

Anorexia Nervosa: An Addiction

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Changing Addictive Thinking

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Abstract

Anorexia nervosa is an eating disorder characterized by very restrictive eating or dieting leading to weight loss, a fear of weight gain, and a distorted body image. Several physiological mechanisms and behaviors that maintain and worsen symptoms of anorexia have addictive qualities that parallel that of substance use disorder. Similarities between anorexia nervosa and substance use disorder are explored, including other relevant diagnoses and phenomena like reward deficiency syndrome. Related mechanisms and behaviors associated with anorexia and substance use disorder include compulsion, the detrimental continuation of maladaptive behaviors, impaired control, and disorder-related changes in neurology. Conceptualizing anorexia nervosa as an addiction could assist in creating effective treatments for this disorder.

Anorexia Nervosa: An Addiction

Anorexia nervosa (AN) is an eating disorder characterized by a restriction in food intake leading to low weight or BMI, obsessive fears of gaining weight, and a distortion of body image. The criteria of low weight are determined contextually by the individual's expected healthy weight for their height, body type, and age.

There are two specific subtypes of anorexia nervosa: the restricting type and the binge-eating/purging type. As their titles suggest, the restricting subtype of anorexia nervosa is characterized by a restriction of food intake. Those with binge-eating/purging type of anorexia nervosa engage in binge-eating and/or purging. Purging can be accomplished through compensatory behaviors such as self-induced vomiting, laxatives, diuretics, or excessive exercise (American Psychiatric Association, 2013).

Anorexia nervosa is highly resistant to treatment, with high morbidity and mortality rates. Recovery from this disorder is difficult, and chronic relapse is common (Zandian et al., 2007).

Etiology. Currently, the specific etiology of anorexia nervosa is unknown. Like most mental health disorders, anorexia is thought to arise from a combination and interaction of multiple risk factors. These risk factors cover many significant areas, including biological, psychological, developmental, and sociocultural.

While the etiology of anorexia is complicated, there are various known risk factors that increase the likelihood of developing anorexia nervosa. Some of these factors include: "family history of anorexia nervosa, obesity, eating and weight concerns, affective disorder, substance abuse, and obsessive-compulsive disorder; a history of exposure to adverse events and circumstances; and the presence of certain traits such as perfectionism, obsessionality, excessive

compliance, and low self-esteem” (Fairburn et al., 1999). Personality traits like impulsivity, novelty seeking, stress reactivity, and harm avoidance are also common (Rikani et al., 2013).

Addiction: Substance Use Disorder

Addiction can be defined as a “chronic, relapsing disorder characterized by compulsive drug seeking, continued use despite harmful consequences, and long-lasting changes in the brain. It is considered both a complex brain disorder and a mental illness” (National Institute on Drug Abuse, 2018).

In the DSM-5, the related diagnosis for addiction- specifically drug addiction- is known as substance use disorder (SUD). Severity is measured on a scale from mild, moderate, or severe. Substance use disorder symptoms are divided into four categories. These categories include impaired control, social problems, risky use, and pharmacological effects (tolerance and withdrawal symptoms).

Etiology. Like anorexia nervosa, the etiology of substance use disorder is not yet known. Recent developments in drug addiction research suggest that addiction is a brain disease. Risk factors have been identified that could offer insight into predictors of drug use, with the presence of multiple risk factors augmenting the likelihood of abuse. These risk factors have environmental, behavioral, psychological, and social attributes. Specific risk factors include peer influences, low socioeconomic status, genetics, a need for stimulation, impulsivity, temperament, poor family relationships in early life, psychopathology, and stressful life events (Normand et al., 1994).

Anorexia Nervosa and Substance Use Disorder

A qualitative investigation by Godier and Park (2015) on the relationship between anorexia nervosa and substance use disorder revealed eight main themes shared between the two disorders. These themes were: “compulsivity as central to AN, impaired control, escalating compulsions, emotional triggers, reactions to prevention, detrimental continuation, functional impairment, and role in recovery.” In addition to this, anorexia shares criteria for SUDs found in the DSM-5: impaired control, risky use of substances, social impairment, and pharmacological criteria.

The overlap of shared themes between anorexia nervosa and substance use disorder offers insight into several characteristics that may explain the addictive nature of anorexia nervosa. By exploring parallels between anorexia nervosa and addiction, the identification of factors and processes that contribute to the formation, progression, and persistence of the disorder could assist in the development of effective treatments and prevention.

Impaired Control

Compulsion. Compulsivity is “a trait leading to behavior that is inappropriate to the situation, persists despite having no relationship with any overall goal, and results in undesirable consequences” (Godier & Park, 2014). Compulsivity likely contributes to the experiences of impaired control in addictions. It is a defining characteristic of substance use disorder and is observed as compulsive drug use and drug-seeking behavior. Additionally, compulsion is central to other psychiatric disorders that are frequently comorbid with anorexia, such as obsessive compulsive disorder (OCD) (Halmi et al., 1991). The compulsive behaviors and rituals adopted by individuals with OCD are performed to reduce anxiety induced by intrusive thoughts.

