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Chapter 1 : SAGE Books - Understanding Relationship Processes: Uncovering the Human Search for Mea

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Understanding Addiction How Addiction Hijacks the Brain Addiction involves craving for something intensely, loss of control over its use, and continuing involvement with it despite adverse consequences. Addiction changes the brain, first by subverting the way it registers pleasure and then by corrupting other normal drives such as learning and motivation. Although breaking an addiction is tough, it can be done. Addiction exerts a long and powerful influence on the brain that manifests in three distinct ways: For many years, experts believed that only alcohol and powerful drugs could cause addiction. Neuroimaging technologies and more recent research, however, have shown that certain pleasurable activities, such as gambling, shopping, and sex, can also co-opt the brain. Although a standard U. New insights into a common problem Nobody starts out intending to develop an addiction, but many people get caught in its snare. Consider the latest government statistics: Nearly 23 million Americansâ€”almost one in 10â€”are addicted to alcohol or other drugs. More than two-thirds of people with addiction abuse alcohol. The top three drugs causing addiction are marijuana, opioid narcotic pain relievers, and cocaine. In the s, when researchers first began to investigate what caused addictive behavior, they believed that people who developed addictions were somehow morally flawed or lacking in willpower. Overcoming addiction, they thought, involved punishing miscreants or, alternately, encouraging them to muster the will to break a habit. The scientific consensus has changed since then. Today we recognize addiction as a chronic disease that changes both brain structure and function. Just as cardiovascular disease damages the heart and diabetes impairs the pancreas, addiction hijacks the brain. This happens as the brain goes through a series of changes, beginning with recognition of pleasure and ending with a drive toward compulsive behavior. Pleasure principle The brain registers all pleasures in the same way, whether they originate with a psychoactive drug, a monetary reward, a sexual encounter, or a satisfying meal. In the brain, pleasure has a distinct signature: All drugs of abuse, from nicotine to heroin, cause a particularly powerful surge of dopamine in the nucleus accumbens. The likelihood that the use of a drug or participation in a rewarding activity will lead to addiction is directly linked to the speed with which it promotes dopamine release, the intensity of that release, and the reliability of that release. Even taking the same drug through different methods of administration can influence how likely it is to lead to addiction. Smoking a drug or injecting it intravenously, as opposed to swallowing it as a pill, for example, generally produces a faster, stronger dopamine signal and is more likely to lead to drug misuse. The hippocampus lays down memories of this rapid sense of satisfaction, and the amygdala creates a conditioned response to certain stimuli. Learning process Scientists once believed that the experience of pleasure alone was enough to prompt people to continue seeking an addictive substance or activity. But more recent research suggests that the situation is more complicated. Dopamine not only contributes to the experience of pleasure, but also plays a role in learning and memoryâ€”two key elements in the transition from liking something to becoming addicted to it. This system has an important role in sustaining life because it links activities needed for human survival such as eating and sex with pleasure and reward. The reward circuit in the brain includes areas involved with motivation and memory as well as with pleasure. Addictive substances and behaviors stimulate the same circuitâ€”and then overload it. Repeated exposure to an addictive substance or behavior causes nerve cells in the nucleus accumbens and the prefrontal cortex the area of the brain involved in planning and executing tasks to communicate in a way that couples liking something with wanting it, in turn driving us to go after it. That is, this process motivates us to take action to seek out the source of pleasure. Do you have addiction? But acknowledging the problem is the first step toward recovery. Do you use more of the substance or engage in the behavior more often than in the past? Have you ever lied to anyone about your use of the substance or extent of your behavior? Development of tolerance Over time, the brain adapts in a way that actually makes

