

A detailed microscopic image of neurons, showing their cell bodies (soma) and long, branching processes (dendrites and axons) against a dark background. The neurons are rendered in a light blue/cyan color, highlighting their intricate structure and interconnected network.

NEUROSCIENCE COURSE
MODULE 7

Addiction seems to have plagued the 20th and 21st centuries as so many people have been and are affected by them. The entire scientific community, from geneticists to neurobiologists, psychologists and psychiatrists, takes an interest in this pathology. The sudden fascination for processes of addiction is partly due to a significant increase in addictive behaviors and psychoactive substances.

The term *addiction* is very often associated with heavy use of illicit substances, or at least this is how many laypeople see it. In reality, lots of people suffer from addictions without even realizing, because the phenomenon of addiction is much broader. It is not solely linked to consumption of psychoactive substances.

As such, we can ask a logical question: what is an addiction? More broadly, what are the different forms of addiction that currently exist? What is its significance from a scientific perspective? Does it facilitate understanding of how the central nervous system functions?

Origins and mechanisms of addictions

Substance abuse is not exclusively linked to the modern age; it dates back to the dawn of time. However, it is important to recognize that use of substances was socially regulated for a long time. In primitive societies, these substances were known to everyone but were only consumed by shamans, who used them as part of religious rituals. Their status as *sacred plants* meant that they were only consumed by those who were initiated, and only for religious or spiritual purposes.

In some ancient societies, the use of certain psychoactive plants was no longer reserved for spiritual purposes only. Nevertheless, they retained a certain mystical aura. Those who consumed them had the same objectives as shamans or priests, namely, to be able to communicate with higher powers and their inner self. In the Middle Ages, plants like tobacco and cannabis were used for therapeutic purposes.

Tendencies began to change in the 17th century when the therapeutic and spiritual dimensions disappeared, and the use of these plants gradually became recreational. This plague spread relatively quickly because doctors were not fully aware of the negative impact these plants had on their patients' psychological state.

Anyone could ask for and freely obtain a concoction made from cannabis, morphine or cocaine. In some cases, their consumption was even recommended. Freud, for example, extolled the virtues of cocaine. Queen Victoria regularly took morphine. A frightening percentage of her subjects could not do without opium. Indeed, England was the biggest 'drug dealer' on the planet at that time.

It wasn't until the late 19th century that some doctors became aware of the seriousness of the problem, but it took almost half a century longer for governments and public authorities to take strict measures to limit consumption of psychoactive substances.

The ban on free sale of these substances did not solve the problem of addiction, however, because not all psychoactive substances had been banned. The sale and consumption of alcohol and tobacco remained legal. Nevertheless, the true root of the problem lay elsewhere: the origin of addictions is not always linked to consumption of psychoactive substances.

Addiction, a complex concept to define

Scientists have been trying to find an exact definition for the notion of addiction for some decades now, but without success. Too many criteria come into play. Furthermore, we continue to realize that innocuous products and activities can also lead to addictions. There are different schools of thought, which further complicates our understanding of this concept.

★ Addiction = substance abuse

This is the classical perception of this concept. Supporters of this vision prefer to restrict the definition of addiction to consumption of psychoactive substances: hard drugs, soft drugs and alcohol. Their decision is completely justified by the fact that it is easy to assess an addiction to psychoactive substances. The experimental design is relatively clear and works for both humans and animals. Heroin, cocaine, cannabis, tobacco and alcohol modify the brain activity by producing phenomenological and somatic effects that differ based on the properties of the substance consumed.

We know each substance's mechanism of action and it is easy to predict how the subject will behave after having consumed it. The same cannot be said in the absence of these substances. We can take the example of food in general, or sugar. Some individuals suffer from addictions relating to food (bulimia or anorexia). However, all humans eat every day, and virtually none of them experience any negative attraction.

Moreover, unlike psychoactive substances, these products do not alter the nervous system. Dependences of this kind are often found to be the body's responses to some sort of mental imbalance. This is why the supporters of the classical perception prefer to classify all forms of dependence that do not include drugs within the category of 'mental illnesses'.

★ Addiction = substance abuse with or without drugs, but with limits

The behavior of someone who takes cocaine is the same as that of someone who has a gambling addiction. They are both prepared to do anything to satisfy their need. As such, it is normal for them to be considered as on the same level. However, this poses a problem. Every year, the list of 'addictions' gets longer, and some of them are not recognized by the proponents of this vision. They do not consider exercising or working excessively as a form of addiction. They prefer to limit it to activities that have truly harmful consequences.

★ Addiction = substance abuse with or without drugs

In the 18th century, alcoholism, hypersexuality and even consumption of hard drugs were not considered addictions. However, it is true that this concept did not yet exist as such. All these activities were thought to fall more within a 'lack of morals' that resulted from a lack of respect for religious principles. People who suffered from what we rightly now consider to be pathologies were perceived as immoral, and possibly victims of the influence of the devil.

Those who support this approach start from the premise that all conditions that are now considered dependencies were not perceived this way a few centuries, or indeed decades, ago. As such, it would be premature to write off new forms of dependence and we should instead wait for biological markers to prove their existence.

They believe that adopting a waiting position (like in the second case) or one of complete denial (like for the proponents of the first approach) minimizes the suffering of people currently affected by these pathologies.

Indeed, it is important to consider the fact that some of these conditions only emerged due to the evolution of society. Addictions to the internet and video games were unthinkable in the 1950s simply because the origins of these addictions did not exist.

Definition of addiction

There is no single precise definition of addiction; some are simply more generally accepted than others. This is true for that given by Goodman, which has the advantage of encompassing several criteria and being relatively objective. According to Goodman, we speak of addiction when:

- The subject who is suffering is unable to resist the desire to satisfy their impulses.
- The subject feels a growing need that mutates into uncontrollable tension just before letting themselves get carried away by their impulses.
- The subject feels a true sensation of pleasure and relief when they let themselves get carried away by their impulses.
- The subject feels lost and desperate immediately after having satisfied their desires.
- The addictive behavior has lasted for at least a month or the behavioral crises have recurred frequently for over a month.
- The presence of at least one of the following elements is detected:
 - ❖ The subject cannot stop thinking about performing or preparing to perform the addictive behavior;
 - ❖ The length and intensity of the episodes are always far greater than the subject's own expectations (for example, the subject promises to only have one beer, but ends up drinking several bottles);
 - ❖ The subject makes several attempts to stop their addictive behavior, all of which are hopeless and fruitless;
 - ❖ The subject devotes all their energy to preparing to satisfy their addictive behavior or recovering from it after performing it;
 - ❖ Addiction crises influence the subject's professional, family, social or school (university) life;
 - ❖ The subject constantly sacrifices activities that do not involve any contact with their addiction in order to satisfy the latter;
 - ❖ The subject persists to fulfil their addiction even if it leads to recurring financial, social, physical or psychological problems;
 - ❖ The subject constantly has to increase either the intensity or the frequency of their addiction-related activity in order for it to continue to bring them pleasure. In the same vein, it can be

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seen that over time, the subject has increasing difficulty achieving gratification because if it remains at the same intensity, the pleasure obtained is weaker than it was in the past;

- ❖ The subject experiences physical and psychological suffering when they are deprived of the opportunity to engage in their addictive activity.

