The Emotional Cycle of Addiction

Includes:

Final Report

By: Chase Kilbourne

Completed for: Canadian Family Health Counseling

Supervising Professor: Taryn Grieder

Trent Community Research Centre Project Coordinator: Kerith Paul

Course Code: PSYC 4801H

Course Name: Research Practicum

Completion Date: April 21, 2025

Project ID: 6229

Suite 3.10, Trent University Student Centre

1600 West Bank Drive

Peterborough, ON K9L 0G2

Phone: (705) 748-1093

Email: tcrc@trentu.ca

Website: trentu.ca/tcrc

The Emotional Cycle of Addiction

Mental health and addiction emergencies are becoming a growing issue in Ontario, and Canada as a whole (Baia Medeiros et al., 2019). The subject of addiction in our society is a complex issue which health care providers may address using many different techniques and models. Understanding the processes that underlie the addiction cycle may help health care providers to treat addiction with greater effectiveness in the long-term.

To illustrate the subject at hand, imagine a person with a cigarette smoking addiction. Whenever the person is stressed, they are triggered to smoke a cigarette. One form of therapy for this problem would be a nicotine patch. However, the person may still notice many changes as they stop smoking. Anxiety and irritability may quickly arise, and even when the nicotine patch has successfully weaned the patient off of their chemical addiction, a stressful event may still trigger them to smoke again. With this example in mind, it is plain to see the role that emotions take alongside addiction, and why care must be taken to address the emotional basis of addiction alongside the chemical basis as part of a comprehensive treatment plan (National Institute on Drug Abuse [NIDA], 2018).

This review will examine some previously existing literature concerning the relationships between emotions and addiction, and how neuroscience informs these underlying processes. First the paper will examine addiction from an emotional perspective and then from the perspective of neuroscience. When the neuroscience behind emotions is explained, the connection is clear that many of the same neural networks affected by addiction are shared with neural networks that regulate emotions, which is why the two are so tightly related in the literature. The result is potentially permanent changes to the brain effecting emotions which must be treated in conjunction with the addiction and for some time after in order to ensure longevity of abstinence (Koob & Volkow, 2010).

Addiction and Emotions

Emotions are strong motivators of indulging in a habit. Hogarth (2020) conducted a study in which individuals were inducted into either a positive or negative mood. Participants that had a positively induced mood were more satiated and decreased their interest in tobacco. The negative mood group increased their tobacco seeking behaviour, showing how emotions change one's tendency to indulge in a habit.

Koob and Volkow (2010) conceptualize active drug addiction as being composed of three stages: binge/intoxication, withdrawal/negative affect, and preoccupation/anticipation (craving). These stages are a cycle that addicted individuals compulsively engage in. Alongside this cycle, many researchers and mental health professionals report an array of emotions that addicted individuals experience (Sargent, 2023). While some of these researchers focus on drug addiction, behavioural addictions such as gambling or internet addiction affect the brain in very similar ways (Koob & Le Moal, 2008). In fact, Dresp-Langley and Hutt (2022) defined digital addiction as functionally the same as other addictions. When looking at the emotional cycles involved in addiction as a whole, the type of addiction does not matter as much, since all addictions have the potential to permanently alter circuits of the brain and cause compulsive behaviour (NIDA, 2018). For this reason, this review will simply use the term addiction as meaning either substance or behavioural addiction.

Depending on where an individual stands on the cycle of addiction, they experience myriads of emotional turmoil. Emotions experienced range anywhere from euphoric pleasure to devasting depressive episodes (Koob, 2015). Some emotions commonly arising during this process are despair and helplessness, shame, guilt, fear and anxiety, anger, irritation, and frustration (Sargent, 2023).

