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PSYCHOLOGICAL STRUCTURE OF DECISION MAKING PROCESS OF INDIVIDUALS WITH SUBSTANCE ADDICTION

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The article is devoted to the description of psychological structure of decision making process of people with substance addiction. In article shows the analysis of studies, which points in processual and neuroanathomy features the decision making process. From the processual point of view, decision making in case of drug addiction demonstrates its specificity in all stages of process (setting performances, making choice, feedback processing) that is caused by sensibility to learn through positive reinforcements and by insensibility (or, at least, this sensibility in much lower) to learn from negative reinforcements.

Keywords: decision making, addiction, substance addiction, cognitive-behavioral mechanisms, behavioral learning, impulsivness, relapse resilience, time discounting, cognitive neuroscience, clinical psychology.

STRUCTURA PSIHOLOGICĂ A PROCESULUI DECIZIONAL LA PERSOANE CU DEPENDENȚĂ DE SUBSTANȚĂ

Articolul este dedicat descrierii structurii psihologice a procesului decizional al persoanelor cu dependență de substanțe. În articol este prezentată o analiză a studiilor, care indică trăsături procesuale și neuroanatomice în procesul de luare a deciziilor. Din punct de vedere procesual, luarea deciziilor în caz de dependență de droguri demonstrează specificul său în toate etapele procesului (stabilirea performanțelor, alegerea, prelucrarea feedback-ului) cauzate de sensibilitatea de a învăța prin întăriri pozitive și prin insensibilitate (sau, cel puțin, această sensibilitate mult mai scăzută) prin învățarea de la întăriri negative.

Cuvinte-cheie: luarea deciziilor, dependență, dependență de substanțe, mecanisme cognitiv-comportamentale, învățarea comportamentală, impulsivitate, rezistență la recădere, disconfortul timpului, neuroștiință cognitivă, psihologie clinică.

Introduction

Decision-making is a process that directly determines behavior, manifestation of will and intellectual qualities of the individual and relates to the highest executive functions of the brain [1]. Ability to make adaptive decisions affects adaptability, quality of life and life success. Decision-making disruption, in turn, leads to a systematic loss in situations of choice, since it becomes more difficult to choose the best alternative, even having all the necessary data to make the right choice. Drug use is an impulsive choice where undesirable long-term outcomes exceed short-term. In addition, the use of drugs leads to a change in cognitive-behavioral mechanisms that determine the decision-making process. A holistic description of specific mechanisms and subsequent changes that impairs decision making in case of substance addiction allows us to develop methods for monitoring and diagnose potential risk of addiction and to develop methods of therapeutic support and rehabilitation of people with drug addiction.

Thus, the aim of this article is to identify specific decision-making mechanisms for individuals with addiction.

Concept and argument

Decision-making is a cognitive process that involves identifying, comparing, evaluating alternative options, and leading to a single point of view in judgment or to a single vector of actions. Decision-making is possible with branching in two or more alternatives. The final product of decision-making is choice, which instantly manifests itself in action, or this manifestation will be postponed to a relevant choice of the situation. The choice is the result of overcoming the uncertainty in the relationship between alternatives [2].

Addiction is a brain disorder, that is characterized by compulsive engagement in rewarding stimuli, despite long-term perspective and primary aim. Drug abuse is an impulsive choice where undesirable long-term outcomes exceed short-term [3].

Verdejo-Garcia et al. (2017) suggest, that drug use is a choice with immediate positive results, but also with a long-term negative effect. Thus, regular use of drugs in face of negative consequences as a behavioral model could mark dysfunction in the cognitive mechanisms underlying the decision-making process.

This cognitive dysfunction can be displayed in three stages: 1) setting a preference related to the evaluation of options (alternatives) for decision-making; 2) making a choice, that include motivation, self-regulation, and inhibition processes; 3) feedback processing that implies further learning. People with psychoactive substance use disorder shown changes in these three stages, such as higher risk in developing of preferences, greater appetite for attractive external effects during the implementation of choice, high effectiveness of learning from rewards and less effectiveness of learning from losses during the processing of feedback. This bias of decision-making is most likely due to both premorbid factors and drug-induced effects. Since the lack of decision-making was prospectively linked with a high risk of drug relapse, it leads to dysfunctional decision-making in cases of addiction.

Biases, that associated with decision-making may be the cause and the effect of the psychoactive substance disorder. Some of the signs associated with vulnerability to the use of psychoactive substances, for example, and impulsivity, contribute to a decrease in productivity in decision-making tasks (Verdejo-Garcia et al, 2008). Harmful effects of chronic drug abuse observed in frontal-striated and limbic systems of the brain, that exacerbate the deficit in the processes of cognitive control, such as working memory, which contributes to decision-making [4].

Based on this premise, decision making includes at least three stages: setting of preferences, the implementation of choice and feedback, and each of these stages cover a range of cognitive management processes. Formation of preferences is the stage, that includes the processes of selection and evaluation of information that assessment of remuneration and risk (for example, weighing the expected rewards and risks of drug use versus alternative pleasures or abstinence/recovery). Since behavioral learning from punishments ineffective significantly in case of substance addiction, negative consequences from drug use would not get sufficient account in whole decision making process. On the other hand, using a drug with strong appetitive motivational component only will reinforce the behavioral model of addiction in every cycle.