This unofficial approach was taken up almost in its entirety in the official definition in the DSM-5. Until 2014, high-risk behaviors were also classified within this. We refer to 'high-risk behaviors' when the subject is not yet addicted, but adopts a harmful attitude that will eventually lead to dependence. The definition given in the DSM-5, which is in fact a form of diagnosis, focuses on consumption of psychoactive substances:

"The central syndrome of the disorder linked to a substance is a set of physiological, cognitive and behavioral symptoms that indicate that a subject continues to use this substance even though it causes significant problems:

- The subject uses more of a substance than intended or for longer than they are meant to;
- They may express a persistent desire to reduce or control their consumption of the substance and make many unsuccessful attempts to reduce or stop it;
- The individual may spend a lot of time obtaining the substance, using it or recovering from its effects;
- A craving for the substance is an intense desire or pressing need to consume the substance that can arise at any time, particularly in an environment where the substance was obtained or used in the past;
- Repeated consumption of the substance can lead to the subject being unable to fulfil major obligations at work, school or home;
- The subject may continue to consume the substance despite experiencing persistent or recurring interpersonal or social problems, which are caused or exacerbated by the effects of the substance;
- Social or professional activities or important hobbies may be abandoned or neglected due to consumption of the substance;
- Recurring consumption of the substance in risky situations where it is physically dangerous to do this;
- The subject continues to use the substance even though they know it causes or exacerbates persistent or recurring problems to their physical or mental health;
- Tolerance is defined as the need to significantly increase the quantity of the substance to produce the desired effect or experience a significant reduction in the effect if using the same quantity of the substance;
- Withdrawal is characterized by one of the following manifestations: a) withdrawal syndrome that is characteristic of the substance; b) the same substance (or a substance very similar to it) is taken to relieve or avoid withdrawal symptoms."

The International Classification of Diseases (ICD) takes essentially the same approach, but in a reduced version:

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“Criteria for dependence according to the ICD-10 (1992): A series of behavioral, cognitive and physiological phenomena that arise as a result of repeated consumption of a psychoactive substance, typically associated with an intense desire to take drugs, difficulty controlling consumption, pursuit of consumption despite its harmful consequences, gradual loss of interest in other activities and obligations in favor of consuming this drug, increased tolerance, and sometimes physical withdrawal syndrome.”

The following table drawn up by A Rigaud and M Jacquet in 2000 summarizes the main features of all the approaches.

Addictions according to clinical data, official classifications and Goodman’s criteria	Impulse control disorder (DSM, ICD)	Clinically identified addictions	Goodman’s criteria
Addiction to a substance	+	+	+
Abuse, harmful use	+	-	-
Anorexia nervosa	-	+	?
Bulimia	-	+	+
Paraphilias (sexual perversions)	+	-	
Kleptomania	+	+/-	+
Pathological gambling	+	+	+
Pyromania	+	+	+/-
Trichotillomania	+	+	+
Smoking	-	+	+/-
Compulsive sexual behavior			
Suicide attempts	?	+	+/-
Compulsive buying			
High-risk behaviors	?	+	+/-
Intensive efforts	?	+	+/-
Workaholics	?	+	+/-

Mechanisms of addictions

Analyzing how the nervous system functions gives a precise vision of the mechanisms involved in addictions. The key lies in the synapses. Several of the neurotransmitters involved in the emergence

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of addictions are vitally important for the nervous system, particularly DA, GABA, noradrenaline, glutamate and serotonin.

Some substances amplify the quantity of dopamine released by directly activating the dopaminergic neuron (nicotine) or inhibiting the inhibitory neuron (morphine, heroin, cannabis). Others halt the degradation or prevent the capture of the dopamine released (cocaine, amphetamines).

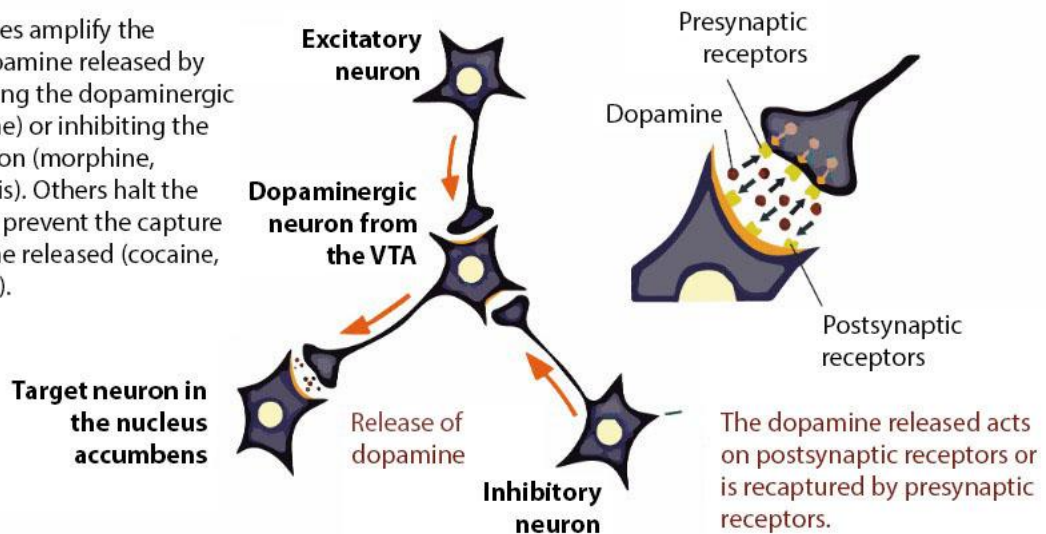


Figure 1: Functioning of the synapse

In principle, the action of neurotransmitters like DA is temporary and very fast. The subject feels a one-off sensation of joy or euphoria that passes quickly and then brings them back to a normal state. All psychoactive substances and addictive behaviors tend to increase the effect of this neurotransmitter.

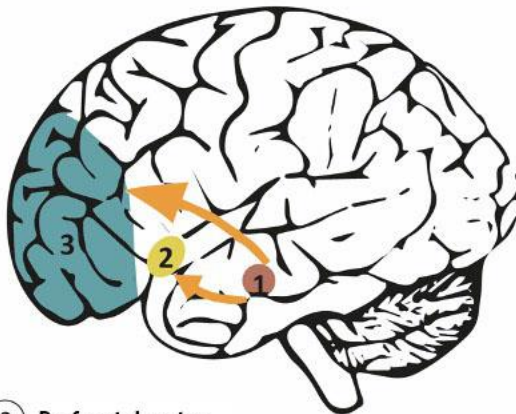
The neural 'memory' pushes the individual to repeat the action in order to relive these sensations. Unfortunately, with time, the body develops an increased tolerance to the substance. This encourages the individual to consume a little more each time to achieve a result that will always be less than the first time.

Taking psychoactive substances destabilizes the autonomic nervous system. The natural reward system is no longer regulated automatically by the body, but by the individual themselves.

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THE REWARD SYSTEM



1 Ventral tegmental area (VTA)

This is constantly informed of the level of satisfaction of fundamental needs. It contains, among others, dopamine neurons (DA): when these are stimulated by a psychoactive substance or activity, this leads to an increase in the release of DA in the nucleus accumbens and the prefrontal cortex.

3 Prefrontal cortex

This is heavily involved in judgement, motivation, decision making and planning, and participates in implementing behaviors that are appropriate for every situation the individual encounters. In addicts, it becomes unable to prevent the individual from seeking out activities and psychoactive substances.

2 Nucleus accumbens (NA)

This transmits information in the regions of the brain involved in evaluating the emotional value of an event (amygdala), storing memories linked to an experience (hippocampus), and seeking pleasure (insula).