Despair and Helplessness

When engagement with the object of addiction shifts from a choice to a compulsion, the first emotion an individual might encounter is despair, or helplessness. Addiction impairs decision-making and inhibits reasoning, so the addicted individual feels helpless but to give in to their habit or face the negative consequences of withdrawal. Since one of the symptoms of addiction is the tendency to relapse, individuals who relapse may feel even more helpless as they feel they are unable to escape the cycle, thus strengthening the cycle as the more helpless one feels, the more they tend to relapse (Shaghaghy et al. 2011). If an addicted individual has decided that they are beyond help, and give up on treatment, they might be experiencing learned helplessness. A study by Shaghaghy et al. (2011) randomly selected addicted men from 4 addiction treatment centers and assessed their levels of learned helplessness (LH) as compared to non-addicted men in the same area. The addicted individuals had significantly higher levels of LH than the control group, and LH was also a predictor of a higher likelihood of relapse to addiction after treatment. Consistent with other research, these individuals also experience much higher levels of shame.

Shame and Guilt

Often paired together, shame and guilt are negative self-conscious emotions. Shame generally relates to feeling bad about oneself, and guilt tends to be directed at a specific behaviour or event (Dearing et al., 2005). When addicted individuals begin to feel shame, they may start to experience what some researchers call the “shame spiral”. Since shame is an uncomfortable emotion to experience, it may prompt an addicted individual to turn to their object of addiction to escape the negative feeling (Koob & Moal, 2008). When the intoxication stage of the cycle completes again, the individual returns to the negative affect part of the addiction cycle

and may feel an increased amount of shame from indulging in their behaviour. A study revealed that for stimulant users, higher levels of shame and guilt were barriers to reducing stimulant use. Higher levels of shame were associated with slower decreases in methamphetamine use over time (Batchelder et al, 2022).

However, not all researchers agree that this must be the case. Dearing et al. (2005) emphasize the difference between shame and guilt by studying them separately. These researchers suggest that while shame is problematic, guilt can be a healthy and adaptive response as feelings of guilt are less debilitating and can motivate an individual towards change for the better. While guilt can protect against problematic alcohol and substance use patterns, shame can have the opposite effect as not only does one not feel motivated to improve their behaviour but are also likely to want to cope with the painful feelings by engaging in their habit.

While shame and guilt can feel negative, it is possible with treatment to reframe these emotions as an intervention. While some therapies would focus on self-forgiveness as a method of alleviating the negative affect of shame (Webb & Boye, 2024), some researchers suggest that both shame and guilt can be reframed as constructive emotions for recovery (Sargent, 2023). Snoek et al. (2021) argue that the view of shame and guilt being in opposition for recovery is not necessarily true, and that both emotions can be constructive when using a method called scaffolding, where an addicted individual can explore the feelings of shame in a blame-free environment and make sense of them. With the proper therapy, the authors claim that an individual can self examine the reasons for their actions and be prompted into a state of pro-active and self-empowering attitudes going forward.

Fear and Anxiety

Fear is a powerful motivator and a very strong and salient emotion that demands to be felt. The energy of fear is often referred to in a ‘fight or flight’ sense, however it is now common to include ‘freeze’ as a common response (Bracha, 2004). Anxiety is linked to fear, but it is directed at a perceived future event rather than an imminent or immediate threat (Chand & Marwaha, 2023). Addicted individuals experience fear of stigma and discrimination from others (Snoek et al., 2021), and anxiety is an extremely common characteristic of addiction (Koob, 2015; Dresp-Langley & Hutt, 2022). Fear of confirming negative stereotypes or being discriminated against for their addiction may stop some individuals from seeking treatment at all (Webb & Boye, 2024).

For the aforementioned model of understanding addiction, negative affect/withdrawal are part of the cycle. Another model for understanding addiction, proposed by Baker et al. (2004) theorizes that negative affect is the main motivation for addictive drug use as a whole. They proposed that the onset of withdrawal symptoms are an effective conditioned stimulus that cue binge/drug use behaviour, even when the negative affect is only just beginning in the body, and arises in a way that is not yet consciously noticeable to the individual. Anxiety and depression are common emotional correlates of substance use, and since they trigger the cyclical nature of addiction, they are prime targets for treatment and intervention (Dearing et al. 2005).

