



Neuroscience Informed Interventions

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Since the 1990s, our understanding of the intersection of substances, neurological functioning, and behavior has significantly improved due to the increased use of neuroimaging to assess the impact of substance use disorders (SUDs) (Chung Noronha, Carroll, et al, 2016; Fals-Stewart, Schafer, Lucente, et al, 1994; Goldstein & Volkow, 2002). SUDs cause impairment in executive functioning, memory, sleep, empathy, self-understanding, mood stability, and visual-spatial skills. For many people, these dysfunctions last well into recovery (Semel Institute for Neuroscience and Human Behavior, n.d.). These neurological impairments¹ layer on top of other factors that include physical ailments, lifelong survival and adaptive behaviors, and the behavioral and attitudinal adaptations that evolved during the using stage of SUDs (Holton, 2021). Each of these possible neurological impairments described below may present differently in various treatment settings. Treatment professionals can implement many positive therapeutic interventions that are likely to improve functioning for the individual.

Not all clients will manifest all symptoms or have identical levels of impairment (Rolland, D'Hondt, Montègue, et al, 2019). Across caseloads, however, all of these will be present to a certain extent. It is important to inform clients and their loved ones of these impairments before the clients or their families experience them. We make clients aware in order to normalize these occurrences and provide positive intervention strategies. In addition, these impairments improve greatly over the first six months and continue to improve for at least 24 to 36 months of recovery. Therefore, recovery support should also last as long. Since both the level of impairment and the rate of recovery will vary by individual, treatment should vary in intensity and time, and should be based on clinical decisions rather than pre-determined, fixed lengths of stay. For all the Post-Acute Withdrawal Syndrome (PAWS) symptoms², there are some general ingredients for recovery which include adequate nutrition, rest, psychological and physical safety, and support through mutual aid groups or other support systems.

Executive Functioning

Executive functioning includes problem solving, judgment, impulse control, and decision making. Early recovery dysfunction in these areas will manifest as difficulty making recovery-positive decisions and impulsivity (Cadet & Bisagno, 2016). For example, when a client makes a self-destructive decision, we often attribute it to a person's character or to being a result of substance use rather than assuming it is the result of a transient neurological condition.

Effective interventions that compensate for or improve executive functioning include motivational interviewing; contingency management (Petry, February 2000); rapid re-intake; integrating problem solving models into lectures, group activities, and individual sessions; using the same problem solving strategies while working with a client on their treatment plan; providing steady encouragement to clients; keeping expectations of their recovery modest; providing adequate clinical support; stepping down housing as clients become more capable of independent living; and encouraging clients to utilize mutual aid and/or other support groups. We can further aid our clients' recovery with problem solving workbooks

¹The neurological impacts described in this article are recognized by the American Society for Addiction Medicine (Verdejo-Garcia, Lorenzetti, Manning, et al, 2019), the American Psychiatric Association (APA, 2013), and the Substance Abuse and Mental Health Services Administration (SAMHSA). For example, in the Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition (APA, 2013), eight conditions follow the words “substance/medication induced.” The DSM-5 states, “...the substance/medication-induced mental disorders resemble independent mental disorders. While the symptoms of substance/medication-induced mental disorders can be identical to those of independent mental disorders..., and although they can have the same severe consequences (e.g., suicide), most induced mental health disorders are likely to improve in a matter of days or weeks of abstinence.... Symptoms of substance and medication-induced mental disorders may be identical cross-sectionally to those of independent mental disorders but have different treatments and prognoses from the independent condition” (P. 489).

²The terms Post-Acute Withdrawal Syndrome (PAWS), Protracted Withdrawal Syndrome (PWS), and Substance-Induced Disorder will be used interchangeably as a single term, for this condition has not yet been settled (SAMSHA, 2010).

such as easy mazes or Sudoku, easy strategy board games, and online games that encourage strategic thinking. All such games should be non-triggering for substance use or trauma. Additional resources to improve executive functioning can be found under the terms “Cognitive Enhancement Therapy,” “Cognitive Remediation Therapy,” “Working Memory Training,” “Cognitive Bias Modification,” and “Goal Management Training” (Rezapour, DeVito, Sofuoglu, & Ekhtiari, 2016; Verdejo-Garcia, Lorenzetti, Manning, et al, 2019).

It is important to prepare families for impairments in executive functioning. Normalizing what families will be experiencing and providing them with positive coping strategies will be important for both family and client healing and for maintaining a supportive home-recovery environment (Humphreys, 2018). Encouraging patience when there are misunderstandings or poor decisions, training families in the same problem-solving strategies that were taught to the client, informing families how long neurological recovery may take, and helping them to understand that they may need to be gently assertive in supporting the client’s recovery are all effective ways for the client’s support system to participate in recovery support.