the sought-after substance or activity less pleasurable. In nature, rewards usually come only with time and effort. Addictive drugs and behaviors provide a shortcut, flooding the brain with dopamine and other neurotransmitters. Our brains do not have an easy way to withstand the onslaught. Addictive drugs, for example, can release two to 10 times the amount of dopamine that natural rewards do, and they do it more quickly and more reliably. In a person who becomes addicted, brain receptors become overwhelmed. The brain responds by producing less dopamine or eliminating dopamine receptorsâ€”an adaptation similar to turning the volume down on a loudspeaker when noise becomes too loud. People who develop an addiction typically find that, in time, the desired substance no longer gives them as much pleasure. Compulsion takes over At this point, compulsion takes over. The pleasure associated with an addictive drug or behavior subsidesâ€”and yet the memory of the desired effect and the need to recreate it the wanting persists. The learning process mentioned earlier also comes into play. The hippocampus and the amygdala store information about environmental cues associated with the desired substance, so that it can be located again. These memories help create a conditioned responseâ€”intense cravingâ€”whenever the person encounters those environmental cues. Cravings contribute not only to addiction but to relapse after a hard-won sobriety. A person addicted to heroin may be in danger of relapse when he sees a hypodermic needle, for example, while another person might start to drink again after seeing a bottle of whiskey. Conditioned learning helps explain why people who develop an addiction risk relapse even after years of abstinence. Cultivate diverse interests that provide meaning to your life. Understand that your problems usually are transient, and perhaps most importantly, acknowledge that life is not always supposed to be pleasurable. Paths toward recovery , a special health report published by Harvard Health Publications. This site is for information only and NOT a substitute for professional diagnosis and treatment. We depend on support from our readers. All donations help and are greatly appreciated.

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Chapter 2 : Stationarity and differencing of time series data

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First difference period-to-period change Statistical stationarity: A stationary time series is one whose statistical properties such as mean, variance, autocorrelation, etc. Most statistical forecasting methods are based on the assumption that the time series can be rendered approximately stationary i. A stationarized series is relatively easy to predict: Recall our famous forecasting quotes. The predictions for the stationarized series can then be "untransformed," by reversing whatever mathematical transformations were previously used, to obtain predictions for the original series. The details are normally taken care of by your software. Thus, finding the sequence of transformations needed to stationarize a time series often provides important clues in the search for an appropriate forecasting model. Another reason for trying to stationarize a time series is to be able to obtain meaningful sample statistics such as means, variances, and correlations with other variables. Such statistics are useful as descriptors of future behavior only if the series is stationary. For example, if the series is consistently increasing over time, the sample mean and variance will grow with the size of the sample, and they will always underestimate the mean and variance in future periods. And if the mean and variance of a series are not well-defined, then neither are its correlations with other variables. For this reason you should be cautious about trying to extrapolate regression models fitted to nonstationary data. Most business and economic time series are far from stationary when expressed in their original units of measurement, and even after deflation or seasonal adjustment they will typically still exhibit trends, cycles, random-walking, and other non-stationary behavior. If the series has a stable long-run trend and tends to revert to the trend line following a disturbance, it may be possible to stationarize it by de-trending e. Such a series is said to be trend-stationary. If the mean, variance, and autocorrelations of the original series are not constant in time, even after detrending, perhaps the statistics of the changes in the series between periods or between seasons will be constant. Such a series is said to be difference-stationary. Sometimes it can be hard to tell the difference between a series that is trend-stationary and one that is difference-stationary, and a so-called unit root test may be used to get a more definitive answer. We will return to this topic later in the course. Return to top of page. The first difference of a time series is the series of changes from one period to the next. If Yt denotes the value of the time series Y at period t, then the first difference of Y at period t is equal to Yt-Yt If the first difference of Y is stationary and also completely random not autocorrelated , then Y is described by a random walk model: If the first difference of Y is stationary but not completely random--i. Notice that it now looks approximately stationary at least the mean and variance are more-or-less constant but it is not at all random a strong seasonal pattern remains:

Chapter 3 : Understanding Addiction: How Addiction Hijacks the Brain

The preventative framework considers intermediate outcomes and processes, not just those that are long term (Coie et al.,), and the evolution of healthy and unhealthy behavior, thought, and.