While it is true that anxiety is a common symptom of addiction, sometimes the inverse is also true. Those individuals that have anxiety or other mood disorders have a correlation with developing comorbid drug use disorders or dependence (Conway et al., 2006), especially among adolescents (NIDA, 2014). Comorbidity of multiple conditions was also observed by Wu and Blazer (2014) in older adults, requiring greater use of services and treatment. While fear and anxiety are often debilitating emotions, if someone can use the ‘fight’ energy to attack the

problems they are facing head-on, it could be a constructive reframing of the emotion. When fear is being used to attack, it can display in similar way as anger.

Anger and Frustration

Being stuck in a cycle is a frustrating ordeal, and there is plenty to be mad at. Addicted individuals may become angry at themselves, angry at others, or be overcome with anger in general about the situation they have wound up in. One can either blame others, or take responsibility for the situation and move forward, just as the reframing of guilt worked (Sargent, 2023). Like the other emotions, the anger is sometimes a two-way street. Rather than addiction causing anger, anger may have been prevalent to begin with in some cases. Adolescents who show higher levels of anger are more likely to have cigarette, alcohol, and drug use problems (Avci et al., 2017). Especially when combined with the other emotions listed, Dearing et al. (2005) stated that shame-prone individuals have higher rates of anger problems and difficulties with self-regulation. Shame-free guilt for these individuals is positively correlated with constructive responses to anger since the person has no one to blame but themselves and has accepted responsibility for their actions.

Moving Forward

When an addicted individual takes responsibility for their actions, they also assume some control over the situation. If one assumes that their problems are from external sources out of their control, they will feel helpless to change them. This is correlated with higher rates of addiction relapse (Shaghaghy et al. 2011). A form of emotional intelligence that is sometimes called emotional dexterity (Sargent, 2023), or otherwise psychological flexibility refers to the ability of one to recognize their current emotional state and move that emotion into a more valuable or constructive direction (Díez-Bejarano, 2022). Since the addiction cycle consists of

negative affect, which is often avoided and thus providing negative reinforcement of the cycle, treatment should focus on accepting and working with the emotions rather than avoiding them.

Garland et al. (2014) also suggests reappraising of emotions, and use mindfulness-based interventions (MBI) to regulate emotions and reduce emotional arousal. However, they mention the difficulty involved since addiction is often seen as a conditioned response, which may be triggered by a cue even after long periods of abstinence. They suggest that the automatic nature of this conditioning can be countered with many repetitions of controlled thought monitoring and careful attention to one's emotions. The difficulty in recovering from addiction comes from the changes in the brain's neural pathways which occur during the addiction cycle (Koob & Volkow, 2010). With therapy, neural plasticity can help to alter the pathways of the brain again, but this time in the direction of recovery. Neural plasticity means that the brain is capable of changing its neural circuits for the better.

Addiction and Neuroscience

Cognitive and behavioural neuroscience, and developments in neuroimaging have led to much work in uncovering the neurocircuitry of addiction. Koob and Volkow (2010) summarized some of this work from imaging studies to show the neuroadaptations present when addiction reprograms neuronal circuits that process key functions such as: "(1) reward and motivation; (2) memory, conditioning, and habituation; (3) executive control; (4) interoception and self-awareness; and (5) stress reactivity" (p. 225). These changes do not happen all at once, but in a succession from mesolimbic dopamine system, ventral striatum (VS), VS/dorsal striatum/thalamus, dorsolateral frontal cortex/inferior frontal cortex/hippocampus circuits, and extended amygdala (p. 227). The more an individual acts on their addiction, such as drug use, loss of control increases and compulsivity increases. The more this cycle continues, the greater

the neuroplasticity causes adaptation to the circuits, resulting in loss of function to the frontal cortex. While drugs of misuse may affect neural pathways slightly differently due to chemical differences, most addiction cycles rely on the same systems as dopamine and glutamate contribute to dysfunction of the reward system of the brain and create the addictive compulsion of conditioned responses. Natural reinforcement becomes less salient compared to the now highly salient object of addiction.