Addictive symptoms have many things in common, unlike the mechanisms of addictions. They depend on several factors:

- The type of addiction: substance abuse with or without drugs.
- The type of psychoactive substance consumed: in the case of substance abuse with drugs.
- The patient's psychological state prior to the start of the behavioral problem: in the case of substance abuse without drugs.

All these specificities make it difficult to establish a typical mechanism for every situation. Thus, we will limit ourselves here to analyzing the mechanism of action of different psychoactive substances on the nervous system: alcohol, tobacco, heroin (and its derivatives), cocaine (and its derivatives) and synthetic drugs.

🌟 Mechanism of action of alcohol

In low doses, alcohol has a euphoric effect. It causes dopamine to be released, which increases the sensation of pleasure. The subject feels free of all taboos and becomes more communicative. This is the sensation that the majority of people who suffer from alcoholism are seeking.

Unfortunately, the more intense the consumption, the shorter this phase becomes. The individual soon moves into the second phase: that of fatigue and exhaustion. Indeed, the more the blood alcohol level increases, the more the tendency changes. Gradually, the sedative effect of alcohol becomes more present and the individual ends up losing control of their actions. They feel drowsy and struggle to control their movements and emotions.

When consumption is a one-off event, the subject's body can recover after a bout of binge drinking. When alcohol is consumed excessively and on a permanent basis, the changes are more profound

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and severe. Alcohol modifies the fluidity of the cell membranes, as well as the receptiveness of receptors like GABA and NMDA. People suffering from severe alcoholism also experience a profound change in brain morphology.

For a long time, it was thought that these subjects were experiencing neuronal loss, but recent studies have proved that this is not entirely the case. The fact remains that they have confirmed a significant reduction in white matter, like with ventricular dilation. Fortunately, this damage is reversible, at least in part, once the subject returns to a healthy lifestyle.

Note that the destructive effects of alcohol are more pronounced in younger subjects than in adults.

★ Mechanism of action of tobacco

We often hear “I’m giving up smoking tomorrow!”, then the next day: “I’m quitting next Monday, it can’t be that hard. Others have managed it.” One year later, the individual in question is still smoking. With a lot of willpower, they may have managed to reduce their tobacco consumption, but no more than that.

Stopping smoking is a complex task due to the double action of nicotine. It gradually replaces acetylcholine by copying its mechanism of action. The problem is that, unlike this neurotransmitter, the action of nicotine is not controlled by the body. It depends solely on the quantity that is absorbed.

Nicotine acts in the opposite way to ethanol: in low doses, it has a relaxing effect, and in medium doses, it has a stimulating power. This is why smokers will unconsciously increase the quantity of cigarettes they smoke when working or when wanting to stay awake.

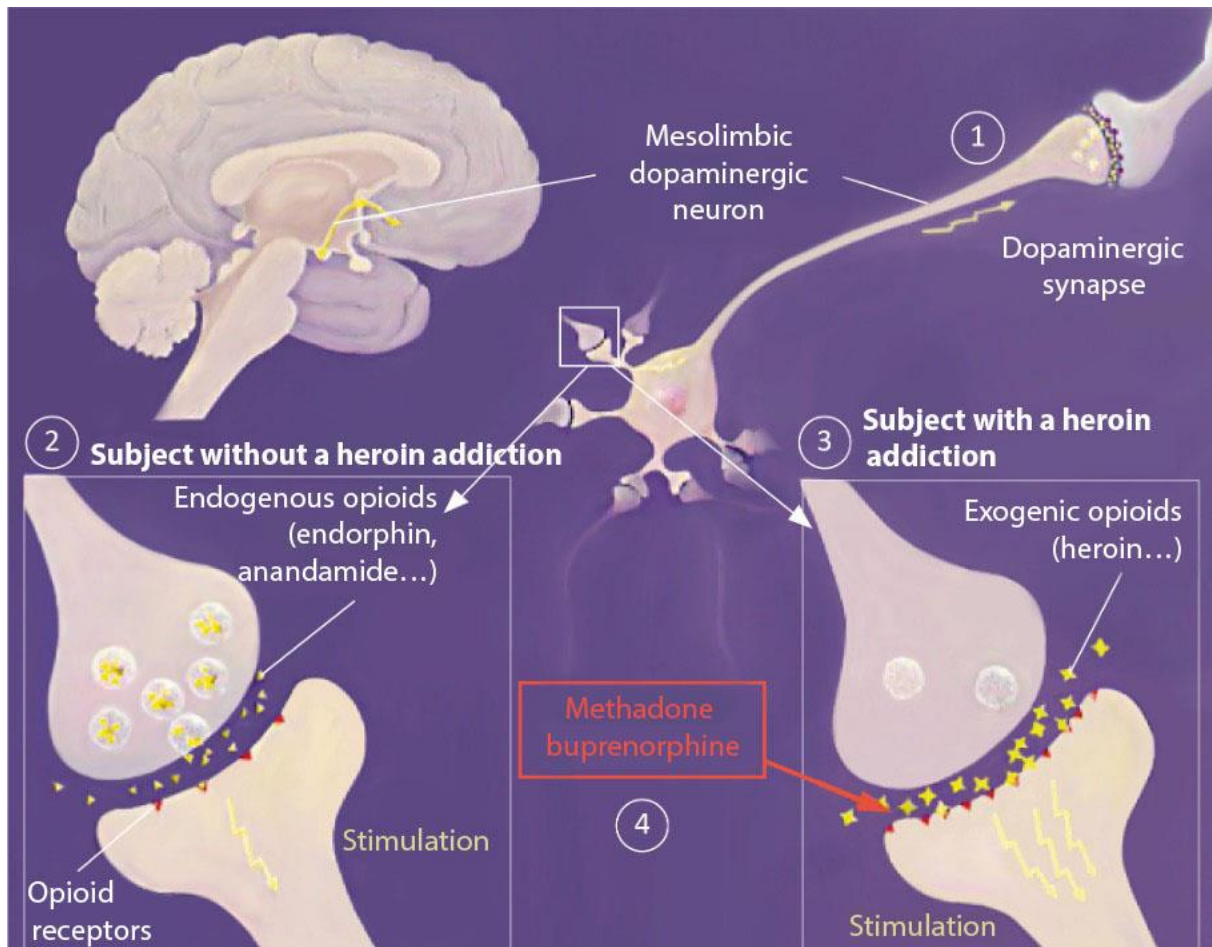
The more smokers engage in this activity, the more they feel the stimulating effect. Once the percentage of nicotine drops in the blood, the smoker feels its relaxing effect again. The result is that the individual is always under the effect of nicotine, which literally inhibits the functioning of the autonomic nervous system. Worse still, with time, nicotine completely takes the place of acetylcholine. The smoker becomes totally dependent on their habit. Cigarettes help them to relax and be stimulated. In short, they become essential.

★ Mechanism of action of cocaine (crack)

Cocaine curbs the recapture of dopamine by inhibiting its transporter. This causes an uncontrolled increase of dopamine in the blood, which leads to the activation of the receptors of this neurotransmitter and provokes dependence. This surge will cause a euphoric effect for around thirty minutes at the most.

Crack will produce an extreme effect, but over a shorter period of time. The biggest danger posed by cocaine is not so much the dependence itself, but its side effects. It has negative repercussions on vasoconstriction, with the consequences being strokes and heart attacks. Furthermore, simultaneous consumption of alcohol and cocaine can be deadly.