Memory

Those in early recovery tend to have memory impairment (Rochat & Khazaal, 2019). Clinicians may interpret a client forgetting appointments, homework assignments, or tasks as poor attitude or resistance to treatment. However, these common memory issues are likely a symptom of PAWS and the client’s memory will likely show improvements over the first two years of recovery.

Specific interventions may include providing clients with notebooks and working to take notes and review them on a regular basis, keeping clients’ treatment schedules consistent, reminding clients of appointments and assignments, being patient when they’re forgetful, and developing a plan with the client to remember important information and events. Any sort of recall exercises like easy crossword puzzles, non-triggering reminiscence groups, and matching games can help with the client’s recovery process. Families should be made aware of this normally transient impairment and positive intervention strategies like mentioned above.

Emotional Lability

Clients in early recovery have difficulty with impulse control and unstable moods that can change rapidly. Moods can range from calm to agitated or from happy to sad in seconds. This symptom of protracted withdrawal

is often misinterpreted as an indication of a mental health disorder or blamed on the substance use disorder. Interventions for this symptom may include deferring the consideration of a mental illness diagnosis and concomitant medication until a solid period of recovery is established; discussing the causes of an unstable mood with the client before they experience it; reinforcing that message with the client when mood instability occurs; providing training to clients in conflict resolution and de-escalation skills; and providing training in self-calming techniques such as meditation, biofeedback, deep breathing, and centering and/or mindfulness exercises (Powers, 2017).

Clinical staff must be vigilant in monitoring clients’ moods and be prepared to intervene as early as possible. Staff must remain calm and non-reactive when clients are reactive. Further, staff should be trained in de-escalation strategies and conflict resolution and be prepared to spend time talking clients through their mood swings. For example, a clients’ impulsive decision to leave treatment will occur during periods of unstable mood, and staff often first notice that the client is upset as they are heading out the door. Since these mood shifts can occur at any time of day, all staff must be adequately trained and prepared to intervene.

Mood instability can be difficult for families who have already suffered from clients’ pre-treatment behaviors and attitudes, causing defensive behaviors or fear that the client is not committed to recovery. Preparing families to anticipate and effectively address these behavioral manifestations of a likely transient neurological condition is essential to creating a positive recovery environment in the home. However, it may also be wise to consider alternative housing to provide a supportive environment for the client. This can allow additional healing to occur before the client returns home.

Lack of Empathy and Self-Understanding

Within and adjacent to the limbic system are the areas of the brain that control our abilities for empathy, understanding non-verbal interpersonal communication, and self-understanding. These functions are impaired during substance use and in early recovery (Porreca, Biringen, Parolin, et al, 2018). This may be understood as a temporary form of high-functioning autism (formally known as Asperger’s Syndrome). It is manifested in the clients’ inability to feel the emotional pain those around them are feeling; an inability to read non-verbal cues such as facial expressions, tone, and body language; and an inability to accurately predict the emotional toll of a client’s own actions on themselves and others. This can lead to misunderstandings between clients and treatment program staff,



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Sleep Disturbances

Sleep disorders are common (Angarita & Emadi, 2016). There are three types of sleep disturbances that clients will likely experience in early recovery. First, is insomnia, an inability to fall asleep or stay asleep during the hours when a person wants to be asleep. This is the result of the dysregulation of neurochemicals along with other factors, including the sleep cycles of most people with substance use disorders. It is not realistic to think that clients will reset their sleep clocks immediately upon entering treatment. In addition, clients have a lot on their minds, and like all of us when we have a lot of feelings, thoughts and decisions churning within us, sleep is hard to find or maintain. Lack of sleep at night leads to fatigue during the day, and it will add further impairment to cognitive functioning.

Clinicians should have a certain level of patience with clients who may fall asleep during the day. Punitive responses by clinicians such as making clients stand or otherwise humiliating them during group, scolding, or discharging clients from treatment are counterproductive. Better interventions include allowing clients to nap for an hour midday; keeping lectures and videos short, interesting, and interactive; integrating movement into groups wherever possible; and providing clients with numerous small group activities. In clinical sessions, one can normalize the clients' feeling of fatigue and remind them that this will improve over time. Also helpful here are the standard treatments for anyone suffering from insomnia which include going to bed and rising at the same times every day; relaxation techniques; and avoiding certain activities, caffeine, and electronics before bed.