While this is one way of looking at addiction, some researchers (Hogarth, 2020; Loganathan & Ho, 2021) theorize that compulsion theory is weaker as compared to a theory where addiction is described as a goal-directed choice under negative affect. Put simply, this competing theory states that addicted individuals are not acting out of a lack of control, but from an over-valuation of a drug, and for some, this valuation is increased by a mitigation of negative emotional states or withdrawal. The addiction cycle is seen or valued by the individual as a better choice compared to abstinence.

It is difficult to determine which theory is more correct or useful from a neurocognitive perspective, as impairments in cognitive function in many areas accompany addiction. It is unclear whether these areas can be isolated to see whether they have a causal role in addiction, however highly correlated they are. Not only that, but dysfunction of one area of the brain may be responsible for or coincide with many impairments. For example, frontal cortex dysfunction may impair reasoning, regulation, executive function, and valuation. Claiming addiction is due to issues in valuation rather than issues with compulsion is difficult when the same brain mechanisms regulate both (Koob & Volkow, 2010). Indeed, addiction affects the circuits of the brain involved in some of the most important human behaviours, which is why addiction is classified as a brain disease (NIDA, 2014).

Emotions and Neuroscience

One of the most notoriously well known “feel good” brain chemicals is dopamine. Dopamine is a neurotransmitter responsible for the reward feeling of the brain and the mesocorticolimbic dopamine system is one of the systems that is responsible for feelings of pleasure when addictive behaviours such as drug use occur. Those feelings positively reinforce the behaviour that trigger them. During withdrawal, a lack of dopamine has the effect of dysphoric or anxious emotions (Koob & Le Moal, 2008). Other chemical mediators of anxiety are an increase in norepinephrine, or a lack of serotonin or gamma-aminobutyric acid (GABA) in the amygdala. When the withdrawal is satiated, a negative reinforcement effect happens, and key neurotransmitters in the extended amygdala are activated to mediate this, including corticotropin-releasing factor (CRF), norepinephrine, and dynorphin (Koob & Volkow, 2010). In general, the extended amygdala is responsible for feelings of fear and anxiety and is connected to the prefrontal cortex (PFC) regions (Chand, 2023). When feeling anxiety, the amygdala communicates with the hippocampus and the medial prefrontal cortex (mPFC).

During research involving mindfulness meditation, it was found that meditators had a reduced amygdala volume due to stress reduction (Garland et al., 2014). Additionally for meditators, the gray matter volume was significantly higher in the parts of the PFC responsible for cognitive control and higher-order associative processing. Meditation practice also increases dopamine release in the ventral striatum. Emotions and neural circuits are inextricably linked, and while dysfunctional neural circuits may affect emotional states, it is also true that controlled emotional processing can change neural circuits too.

Linking It All Together – Addiction, Emotion, and Neural Pathways

From all of this we can see that there are at least two major aspects that connect emotions and addiction. The first is that negative emotions are part of the withdrawal aspect of the addiction cycle. The second is that chronic addiction changes the neural pathways in the brain so that the affect of other rewarding stimuli in life are reduced because the addicted individual has learned to reward themselves with indulging in their habit rather than by enjoying the natural environment (Garland et al., 2014; Koob & Volkow, 2010). This would be a dysfunction of the dopaminergic system and the PFC (Koob, 2014). The neural pathways change in such a way that create an automatic response to negative emotions without much rational thought involved. These pathways remain even after the addiction is long under control and can sometimes be triggered during the craving process if other stronger alternative neural pathways have not been created or if self-regulation does not occur.