✪ Mechanism of action of heroin (morphine)



Heroin is a particularly powerful drug. It only takes a few times taking it to become dependent and, unlike with other drugs, the withdrawal symptoms are real physical and psychological torture. Thus, the individual will do everything they can to prevent themselves from experiencing them. In the body, heroin transforms into morphine. This immediately blocks the action of the inhibitory neurotransmitter and leads to overproduction of dopamine.

This excess translates as a true wave of strong sensations and emotions that the individual will inevitably want to relive. Unfortunately, in the long term, the intensity of the effects of dopamine reduces, as does the endorphin level in the body. This will therefore force the subject to consume a little more each time in order to feel the emotions they felt the first time again.

✪ Mechanism of action of synthetic drugs

There are more than a dozen synthetic drugs and each of them has a different mechanism of action on the brain. We will not dwell on the action of each of these substances. The most important point, but also the worst aspect of synthetic drugs, is that they were designed specifically to produce a maximum effect on the individual who consumes them. These drugs also have to be less expensive and, above all, provoke an immediate dependence so that dealers can make huge profits in as short a time frame as possible.

This is why consumption of synthetic drugs is always more dangerous than use of natural psychoactive substances. Furthermore, the damage caused by these drugs is almost always irreversible. Some of these drugs cause such a strong dependence that they kill those who take them after barely even a year of using them, or even just after a few months.

The different categories of addiction

Overall, we distinguish between two main categories of addiction:

- addictions caused by psychoactive substances;
- behavioral addictions.

The emergence of the first category of addiction is very often linked to high-risk behaviors. A high percentage of those who suffer from such addictions are young adults and adolescents. Indeed, the latter are more inclined to adopt this type of behavior in order to escape parental control, to please their friends and be accepted by a group, or simply to prove to themselves that they are grown-up enough to do it. In this case, taking drugs is considered a form of affirmation of one's character.

The emergence of behavioral addictions, meanwhile, is in most cases linked to some kind of trauma. For example, a child who is criticized due to their weight may lose self-confidence and fall into extreme behavior. They may become anorexic in order to be accepted by everyone and be complimented on their beauty. Gradually, they may lose contact with reality and not understand that they are putting their life in danger. They may also go to the other extreme; in this case, food acts as a refuge that protects them from the prying eyes of society.

In this section, we will not look at dependencies linked to consumption of psychoactive substances and instead focus on behavioral addictions. We will analyze nine types of dependencies that are relatively common in modern societies:

- gambling addiction;
- internet addiction;
- compulsive buying;
- food addiction;
- exercise addiction;
- sex addiction;
- work addiction;
- addiction to psychoactive substances;
- crime addiction.

Gambling addiction

After having been ignored for a long time, pathological gambling is now officially recognized as a form of behavioral addiction. This addiction has only been considered a disorder since 1980, when it was

finally included in the DSM-3. The DSM-4 describes pathological gambling as 'persistent and maladaptive gambling behavior'. In order to be considered a compulsive gambler, the individual must meet at least five of the following criteria:

- Having a preoccupation with gambling (for example recalling past gambling experiences, planning the next attempt or thinking of ways to get money to use for gambling).
- Needing to gamble with increasing amounts of money to achieve the desired state of excitement.
- Having repeated unsuccessful efforts to control, reduce or stop gambling.
- Feeling restless or irritable when trying to reduce or stop gambling.
- Gambling to escape problems or relieve a dysphoric mood (for example feelings of powerlessness, guilt, anxiety, depression).
- After losing money gambling, often returning another day in order to recover one's losses.
- Lying to family members, therapists or others to conceal the true extent of involvement in gambling.
- Committing illegal acts, such as forgery, fraud, theft or embezzlement to finance gambling.
- Jeopardizing or losing a significant relationship, job or educational or career opportunity because of gambling.
- Relying on others to provide money to relieve a desperate financial situation caused by gambling.

If we replace the word 'gambling' with 'psychoactive substance' or 'use of psychoactive substances', we obtain the same list of criteria to define addiction to psychoactive substances.

With regard to gambling, there is a very fine line between normal behavior and pathological behavior. Indeed, sometimes the gambler is deeply absorbed in their activity for a shorter or longer period without suffering from a gambling addiction. As Edmund Bergler noted, not everyone who gambles is addicted to gambling.

Gambling is a relatively addictive activity by nature. As such, it is not uncommon that gamblers pay no attention whatsoever to the outside world while they are concentrating on what they are doing. To facilitate differentiation, several authors have developed a classification of gambling, or rather of types of gamblers. There are three main categories of gamblers.

- **Professional gamblers:** As the adjective suggests, gambling is their profession, and they consider it as such. They know their personal limits and do not take unnecessary risks. Whether they play games of chance or video games, they are able to stop when they need to. They are passionate about gambling, but do not let themselves get overwhelmed by it. They have a social life that is just as active as many other people's and are therefore able to keep things in perspective.
- **Social gamblers:** they may gamble regularly or occasionally, but in both cases, they only consider gambling as a hobby. Like professional gamblers, they are aware of their limits and avoid letting themselves get caught up and gambling excessively.
- **Pathological gamblers:** these individuals have completely lost touch with reality. For this category of gamblers, gambling replaces all aspects of life. They devote themselves to it at the expense of their social, professional and family life.

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It is easy to detect pathological behavior by observing the individual's psychological responses. Pathological gamblers will go through the following three stages:

- **The winning phase:** this is the period during which the individual engages in gambling with the firm conviction that they can overcome all their financial difficulties (or increase their assets considerably). However, this phase is associated with the period during which the gambler obtains positive results and takes even more comfort in the position that gambling is the solution to all their needs.
- **The losing phase:** the gambler suffers constant setbacks. Very often, they are already immersed in debt, but they continue regardless in the hope of being able to make it back. This is the most destructive phase because, irrespective of the amount won or lost, the individual's dependence is such that they will be completely unable to stop their activity and take stock of their condition.
- **The desperation phase:** this is the final and most sensitive phase. The individual finally becomes aware of the fact that their life is a bottomless pit. They realize not only that their addictive behavior is destroying them, but also that they are unable to get out of it by themselves.

This final phase is decisive because the gambler arrives at a crossroads. At this point, they have generally lost everything, or almost, and have to make a decision upon which their future will depend. The choice is always between four options:

- **Continue blindly:** despite being aware of the fact that their activity is harming them, the gambler decides to continue. They are ready to do anything to satisfy their passion, including getting involved in criminal activities.
- **Surrender:** this generally involves suicide. The gambler thinks they have lost everything and that no one, including themselves, can resolve the situation. Suicide is both a way of getting rid of problems and an attempt to take control of their life one final time and solve all the problems they have created.
- **Escape:** this is a headlong rush whereby the gambler permanently changes their place of residence in the hope that they will be able to get rid of their addiction in doing so.
- **Cry for help:** this is the best option for gamblers. However, it is the most difficult one to choose because in most cases, the gambler will already have broken the ties with those close to them and all those who could have offered them the psychological support they needed to get out of the situation.

The downward spiral is long. This process sometimes lasts a few years, or even more than a decade. Statistics show that men are more affected than women. No social class is more affected than another. Poorer people start gambling to improve their financial situation. Wealthier people do the same, but to earn even more than they already have.

Internet addiction

Despite having been unthinkable three decades ago, internet addiction is now a scourge that affects millions of people around the world. The term encompasses all forms of addictions linked to the virtual world: games, shopping, communication, etc.