Food restriction and excessive exercise are examples of compulsive behaviors congruent with anorexia nervosa. These compulsive behaviors and rituals that sustain anorexia may function to reduce anxiety associated with the fear of food and gaining weight (Steinglass et al., 2012). Many patients with anorexia express not feeling in control of their eating disorder. It's possible that the destructive compulsive behaviors, which impair control and are continued in spite of the accompanying detriments, have a neurological basis.

Social Impairment

Like addiction, disturbances of social life and relationships in severe cases of anorexia nervosa can occur. These repercussions can develop as the disorder and its compulsions escalate. In order to maintain their rigid lifestyle and the constant pursuit of thinness, the social functioning and relationships of the anorexic individual suffer.

Activities that are implemented to promote or sustain weight loss can be time-consuming, with many hours each day devoted to exercise and controlling food intake. Social activities may also be avoided to circumvent anxiety related to low self-esteem and eating around others. Avoidance of sharing meals with family members can also create contention and conflict. Withdrawal and isolation from friends and usual activities are not uncommon.

As the severity of anorexia nervosa increases, the accompanying physical health complications can also impede on social life. Symptoms of dizziness or fainting can prevent movement, encouraging isolation. More serious health complications from anorexia warranting hospitalization- like damage to organs, suicidal thoughts, malnutrition, and dehydration- can further complicate the life of the individual suffering from this disorder.

Risky Use

The persistence of maladaptive behaviors despite negative consequences is a characteristic shared by substance use disorder and anorexia nervosa. Both of these disorders share brain dysfunctions implicated in addiction and compulsivity. Complementary explanations for this “risky use” should be further investigated.

The Brain’s Reward System. Although chronic cases of anorexia can have fatal consequences and serious health complications, those who suffer from this disorder still engage in these behaviors in spite of their negative effects. Similarly, individuals who are addicted to drugs will continue to abuse substances regardless of adverse consequences. The detrimental continuation of risky behaviors could be mediated by the brain’s reward system and its related neurotransmitters.

Neurotransmitters. Neurotransmitters such as dopamine, glutamate, and serotonin are involved in the development of compulsive behavior. Dysfunction of these neurotransmitters can result in reduced impulse control and addictive behavior.

Serotonin. Serotonin helps regulate mood and appetite. Alterations in serotonin activity found in anorexic patients show that anorexia can “potentially alter serotonin function and therefore result in persistence of functional alterations of serotonin after recovery of eating disorders” (Rikani et al., 2013). This persisting alteration of serotonin can function to maintain behaviors related to anorexia after recovery such as anxiety, perfectionism, and obsessive behavior.

Dopamine. Dopamine is a neurotransmitter that has a central role in the reward circuitry system of the brain. It has a significant part in the formation and persistence of addiction, as “low

dopamine function leads to impulsive, compulsive, and addictive behaviors” (Blum et al. 2012). Someone with low dopamine function is vulnerable to substance abuse or other behaviors that will initiate the release of dopamine.

Learning, Reward, and Habituation. Behaviors that increase dopamine tend to be repeated in the future for reasons beyond the initial rewarding effects. For example, by learning the signals that precipitate a reward, dopamine firing is altered. The resulting effect is that “the response to the reward itself habituates and, instead, the dopamine neurons fire in response to the predictors.” (Hyman & Malena, 2001). This dysregulation could account for the risky use and behaviors seen in anorexia nervosa and substance use disorder.

The restriction of food intake with anorexia can be experienced as rewarding by the consequence of dopamine modulation. It has been suggested that chronic food restriction increases sensitivity to reward, and that associated neurobiological changes “may enhance the experience of reward in AN, and positively reinforce disorder related compulsion... psychological and physical stressors associated with the disorder, as well as chronic food restriction, may promote reliance on habits” (Godier & Park, 2014).

The result of this is that compulsive restricting behavior becomes learned or habitual. Not only is the weight loss from food restriction rewarding to the anorexic patient, but food restriction itself also is rewarding as it becomes associated with the rewarding outcome of weight loss.

Similar effects of dopamine and its role in learning processes are observed in substance use disorder. The euphoric effects of drugs, caused in part by the production of dopamine, reinforce their use. Additionally, drug use is positively reinforced by the expectancy of rewarding

effects. Both the associated stimuli and the drugs thus incentivize future compulsive drug-seeking behaviors (Godier & Park, 2014).

Reward Deficiency Syndrome. To further expound upon the role of neurotransmitters and reward in the formation and persistence of risky behaviors, the pertinence of reward deficiency syndrome (RDS) should be discussed. Reward deficiency syndrome is a “genetic and epigenetic phenomena leading to impairment of the brain reward circuitry resulting in a hypo-dopaminergic function. RDS involves the interactions of powerful neurotransmitters and results in abnormal craving behavior” (Blum et al., 2014).