Self-regulation

Controlling one's impulses is a vital part of recovery, but this is the role of the prefrontal system, which becomes dysfunctional due to neuroadaptations that happen during the addiction period. Low volumes of gray matter in the frontal cortex were correlated with a preference for immediate gratification rather than delayed gratification (Koob & Volkow, 2010). The ability to self-regulate emotions is critical for uncoupling triggers in the stimulus-response cycle. Poor emotional regulation was correlated with addictive behaviours including problematic internet use and video game addiction, as well as substance use. Emotional regulation is associated with impulse control (Estévez, 2017).

The connections found between neural pathways, addiction, and emotions uncover promising new strategies to addiction recovery that focus on more than abstinence. Emotional

care is more than just easing the anxieties of someone suffering from withdrawal. Therapies should focus on developing emotional regulation skills and uncoupling deeply ingrained habits while making neuroadaptations through new habits. Excellent examples of this come from Garland et al.'s (2014) work with mindfulness-based interventions (MBI). Neuroimaging showed that the meditation exercises involved in MBI increased gray matter density in regions of the PFC and reduced amygdala volume. This could mean an enhancement in executive control and lowering of anxiety respectively, which are the linked effects of the dysfunction of those areas.

In terms of training those recovering from addiction to have better emotional dexterity, the MBI also allowed individuals to experience emotions such as anxiety, fear and anger and allow those emotions to pass without triggering the conditioned responses or impulses normally enacted to avoid those negative affects (Garland et al. 2014). No matter the type of addiction, emotional therapy must accompany the interventions as part of a comprehensive treatment plan. Addiction changes the structure of the brain, but with emotions in check, neural pathways can be created that ensure an enduring and successful road to recovery.

References

Avci, D., Tari Selçuk, K., & Doğan, S. (2017). The Prevalence of Substance Use among Adolescents Participating in Apprenticeship Training, Relationship between Anger Level-Anger Expression and Addiction Severity. *Journal of Psychiatric Nursing*, *8*(1), 1–8. https://doi.org/10.14744/phd.2017.50479

Baia Medeiros, D. T., Hahn-Goldberg, S., Aleman, D. M., & O'Connor, E. (2019). Planning Capacity for Mental Health and Addiction Services in the Emergency Department: A Discrete-Event Simulation Approach. *Journal of healthcare engineering*, *2019*, 8973515. https://doi-org.proxy1.lib.trentu.ca/10.1155/2019/8973515

Baker, T. B., Piper, M. E., McCarthy, D. E., Majeskie, M. R., & Fiore, M. C. (2004). Addiction Motivation Reformulated: An Affective Processing Model of Negative Reinforcement. *Psychological Review, 111*(1), 33-51. https://doi.org/10.1037/0033-295X.111.1.33

Batchelder, A. W., Glynn, T. R., Moskowitz, J. T., Neilands, T. B., Dilworth, S., Rodriguez, S. L., & Carrico, A. W. (2022). The shame spiral of addiction: Negative self-conscious emotion and substance use. *PloS one*, *17*(3), e0265480. https://doi.org/10.1371/journal.pone.0265480

Bracha H. S. (2004). Freeze, flight, fight, fright, faint: adaptationist perspectives on the acute stress response spectrum. *CNS spectrums*, *9*(9), 679–685. https://doi.org/10.1017/s1092852900001954

Chand, S. P., & Marwaha, R. (2023). Anxiety. In *StatPearls*. StatPearls Publishing.