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The typical profile of an internet addict is someone who suffers a psychological shock or trauma, very often a loss, that they struggle to recover from. They try to rebuild real social connections but, for various reasons, reach the conclusion that it is impossible to do so. They might fear the reactions of those around them, or simply feel they do not have the strength to achieve their objectives.

The virtual world constitutes both an escape from reality and an attempt to construct what seems to be a better world, where the individual can be brighter and more important than they are in their current life. For a long time, this escapism was complex because the individual was obliged to step back into the real world, if only to eat.

Nowadays, it is possible to isolate oneself completely from the real world and live exclusively in the virtual sphere, which makes this dependence even more dangerous. It will be difficult to convince someone who works and has fun in the virtual world to come back into reality.

Two age groups are particularly affected by this problem: adolescents (and young adults) and individuals aged between 30 and 40. The former do it more out of apathy. Children discover the virtual world at a very early age and are sometimes tempted to stay there, especially when they have difficulties socializing. The latter make a deliberate choice to isolate themselves in order to escape reality, which is sometimes oppressive. The following are some examples of character traits in people who suffer from internet addiction:

- socioemotional immaturity;
- emptiness with regard to identity;
- frustration and inability to overcome it;
- anxiety;
- behavioral problems and emotional dependence;
- feeling of worthlessness and a lack of recognition;
- feeling of isolation and solitary nature;
- emotional emptiness.

Gradually, the internet addict ends up forming connections with other members of their group, which leads them to strengthen their convictions.

Orman's test (Internet Addiction Survey) is very often used to identify internet addiction. The individual is asked to answer questions with a yes or no. 0 to 3 positive responses indicate a mild internet addiction. If the individual gives between 4 and 6 positive responses, they are highly likely to develop addictive behavior. Over 6 positive responses indicate that the individual is already suffering from internet addiction.

★ Orman's test

The questions asked in the test are as follows:

- Do you spend more time online than you would have initially thought?
- Does this bother you?
- Have your friends or members of your family complained about this?

- Do you find it hard not to go on the internet for several days?
- Have your productivity, the quality of your work or your personal relationships suffered as a result of being online?
- Are there areas of the internet or particular sites that you cannot avoid?
- Do you struggle to control your impulse to buy products or services online?
- Have you tried unsuccessfully to curtail your use of the internet?
- Are you losing a lot of involvement and personal satisfaction due to being online?

Compulsive buying

This addiction is closely linked to the individual's relationship with money. Many people have complex relationships with it, for example:

- extreme misers, who are capable of unimaginable actions (like letting a loved one or themselves die) in order to avoid spending money;
- strict savers, who plan all actions linked to finances like a war plan and never stray from it, no matter what. Regardless of their social background, everything has to happen according to their plan;
- profiteers, who gain pleasure from spending or even wasting money, but only when the money does not belong to them;
- frenetic spenders, who are unable to keep even a penny. They tend to get rid of their money as quickly as they acquire it, even if they do not have a lot.

The concept of compulsive buying is a modern one, but not particularly new. Compulsive buyers emerged in the second half of the 19th century, and not by chance. For centuries, only wealthy individuals could afford to buy what they liked, and they were the strict minority. The rest of the population had to fight to survive. The latter group could not spend anything because they simply could not afford to do so.

The industrial revolution in the 19th century changed the game. Products that only the wealthiest could afford a few centuries earlier became available to all. For some people, the temptation was too great, and this trend continues to increase today. Like with gamblers, big spenders are not necessarily compulsive buyers. There are four main categories of buyers.

- **Emotional buyers:** these individuals are more connected to the sentimental value of the item they are purchasing. They may buy an item not because they like it, but because someone dear to them owned something similar. They are not attached to the object itself, but to the memory it evokes.
- **Impulsive buyers:** like the previous category, these people are not particularly attached to the item they buy. They spend on impulse. They buy items not because they like them, but because they want them at that precise moment. They always end up regretting their action and spending their money, but this does not stop them from doing exactly the same thing a few days or even hours later.

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- **Fanatical buyers:** these people are genuinely interested in the items they buy, but unfortunately, they are unable to put things in perspective. They may buy the same bag or pair of shoes in all the colors available but end up only wearing them in one color.
- **Compulsive buyers:** these individuals buy for the pure pleasure of doing so. Buying is a way to reduce the tension and stress they experience. At the slightest inconvenience, they spend. They are not attached to the items they buy, only to the process itself. The more they spend, the better they feel. Very often, they do not even use the things they buy. If they are unable to satisfy their passion, they feel a sense of frustration and psychological imbalance as deep as those experienced by people who are addicted to psychoactive substances.

McElroy created a classification that helps to understand the personality of compulsive buyers:

- Invasive and distracting thoughts concerning buying, buying behavior that is inappropriate or impulse buying that corresponds to at least one of the following:
 - ❖ Invasive and distracting thoughts concerning buying or impulse buying perceived to be irrepensible, intrusive and meaningless.
 - ❖ Frequent purchasing beyond one's financial capabilities, frequent purchasing of useless items or purchasing that lasts longer than planned.
- Thoughts, impulses or behavior that cause strong discomfort, are time consuming or substantially interfere with social functioning or leisure activities, or cause financial difficulties (debts, bans on buying).
- The excessive buying behavior does not appear exclusively during periods of mania or hypomania.

Other authors, specifically O'Guinn and Faber, developed an extremely effective test that detects compulsive buying behaviors: the Compulsive Buying Scale.

✦ The Compulsive Buying Scale test

The participant has to answer the following yes/no questions. If all the answers are yes, this says a lot about the person taking the test.

- Have you ever felt an irresistible urge to go and spend your money on buying something, whatever it might be?
- Do you ever buy items that seem unnecessary to you later?
- Have you ever felt aggravated, agitated or irritable when you have not made a purchase?
- Do you ever avoid certain shops for fear of buying too much?
- Do you ask someone to come shopping with you just to stop you from buying too much?
- Have you ever hidden any purchases from your family and friends?
- Can an irresistible urge to buy things cause you to miss an outing with friends?
- Have you ever missed work in order to make purchases?
- Have any purchases you have made ever triggered criticisms from your family or friends?
- Have any of your purchases led to a prolonged disagreement or separation?

- Has a purchase you have made ever caused you to get into financial difficulties?
- Has a purchase you have made ever been responsible for legal proceedings?
- Have you continued to make purchases in spite of the difficulties (family or financial) they caused?
- Do you regularly regret your purchases?
- Before buying something, do you feel tense or nervous?
- Does buying something relieve your tension or nervousness?
- Do you ever experience periods where you make multiple excessive purchases, accompanied by a feeling of generosity?
- Do you buy something on impulse, without having planned it, at least once a month?
- If you make any impulse or excessive purchases, do they account for at least one-quarter of your earnings?

Food addiction

Before we get to the heart of the matter, it is important to set things straight. Food addiction must not be confused with binge eating. Individuals who suffer from these two issues experience uncontrolled binge periods, but those who are binge eaters alone do not use compensatory strategies.

An example of a compensatory strategy is making oneself be sick just after consuming a large quantity of food. This is why bulimic individuals can maintain a perfectly normal weight, while binge eaters are almost always overweight.

However, it is important to note that the two concepts are not distinct. Researchers consider that food addiction is simply a severe form of binge eating.