Reward deficiency syndrome occurs from impaired function of the brain reward cascade, which is defined as “an interaction of neurotransmitters and their respective genes to control the amount of dopamine released within the brain” (Blum et al., 2012). Neurotransmitters in the cascade include serotonin, GABA, and dopamine. Abnormality in the brain reward cascade can enhance susceptibility for self-regulation through means of reward-based stimuli, such as psychoactive drugs or behaviors that will increase dopamine.

Implications of reward deficiency syndrome can be related to the similar physiological mechanisms that are seen in anorexia nervosa. There is a phenomenon called “food anticipatory activity,” which is the increased hyperactivity induced by starvation. This is thought to have served a survival and evolutionary purpose, as it would have allowed for human ancestors to search and hunt for food during times of limited supply. Individuals with anorexia nervosa can experience the same food anticipatory activity from food restriction (Scheurink et al., 2010).

Physical hyperactivity caused by food intake restriction activates cells and neurotransmitters, such as dopamine, that are the basis of reward and attention (Zandian et al.,

2007). As a consequence, the rewarding effects of food restriction maintains the restricting behavior via conditioning to the rewarding stimuli.

Pharmacological Criteria

Tolerance and withdrawal symptoms are both attributes of addiction and the pharmacological criteria for substance use disorder. Tolerance results from repeated drug use, requiring increased dosage to maintain the pleasurable effects of the substance. Withdrawal occurs after the cessation of drug use. The accompanying symptoms of withdrawal are caused by the physical dependence that develops from the adaptations made by the body from repeated drug use (Hyman & Malenka, 2001). Instances of these pharmacological criteria have been seen in chronic cases of anorexia nervosa.

Opioids. A model of chronic anorexia nervosa suggests that “endogenous opioid systems are disturbed in patients with anorexia nervosa whereby patients become “dependent” on the opioids released as a result of sustained starvation” (Avena & Bocarsly, 2012). Through dieting and starvation, the anorexic individual becomes addicted to the opioids that are released. It is also a possibility that atypical endogenous opioid systems contribute to the etiology of anorexia by mediating an auto-addiction (Marrazzi et al., 1996).

It should also be noted that similar activations of the endogenous opioid system have been found in anorexic patients that over-exercise. Strenuous exercise activates the HPA axis and the endogenous opioid system, which stimulates dopamine production and the release of endogenous opioid peptides. This process is responsible for the rewarding and euphoric effects of exercise.

Tolerance. Exercising can initially serve as a means to self-regulate mood but ultimately result in the need for increased physical activity to serve the same function, which could be considered a form of tolerance. The escalation of other compulsions related to diet as the severity of AN has also been reported, indicating tolerance.

Withdrawal. Prevention of engagement in compulsive behaviors in anorexia nervosa can cause negative reactions comparable to withdrawal in SUD. A specific example of this is seen during the cessation of exercise, which can cause symptoms of withdrawal, such as depression, irritability, and anxiety. To avoid these symptoms of abstinence, the individual experiences an increased urge to be active, indicating a dependence (Scheurink et al., 2010). These effects are observed in anorexic patients as their disorder and compulsive behaviors become more chronic. Additionally, some patients experience “cravings” for exercise even after recovery (Davis & Woodside, 2002).

Gratification. It should be recognized that anorexia nervosa differs from substance use disorder in regards to the individual’s ability to delay gratification and its relationship to reward. It appears that anorexia nervosa is characterized by delayed gratification to meet long-term goals of thinness, while substance use disorder and addiction favor immediate gratification.

However, there is a possibility that some of the compulsions and thinking patterns associated with anorexia provide immediate gratification. Godier and Park (2014) explain how “starvation in those vulnerable to AN may produce an immediately rewarding sense of control, acting as a positive reinforcer of behavior. Equally, avoiding negative consequences such as dysphoric mood during refeeding, which some individuals with AN experience “withdrawal symptoms” from starvation, may be important short term goals.”

Implications for Treatment of Anorexia Nervosa

The compulsive behaviors that maintain anorexia nervosa are one of the main barriers to recovery. Adaptation of the criteria used for substance use disorder could confront this issue, along with the implementation of its treatment interventions.

Recovery for anorexia nervosa should first focus on facilitating healthy weight gain and treating any accompanying disorder-related health issues like malnutrition. Furthermore, teaching healthy eating habits and coping mechanisms to challenge thought distortions and compulsions is a significant challenge and component of recovery.

Potential neuromodulatory interventions that could be used for anorexia recovery include repetitive transcranial magnetic stimulation and deep brain stimulation. These treatments have shown to be effective in reducing compulsive behaviors and cravings in SUD and OCD (Godier & Park 2015). Relevant therapies like Exposure Response Therapy, which is utilized in addiction treatment, could be used to create behavioral changes and recondition reward responses. Other therapeutic methods used in addiction treatment such as cognitive behavioral therapies, group or family therapy, and relapse prevention could also prove to be helpful.

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