The second and third sleep disturbances are similar to each other. They are "vivid dreams and nightmares" and "using dreams." People in early recovery have a backlog of dreams due to the quality of sleep they get while they are using substances. In addition, early recovery is an emotionally tumultuous time. Both factors contribute to a heavy schedule of dreaming. Clinicians can positively impact this in two ways. First, let the client know as early as possible that a heavy dose of dreams and nightmares are on their way. Normalize the experience and assure the client that this is an indication that they are in recovery. Also, invite clients to share their dreams with you. You don't have to be Carl Jung to interpret or process dreams with a client.

The related type of dreams are called using dreams, in which the client dreams they are using their substance of choice. These dreams are very realistic and can be quite disturbing. Using dreams can occur at any point in both early and long-term recovery. Again, an important step is to talk with the clients about these dreams before they experience them. Reassure clients and families that these dreams are not an indication of a lack of motivation, nor are they omens that use is imminent. Finally, encourage the clients to talk about the dreams and their feelings surrounding them.

Visual and Spatial Difficulties

Clients in early recovery have difficulty tracking objects in space and with hand-eye coordination (Wollman, Hauson, Hall, et al, 2019). Outside of treatment, this can impair a client's ability to move through the world and may impair daily functioning. In treatment, this has its primary impact on recreational therapy activities. Recreational activities should avoid events that require good hand-eye coordination or body movement through space. Instead, provide activities that enhance hand-eye coordination and balance. These may include yoga or Tai Chi, walking while swinging one's arms, playing gentle catch with oneself

as well as with significant others and loved ones. It can also lead clients to take on activities that even under normal circumstances would cause an overload of their emotional resources. Clients are unable to predict the impact of their own behaviors on themselves and others. Combining this PAWS symptom with the previously described executive function difficulties, emotional lability, and impulsiveness will often lead to the types of blowups that can result in discharge from a treatment program or a home and a subsequent return to substance use.

To address this "high-functioning autism," inform the clients as early as possible that these difficulties will exist and that they are not permanent. This provides you with a reference point when issues arise. You can remind the client that this is a condition of early recovery and work with clients on their interpersonal communication skills and problem solving. Here, too, it may be necessary to assess whether a client can return home or if time in a transitional living arrangement would be beneficial.

An understanding of this disability also informs couples therapy or family counseling, where they can work to maintain relationships as best as can be expected until the clients' empathy and problem-solving skills return. It will be clear to the clinician when this begins to take place and once this occurs, more actual healing versus maintenance can be seen.

It is especially important to work with those close to the client to anticipate and appropriately respond to misunderstanding and the client's apparent disregard for others' feelings. It is easy to imagine things escalating out of control quickly in these situations. Appropriate responses include staying calm, clarifying what was intended to be communicated, and learning de-escalation strategies. Treatment staff can use these strategies as well when clients misunderstand staff or each other. Work with clients to rehearse interpersonal and problem-solving strategies. These can be valuable learning experiences rather than opportunities to give clients negative consequences.

Finally, it is the responsibility of clinicians to ensure that clients do not bite off more than they can chew in terms of personal goals. Work with clients on goal setting and use this as an opportunity to discuss the process of recovery, planning, and problem-solving strategies. Goals evolve, and clients should not attempt to solve everything or make up for lost time all at once.



or another person using a ball or balloon, appropriate video games, hacky sacks, kickball, etc.

Startle Responses

Clients in early recovery may have intense startle responses likely due to increased acuity in several senses (J. McClanahan, Personal Communication, June 10, 2021). There is not much to be done as an intervention for this response except to normalize the experience by preparing clients that this may occur and talking it through with them when they report it, or when you observe it.

All of the Above on Top of Other Factors

PAWS symptoms occur when clients are still transitioning out of their former lifestyle; recovering from other medical concerns; facing possible co-occurring mental health conditions; becoming aware of survival/adaptive strategies they used in their lives that are not conducive to societal reintegration; and likely dealing with traumas they experienced throughout their lives. Assessment and interventions designed for each of these are also necessary for recovery. It is counter-therapeutic to assume that any of these will disappear quickly. Many of these issues will take months or years to work through. Therefore, clinical staff need to be patient and develop effective interventions that will involve traditional psychotherapy. Therapeutic support must be provided long enough to be effective. As stated previously, fixed time or time-limited programs are not the best way to address the multiple issues clients bring to recovery. The initial round of therapy – whether residential (inpatient, halfway house, or recovery home), outpatient (intensive or regular), or a flexible combination of both – will probably last up to two years. This is likely the length of time necessary to begin to address clinical issues and to provide support during a time of physical, psychological, and neurological healing.

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