Exercise addiction

Exercise keeps us healthy. However, in the case of addictive behavior, it becomes a disorder. Like all forms of dependence, it begins with a few instances of excess of little significance – at first sight – that give the individual a feeling of intense pleasure. The individual gradually increases the intensity and duration of exercise until they reach a state of complete addiction. When they do not exercise, they present the same withdrawal symptoms as someone who is addicted to psychoactive substances.

It would be inaccurate to think that only high-level sportspeople succumb to this addiction; they are simply more exposed to it than others. People with exercise addiction can be grouped within three categories:

- **People who have managed to overcome personal difficulties thanks to sport:** these can include someone who was left by their partner due to their physical characteristics. The person finally takes control of their emotions and manages to achieve the body they have always dreamed of.

However, after having reached their goal, they cannot stop their efforts due to fear of going back to square one.

- **High-level sportspeople:** who struggle to move on from their career, even once it is over: as they became used to surpassing themselves from a very young age, they have difficulty accepting their situation. They think that if they keep getting involved a little more, they will be able to reignite a flame that has gone out.
- **People who aspire to achieve a form of recognition through sport:** this applies for example to bodybuilders, who hope to appear in a calendar or in a sport magazine. As they are ready to do anything to attract attention, they believe the most effective way to do so is by reaching extremes.

In all of these cases, sport is a means of filling an emotional void. This test devised by D Veale helps to detect addictive behaviors.

✦ D Veale's test

- Reduction in the range of physical exercises that leads to a formulaic physical activity, performed at least once a day.
- Involvement in physical activity is greater than in any other activity.
- Increase in tolerance to the intensity of exercise over the years.
- Withdrawal symptoms and sadness when stopping (voluntarily or forced) physical exercise.
- Reduction in or disappearance of withdrawal symptoms upon resuming exercise.
- Subjective perception of a compulsive need for exercise.
- Rapid re-establishment of compulsive activity after a period of interruption.
- Continuation of intense physical exercise in spite of serious physical conditions caused, aggravated or prolonged by sport. Disregard for opposing views given by doctors or trainers.
- Difficulties or conflicts with family, friends or employers linked to sporting activity.
- The subject forces themselves to lose weight by following a diet in order to improve their performance.

D. Smith developed a test especially for bodybuilders, which uses the outlines of Veale's test. For running enthusiasts, Chapman and Castro created the Running Addiction Scale.

Sex addiction

It would be better to speak of sex addictions in the plural, because there are several types. However, these disorders have similar symptoms:

- compulsive masturbation;
- frequent sexual intercourse;
- virtually constant use of pornography (magazines, films, etc.);
- reduction in affective and emotional connections over time.

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Contrary to popular opinion, people who suffer from sex addiction are not necessarily single people in constant search of sex. They may have been in a relationship with the same partner for a long time. They will not be faithful to this person, but will nevertheless remain partially dependent on the affective ties that connect them. Someone is considered to suffer from sex addiction when they present at least two of the following symptoms:

- Permanently in search of new sexual partners in order to relieve and control anxiety and stress.
- Frequent autoeroticism: the individual may engage in this up to 15 times a day, even when they are completely exhausted or injured.
- A true fixation on one or sometimes several inaccessible sexual partners. The individual lives on fantasies and sometimes constructs a whole life with these characters. It is not uncommon for them to try to build a 'normal life' with their imaginary partner. In the event of rejection (which is frequent), they will have severe fits of jealousy that can make them extremely violent.
- Multiple and compulsive romantic relationships with several partners: the individual is seeking an idealized, illusory relationship that they cannot find, and changes partner every time in the hope of finding their perfect match.
- Frequent sexual intercourse, but which is never satisfying.

The life of people who suffer from this addiction is a perpetual emotional hell because they are constantly living in a dream that has no chance of becoming a reality. Very often, they have been victims of sexual abuse in childhood or adolescence.

🌟 Screening test (SAST-Carnes)

The questions asked to diagnose this kind of addiction are as follows:

- Were you sexually abused as a child or adolescent?
- Have you subscribed to or regularly purchased or rented sexually explicit materials (magazines, videos, books or online pornography)?
- Did your parents have trouble with sexual behavior?
- Do you often find yourself preoccupied with sexual thoughts?
- Do you feel that your sexual behavior is not normal?
- Does your partner worry or complain about your sexual behavior?
- Do you struggle to stop your sexual behavior when you know it is inappropriate?
- Do you ever feel bad about your sexual behavior?
- Has your sexual behavior ever created problems for you and your family?
- Have you ever sought help for sexual behavior you did not like?
- Have you been afraid that people would find out about your sexual behavior?
- Has anyone been hurt emotionally because of your sexual behavior?
- Are any of your sexual activities against the law?

- Have you promised yourself to stop certain sexual behaviors?
- Have you made efforts to quit a type of sexual activity and failed?
- Do you hide some of your sexual behaviors from others?
- Have you attempted to stop some parts of your sexual activity?
- Have you felt degraded by your sexual behaviors?
- Has sex (or romantic fantasies) been a way for you to escape your problems?
- When you have sex, do you feel depressed afterwards?
- Have you felt the need to stop certain forms of sexual activity?
- Have your sexual activities disrupted your family life?
- Have you had sexual relations with minors?
- Do you feel controlled by your sexual desires?
- Do you ever think your sexual desire is stronger than you are?

Work addiction

This is defined as a pathological relationship with work. The individual devotes all their energy to their professional activity. Personal and family life only occupy a secondary position in their existence. Unlike the other forms of addiction, this is generally mistakenly viewed favorably by society.

In theory, the individual is not harming those around them. The expression 'in theory' is completely justified because in reality, this is a destructive condition like any other. It has negative consequences, but not on the individual themselves, or at least not at first. It is the people around them who suffer the most. It is psychologically taxing to live with a partner or parent who pays no attention to you.

At the start of their professional career, the individual is called upon and very often idolized, which gives them great psychological satisfaction, and particularly the desire to continue. In the long term, however, the people around them end up objecting in some way (infidelity on the partner's part and/or asking for a divorce, children feeling a sense of contempt, etc.).

Although they prioritize their professional life, work addicts end up being negatively affected by this imbalance in their family life. This leads to psychological problems that very often turn into physical issues, such as a permanent feeling of fatigue, significant stress, ulcers, blood pressure problems and heart conditions. It also results in a drop in their working capacity.

The most popular test used to detect a work addiction is that developed by B. Robinson, the WART (Work Addiction Risk Test).

★ WART

The scoring for responses to the following statements is as follows:

- Never: 1 point.
- Sometimes: 2 points.

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- Often: 3 points.
- Always: 4 points.

Results below a score of 57 points are normal. Between 57 and 66 points, the individual is at significant risk of work addiction. Individuals who score above 66 points are suffering from work addiction.

The statements are as follows:

- I prefer doing things myself rather than asking for help.
- I get impatient when I have to wait for someone or when a task takes too long for my liking.
- I feel like I am always rushing, running against the clock.
- I get irritated when someone interrupts me while I am working.
- I have several activities in progress. I am always busy.
- I do several things at the same time (eating, reading, talking on the phone).
- I get too involved in my work. I take on commitments that exceed my working capacities.
- I feel guilty when I'm not working.
- It's important for me to see the concrete results of what I do.
- I am more interested in the final outcome of my work than how I get there.
- Things never move quickly enough for me.
- I lose my patience when things drag on too much for my liking or do not unfold as I wish.
- I ask the same question several times even when I have already been given an answer.
- I spend a lot of time organizing my work and thinking about how I am going to work.
- I continue working after my colleagues have left the office.
- I feel irritated when people around me do not conform to my expectations of them.
- I feel annoyed when I find myself in a situation where I am not in control.
- I tend to put pressure on myself when I am working by setting myself deadlines.
- I struggle to relax when I am not working.
- I spend more time working than I do with my friends or family or doing leisure activities.
- I like to prepare my work in advance so I can get ahead.
- I resent my mistakes, even the most insignificant ones.
- I devote more energy and time to my work than I do to my friends or family.
- I forget or overlook holidays and family celebrations.
- I make important decisions even before having put together all the necessary information to form an opinion.

