifestyle


Theoretical and Practical Considerations Related to Movement Through the Stages of Change

Motivation
Precontemplation → Contemplation → Preparation → Action → Maintenance

Decision Making
Decisional Balance

Self-efficacy
Behavioral Processes

Cognitive Experiential Processes

Personal Concerns
Environmental Pressure

Recycling
Relapse

What would help or hinder completion of the tasks of each of the stages and deplete the self-control strength needed to engage in the processes of change needed to complete the tasks?
*Task completion and movement between stages*

- Interest Concern
- Risk/Reward Decision
- Commitment Planning Prioritizing
- Implement the Plan
- Revise
- Lifestyle Integration
- Avoid Relapse

PC → CON → PREP → ACT → MAIN

 ↔ ↔

J J
* Better defining the extent and severity of addiction using these concepts and categories we can:
  * Characterize the addictive behavior pattern using a biopsychosocial framework
  * Understand the change burden (how difficult will be the change) in terms of its relationship to this broad view of severity of the disordered engagement in the addictive behavior
  * Identify critical issues that can guide treatment and that can hinder or promote movement through the change process
  * Connect quantity and frequency with important indicators and contextual factors to better characterize the severity of the addictive behavior pattern and not simply rely on a set of symptoms or a list of conditions, consequences or correlates

* Severity, Motivation and Treatment
* Better connection of neuroscience and biological perspectives with social and behavioral science views on addictive behaviors

* Offers a better way to measure use disorders with a more dimensional approach

* May help to distinguish and define use, misuse, abuse, dependence and use disorders

* Offers a way to bring together literatures on stress reactivity, brain mechanisms, self-regulation, loss of control, internal and environmental perspectives

* Implications
1. Accurate and useful measurement of these dimensions and finding cost effective and efficient methods to assess neurobiological and other dimensions in addition to self-report

2. Evaluation of how aspects of severity and overall severity relate to different treatment types and strategies

3. Are these the only dimensions or the right dimensions?

4. Can we connect assessment with personal feedback to the individual?

5. Does this conceptualization work as well all types of substances as well as process addictions? (problems assessing quantity/ frequency, gambling behaviors, legality of the behavior)

6. Can we influence the ongoing battle between ICD and DSM perspectives on defining addiction and use disorders.

* Ongoing Challenges
* Focus on **chronic conditions** which always involve some behavior change and management of psychological/emotional dimensions of the person

* **Multidisciplinary** - Medical, Pharmacological, Psychological, Behavioral, Environmental, Community, **Systems Sciences** must be blended together to achieve goals of Recovery and Healthcare Reform

* **Collaborations** in terms of where services will be given and integration of information

* **Use of new technologies** to reach out and extend services to where patients are

* Integration in the New Health Care System
* Targets *Substance Use, Mental Health, and Infectious Disease* Testing and Treatment

* Involves Maryland Department of Health and Mental Hygiene and their Drug Abuse, Mental Health, Prevention and Health Promotion administrations and academic partners

* Funded by SAMHSA

* Create a system of care where whatever door the client enters, he or she will be screened, assessed and treated for problems in all three areas

* NO WRONG DOOR PROJECT
### Needs
- A Process Model to guide decision making
- Interdisciplinary and multidisciplinary resources
- Time sensitive communication system
- Client oriented, empowerment approaches
- Flexible allocation of Resources

### Barriers
- Lack of adequate actionable assessment
- Specialist Model of Care
- Lack of collaboration among providers and programs
- Lack of integrated medical record accessible to all healthcare providers
- Lack of incentives and trust among providers

*Needs and Barriers for Patient Centered and Integrated Care*
<table>
<thead>
<tr>
<th>Case Management</th>
<th>Integrated Care</th>
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</thead>
<tbody>
<tr>
<td>A manager of problems or services</td>
<td>A coordinated care approach to addressing the person in light of multiple complicating problems</td>
</tr>
<tr>
<td>Tries to link patient and various providers</td>
<td>A team of providers working together linked by client needs</td>
</tr>
<tr>
<td>Often affiliated with a single provider and trying to connect to others</td>
<td>Reciprocal Communication and Referral flow</td>
</tr>
<tr>
<td>Inadequate resources to meet needs</td>
<td></td>
</tr>
<tr>
<td>Overcome siloed care systems</td>
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</table>

* Differences between Case Management and Integrated Care
* Use a multidimensional assessment of addiction severity that addresses addiction mechanisms
* Focus on patient needs and desires, & motivation
* Scaffold impaired self-regulation
* Create systems of care not treatment programs
* Create a system of communication among professionals focused on client severity that coordinates interventions and treatment (patient oriented problem and care record?)

* Some Solution Focused Suggestions
References