Conway, K. P., Compton, W., Stinson, F. S., & Grant, B. F. (2006). Lifetime comorbidity of DSM-IV mood and anxiety disorders and specific drug use disorders: results from the

National Epidemiologic Survey on Alcohol and Related Conditions. *The Journal of clinical psychiatry*, *67*(2), 247–257. https://doi.org/10.4088/jcp.v67n0211

Dearing, R. L., Stuewig, J., & Tangney, J. P. (2005). On the importance of distinguishing shame from guilt: Relations to problematic alcohol and drug use. *Addictive Behaviors, 30*(7), 1392–1404. https://doi.org/10.1016/j.addbeh.2005.02.002

Díez-Bejarano, L. (2022). Is Acceptance and Commitment Therapy Effective in Treating Addiction? A Systematic Review. *Psychiatric Annals, 52*(6), 248-260. https://doi.org/10.3928/00485713-20220504-01

Dresp-Langley, B., & Hutt, A. (2022). Digital Addiction and Sleep. *International journal of environmental research and public health*, *19*(11), 6910. https://doi.org/10.3390/ijerph19116910

Estévez, A., Jáuregui, P., Sánchez-Marcos, I., López-González, H., & Griffiths, M. D. (2017). Attachment and emotion regulation in substance addictions and behavioral addictions. *Journal of behavioral addictions*, *6*(4), 534–544. https://doi.org/10.1556/2006.6.2017.086

Garland, E. L., Froeliger, B., & Howard, M. O. (2014). Mindfulness training targets neurocognitive mechanisms of addiction at the attention-appraisal-emotion interface. *Frontiers in psychiatry*, *4*, 173. https://doi.org/10.3389/fpsyt.2013.00173

Hogarth, L. (2020) Addiction is driven by excessive goal-directed drug choice under negative affect: translational critique of habit and compulsion theory. *Neuropsychopharmacology.* 45, 720–735. https://doi.org/10.1038/s41386-020-0600-8

Koob, G. F. (2015). The dark side of emotion: The addiction perspective. *European journal of pharmacology, 753,* 73–87. https://doi.org/10.1016/j.ejphar.2014.11.044

Koob, G. F., & Le Moal, M. (2008). Addiction and the brain antireward system. *Annual review of psychology, 59,* 29–53. https://doi.org/10.1146/annurev.psych.59.103006.093548

Koob, G. F., & Volkow, N. D. (2010). Neurocircuitry of Addiction. *Neuropsychopharmacology*, *35*(1), 217–238. https://doi.org/10.1038/npp.2009.110

Loganathan, K., & Ho, E. T. W. (2021). Value, drug addiction and the brain. *Addictive behaviors, 116,* 106816. https://doi.org/10.1016/j.addbeh.2021.106816

National Institute on Drug Abuse [NIDA]. (2018). Principles of Drug Addiction Treatment: A Research-Based Guide (Third Edition). Retrieved from https://archives.nida.nih.gov/publications/principles-drug-addiction-treatment-research-based-guide-third-edition on 2024, June 10

Sargent, K. (2023). *Neural Network Therapy® Practice Guide: A practical approach to emotional health care* (G. Callahan, Ed.; 3rd ed.)

Shaghaghy, F., Saffarinia, M., Iranpoor, M., & Soltanynejad, A. (2011). The Relationship of Early Maladaptive Schemas, Attributional Styles and Learned Helplessness among Addicted and Non-Addicted Men. *Addiction & health, 3*(1-2), 45–52.

Snoek, A., McGeer, V., Brandenburg, D., & Kennett, J. (2021). Managing shame and guilt in addiction: A pathway to recovery. *Addictive behaviors, 120,* 106954. https://doi.org/10.1016/j.addbeh.2021.106954

Webb, J. R., & Boye, C. M. (2024). Self-Forgiveness and Self-Condemnation in the Context of Addictive Behavior and Suicidal Behavior. *Substance abuse and rehabilitation, 15,* 21–30. https://doi.org/10.2147/SAR.S396964

Wu, L.-T., Blazer, D.G., 2014. Substance use disorders and psychiatric comorbidity in mid and later life: a review. Int. J. Epidemiol. 43, 304–317. https://doi.org/10.1093/ije/dyt173.