Addiction to psychoactive substances

The individual's behavior will depend on the psychoactive substance taken.

★ Tobacco

This plant-based substance has both a stimulating and relaxing effect. Its addictiveness is extremely strong in those who consume it regularly. It poses many dangers to health. In addition to addiction itself, it can cause cancer, cardiovascular events and acute bronchitis.

★ Alcohol

This helps to reduce anxiety and aggression. At the same time, it causes disinhibition and drowsiness. The short-term dangers are primarily linked to its method of action. A drunk driver who is drowsy may cause a severe road accident. People who suffer from alcoholism may experience liver disease and psychological and neurological problems. Alcohol dependence develops gradually, but it is extremely strong once it has become established.

★ Cocaine

This gives users extreme confidence in their own strengths, as well as complete insensitivity to fatigue (at least initially). Once the peak is over, the individual not only feels exhausted, but is also plagued by depressive emotions. Addiction to this substance is extremely strong, but develops gradually. It poses numerous health risks: seizures, tachycardia, arrhythmia, cardiovascular events and destruction of the nasal wall for those who snort cocaine. Overdoses are fatal.

★ LSD

The sensations caused by these drugs are unforgettable: various auditory and visual hallucinations, some of which may be pleasant but others nightmarish. They last a maximum of 2 hours after taking the substance. This is followed by a very challenging period that lasts a maximum of 12 hours, during which time the individual may suffer severe psychological problems. These generally arise if the hallucinations were terrifying.

Addiction to LSD is very rare, but those who take it are capable of committing the most serious acts under its influence (suicide, murder, etc.).

★ Crack

This form of cocaine produces a sensation of extreme euphoria just a few seconds after it is taken, but this is extremely short-lived. It is followed by a feeling of fatigue and a depressive phase. Like with cocaine, addiction to crack is gradual but very powerful. This drug poses many dangers. As well as death caused by overdosing, it can lead to lung conditions, inflammation and burns.

★ GHB and GBL

These substances were initially anesthetics used either for preoperative purposes or to treat narcolepsy. For around twenty years now, they have been used as narcotics. They are colorless, odorless and tasteless, so can even be taken by mistake or unbeknownst to the individual who consumes them. This is why they are very often used for criminal purposes.

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They take effect around fifteen minutes after being absorbed, causing feelings of euphoria and calmness, and last between 4 and 8 hours. In high doses, they cause the user to lose consciousness. Addiction to these substances is gradual but strong.

★ Cannabis

Cannabis is very often presented by those who want it to be legalized as a completely inoffensive substance that does not harm the user. This is false, however. The impact of cannabis consumption on the body is certainly lower than that of morphine or cocaine, but is still negative.

Drowsiness, impaired attention and concentration, anxiety, forgetfulness, a state of panic or depression, headache... these are a non-exhaustive list of the consequences of cannabis consumption. If the user has a job that requires a high level of concentration or attention to detail, the results can be catastrophic.

The situation is complicated further by the fact that the effects of this drug can last for up to 15 hours (if it is ingested and not smoked). The idea that cannabis does not lead to addiction is a myth. Over time, the user develops a psychological dependence that can ultimately translate as a profound craving in cases of withdrawal.

★ Spice (Yucatan fire, Algerian blend, Sence, etc.): synthetic cannabis

There is no doubt that consumption of natural cannabis is preferable to that of synthetic cannabis. Despite the fact that it is presented in the form of plants (a small bag of dried leaves), this drug is not of plant origin. It is a synthetic drug that is sprayed onto the plant material that is sold.

Its action is far more powerful than that of cannabis and is completely destructive. Furthermore, this psychoactive substance leads to extremely strong dependence. Anxiety, irritability, hallucinations, redness (face and eyes) and vomiting are the most frequent side effects.

Excessive consumption – which is inevitable in the event of addiction – causes high blood pressure, cardiovascular disorders, psychiatric problems that can drive the subject to suicide, seizures, loss of consciousness, etc.

★ Morphine (heroin)

In terms of addiction, this is probably one of the most dangerous psychoactive substances. Addiction occurs almost immediately; only a few bouts of drug use are required. Users generally become dependent a few days after taking it for the first time.

The effects of the drug itself are just as rapid. Morphine offers the user a feeling of profound calmness and disconnects them from reality completely. Taking this substance at the same time as alcohol or overdosing can be fatal.

The most frequent complications are nausea, respiratory failure and vomiting. However, people who are addicted to heroin often suffer from hepatitis and even AIDS. This is due to the method of administering the substance, i.e., intravenously.

★ MDMA and ecstasy

Like with all synthetic drugs, users do not stand a chance with these. Depending on the individual, the effects will kick in between 30 minutes and 2 hours after taking the substance and will last

between 6 and 8 hours. The first sensation, which is observed by all those close to the user, is hyperactivity. This is accompanied by stimulation of the senses and perception.

They also enhance communication and cause cardiovascular problems. Over time, the individual will suffer from psychiatric conditions, hyperthermia, cardiovascular disorders and intense fatigue. The latter is both a side effect of the substance itself and a result of the user's behavior.

Taking these drugs gives a sensation of unlimited power that often leads the individual to take reckless actions (for example pushing or lifting extremely heavy objects). Once the effects of the drug have worn off, the individual will feel the negative consequences of all their efforts. Although they are gradual, dependence on and tolerance to these substances are extremely strong.

The psychoactive substances mentioned here are a non-exhaustive list. There are many others and new, more dangerous substances than those already available on the market emerge each year.

Causes of addiction

There are many different causes of addiction. To perform an in-depth analysis, it is necessary to take a multidimensional approach. Four factors need to be considered in order to define the causes of addiction.

★ The genetic factor

This is the most contentious factor. Some researchers state that there is a form of "segregation" when addressing the genetic aspect of addictions. Nevertheless, this has a purpose. Some people are genetically more vulnerable than others concerning addictions. Recent studies have even identified genes that predispose individuals to certain forms of addiction (tobacco, alcohol, heroin, etc.). The genes identified by the GWAS are listed below.

Addiction	Gene	Function of the protein	References
	<i>BDNF</i>	Neurotrophic factor	
	<i>CHRNA5</i>	α 5 subunit of nicotine receptors	
Tobacco	<i>CHRNA3</i>	α 3 subunit of nicotine receptors	[6–12]
	<i>CHRNB4</i>	β 4 subunit of nicotine receptors	
	<i>CYP2D6</i>	Enzyme that catabolizes nicotine into cotinine	
	<i>ANKK1</i>	X-kinase that regulates the D2 receptor	[13–15]
	<i>AUTS2</i>	Neuronal transcriptional regulator	[18]
Alcohol	<i>DRD2</i>	Dopamine receptor D2	[13–15]

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	<i>GABRA2</i>	$\alpha 2$ subunit of the GABAA receptor	[17]
	<i>ADH1B</i>	Alcohol dehydrogenase	[19, 20]
	<i>ADH1C</i>	Alcohol dehydrogenase	[19, 20]
Cannabis	<i>ANKFN1</i>	Unknown function	[23]
Opioids	<i>KCNC1, KCNG2</i>	Subunits of voltage-gated potassium channels	[26]
Cocaine	<i>FAM53B</i>	Regulator of cell proliferation	[27]
Heroin	<i>ANKK1</i>	X-kinase that regulates the D2 receptor	[28]
	<i>DRD2</i>	Dopamine D2 receptor	

It goes without saying that only having a genetic predisposition does not justify addiction. However, it would be shortsighted and indeed improper to ignore this aspect. The carrier of “dangerous” genes will not necessarily become addicted to a substance. However, in the event of exposure, they are more likely to be affected by this condition than someone who does not have them.

★ The psychological factor

The biggest impact is rightfully attributed to this factor. Addiction appears in people who are seeking positive sensations in their life. For various reasons, they want to improve their existence and try to compensate through psychoactive substances or an addictive behavior that they cannot find in their everyday life.

★ The family factor

Although this is a psychological factor, it is helpful to deal with it separately. Indeed, it is relatively common for addicts to give into temptation in order to avoid family pressures or to be accepted and respected by their family. The role played by the family is always significant.

★ The social factor

This is the true basis of any addiction. People very often give into addiction in order to socialize, and are rarely alone the first time they take addictive psychoactive substances. The individual is always pushed or encouraged by a group and lets themselves get carried away in order to satisfy them. The

same is true for behavioral addictions. Nowadays, the social pressure is even greater than it was in the past.

★ The impact of advertising

Addictions have varied origins and the importance of all the traditional causes of dependence must not be overlooked. However, one scourge dominates over the rest: advertising. New marketing strategies lead people to consume substances that may be dangerous or use services and products that can cause dependence.

★ Gambling addiction

In the past, fans of games of chance only had one way of satisfying their pleasure: by going to a casino. Although the situation was dangerous for people with an addiction, this approach was relatively secure. Indeed, after having lost most of their money, players were simply no longer allowed into these establishments and therefore could not gamble any more. Of course, there was the option to use illegal casinos, but the risks involved in doing so were so significant that a considerable percentage of gamblers avoided taking them.

Nowadays, it is not only possible to gamble online. Virtual casinos even offer their clients money to start or continue playing, as long as they are active. Furthermore, it is no longer even necessary for gamblers to use a computer in order to indulge in their passion; they can simply use their phone. The result of this is that the number of people with a gambling addiction is constantly rising. The same phenomenon affects video and online gaming enthusiasts. Every effort is made to encourage the player to engage in their habit as much as possible.

★ Alcohol addiction

The notion of beer being a tool for socialization might seem absurd, but this is the idea conveyed by virtually all forms of advertising for it. Strong alcohols, meanwhile, are presented as a form of sophistication, with the idea that there is nothing better than a glass of scotch, whisky or gin to prove someone is elegant and refined. This illusory and misleading projection might not affect adults, but young people will always be convinced more easily.

★ Psychological addiction to psychoactive substances in general

Adolescence is the period during which people develop addictive behaviors fastest. It is also the stage when individuals open themselves up to the world. They are tempted to experiment for themselves rather than listen to the advice given by more experienced people, which they want to break away from in order to assert themselves. What must this sensitive mind think – especially if it is revolutionary – upon reading or hearing in the media that drugs (soft, of course, but no less dangerous) like cannabis do not deserve to be considered as such?

➔ Internet addiction

This is unwittingly encouraged by society, and even governments. It is relatively surprising to realize that, in some official forms, individuals are invited to give the details of their social media accounts in the guise of obligatory information. It is not uncommon to see employers suspect prospective employees of lying because they claim not to have an account on any social media platforms. All indications suggest that it is impossible to live in modern society without being connected to social media.

➔ Sex and crime addiction

If we selected around one hundred films, adverts and music videos at random, we would find at least sixty that promoted violence or sexual behavior, whether voluntarily or unwittingly. Sex and violence sell, and advertising agencies do not hesitate to use them.

The trend is the same for all categories of addiction, including those to psychoactive substances. Of course, official advertising of morphine or antidepressants is illegal, but when a doctor encourages a patient to take antidepressants when they do not really need them, rather than see a therapist, they are doing them a disservice. The latter option will surely be longer and more complex, but the results will be lasting and effective.

Thus, it is not surprising that, despite the fact that there has been a clear drop in tobacco and alcohol consumption (with their consumption finally being resisted), we observe a frightening increase in consumption of cannabis and other illicit psychoactive substances in parallel. The figures are shocking. Almost 4% of the population admit that they have taken cocaine at least once. 1.2% have taken heroin. Lastly, 2.7% of young adults say they have taken a synthetic drug at least once before.

The figures for cannabis are particularly worrying. Almost a third of adults admit to having smoked it at least once, and more than 2.1% take it regularly. Almost half of adolescents (4 in 10) have taken cannabis at least once, and almost 10% of these present addictive behavior. These figures relate to children aged under 18. Generally, cannabis has a negative impact on the nervous system. During adolescence, the harmful consequences are even greater as the brain is still developing.

The situation is the same for addictive behaviors (sport, buying, etc.). Marketing techniques encourage adolescents to conform to a society that does not always conform to a realistic world: certain types of clothing and electronic appliances and a sometimes flawed range of social behaviors. The trend has no chance of declining, given the economic consequences.

Conclusion

Addictions are not modern phenomena. They have always existed, but for centuries, society was content to denounce those who suffered from them without acknowledging the seriousness of their condition and their psychological distress.

Thus, alcoholics were deemed lost souls who did not fear God and who would end up in hell sooner or later. To avoid destroying their life and that of those around them, they had to ask for help from people who were not really in a position to provide it: the church. Ultimately, some of them managed to see the light at the end of the tunnel thanks to immense willpower, but the majority had to settle for being stigmatized by society.

Nowadays, society's prying gaze has not changed, even though the situation has certainly improved. We now understand that the first victim of addiction is the individual themselves, but this does not prevent this pathology from being considered a stigma.

This consideration forces the patient to hide and only ask for help when their condition is already hopeless. Worse still, many do not succeed and die without having had the chance to take advantage of help. Every year, thousands of people die as a result of overdosing on psychoactive substances or deliberately end their life after failing to put an end to their compulsive behavior.

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The situation is even more serious because we are observing a stark increase in forms of addiction. Fortunately, measures are now taken to assist the individuals affected. The scientific world is just as interested in the nature of these pathologies as the impact they have on the patient themselves and those close to them.

In turn, these multidisciplinary studies make it possible to implement effective prevention and treatment methods. The results speak for themselves. In general, alcohol and tobacco consumption have diminished globally. This does not mean, however, that we are seeing a decline in addictive behaviors. Nevertheless, the measures implemented help to combat these disorders effectively. The individuals affected and their families are looked after and supported.

However, the focus should not be placed on treatment of addictive behaviors, but on preventing them. Addiction does not spare any age groups, but those most affected by it are adolescents and young adults. As their personality has not yet developed completely, they are prime targets for aggressive marketing. They are also more tempted to adopt risky behavior than other groups. The considerable drop in the rate of cigarette consumption, for example, proves that the impact of prevention is far more significant than that of treatment.