According to Bechara (2005) addiction is a result of a lost balance between two different, but integrated, brain systems that controls decision making: an impulsive, amygdala system, that evaluates and signalize information about pain or gain of short-term prospects, and a reflective, prefrontal cortex system for signaling pain or gain of long-term prospects. After a socialization process, the reflective system taking over the impulsive system, guiding the most important of social behavior. This control is not absolute in essence. Hyperactivity of the impulsive system can overpower the reflective system. The author proposes that several drugs can hyperactivate bottom-up, involuntary signals from the amygdala that modulate, distort or hijack the goal-driven cognitive resources that are needed for the normal functioning of the reflective system and for exercising the willpower to resist drugs [5].

For understanding the psychological structure of decision making process of drug addicted person, it should be compared to a non-essence addiction, such as internet addiction, according to the study of Ko et al. (2010).

The nature of Internet addiction is controversial. It was classified as behavioral dependence or impulse control disorder. The diagnostic criteria developed by Ko et al. (2009) indicate that the main symptoms of Internet addiction overlap with the criteria for substance addiction and pathological gambling. One of the main symptoms of all three disorders is the persistence of behavior, despite the repeated psychological or physical problems caused by it [6].

The Iowa gambling task was designed to test the hypothesis of somatic markers which states that the reasoning is influenced by gross displacement signals arising from nervous mechanisms that undermine emotions. As a test for decision-making on ambiguity and risk, actors make a series of choices between options with larger short-term incomes that are offset by greater risks of large losses and those with less short-term profit and lower risk of loss, which leads to a long-term maximization of monetary compensation. Since the potential results of various options are initially unknown to the subjects, they must study the rule implicitly, using emotional feedback about their choices. It has been found that patients with lesions of the ventromedial frontal lobe or amygdala poorly perform the gambling tasks in Iowa patients with that lesion could generate a somatic marker, but could not properly respond to this signal and use it in the decision.

Iowa gambling task is postulated in two phases. At an early or early stage (approximately the first 40 trials), subjects learn to make a choice, but without any clear knowledge of the task to guide their decisions. At this stage, decisions are largely guided by implicit information. At the second stage (after the first 40 trials, but varied from person to person people), objects acquire some conceptual knowledge about the task and the solution is more influenced by explicit knowledge. Thus, the subjects make a decision in ambiguity at the beginning phase and risk in a later phase. Decisions in this task are believed to be based on intuition, not on reasoning and can be separated from working memory.

This indicates that (a) addicts are insensitive to the future, (b) they cannot change behavior in response to feedback of negative outcomes, and (c) they are hypersensitive to victories and are hypo-attentive to losses. It was also reported that pathological players have lack of decision-making, based on the Iowa gambling task, which points to the same problems with decision making as in case of substance abuse. These deficits, which point to the decision-making process is based only on immediate highs and gains without attention to potential losses can explain why they choose to continue to abuse substances or gambling, despite negative results caused by this behavior.

However, the bias of the implicit emotional training in the Iowa gambling task is associated with Internet addiction was not evaluated. Iowa gambling task should be an appropriate test for the study of characteristics decision-making in conditions of ambiguity and risk among addicts.

Research shown, that students with Internet addiction had better performance in the Iowa gambling task. This result indicates that Internet addiction is not identical to the substance disorder or pathological gambling from a neurocognitive point of view. Thus, this result indicates that the loss of control over the use of Internet can be associated with excessive implicit emotional training that establishes positive somatic markers for intensive use of the Internet [7].

Conclusion

Neuropsychological structure of decision making of drug addicted people is different from general, because it includes a list of maladaptive mechanisms and strategies, that, in fact, causes addiction. These maladaptive mechanisms become stronger with damage, that addiction brings. That interfering implementation of will-moderated behavior, that needed for resistance from addictive behavior Hypothesis about the additional influence of substance on addiction development process also supports by founded difference in decision making mechanisms in cases of substance and non-substance addiction.

Premorbid specific in behavioral learning alters all stages of decision making - sensitivity to appetitive rewards from substance; motivation to get a reward from substance, but not to avoid possible losses; effective learning from the positive effect of, despite negative. As an effect of chronic substance abuse, such as specific gets sharpened, because rational decision making system became detuned and emotional decision making system became overwhelming (specification of which is swiftness in problem-solving of here and now situation). Such correspondence between premorbid and morbid symptoms affects the dynamic of the behavioral disorder in way of self-reinforce. However, details of this specific dynamic are needed. Explanation in further studies should include age factor influence, because of age influence on cognitive processes, therefore on resilience or impulsiveness.

Thus, each case of decision making can be described through at least two criteria: time accounting (long-term or short term preference) and motivation (reward seeking or harm avoiding).

Observed specific ally, the structure of decision making process should be taken into account in case of therapeutic treatment. Primary it will manifest in orientation to positive reinforcement in the therapeutic process or when a patient had shown resilience. This way, emotional system will get an engaging behavioral model of drug resilience. Moreover, the therapeutic effort should be oriented on the training of rational decision making system, to enhance it in face of interference from the emotional system, in case of relapse risk.

References:

1. BRAND, M., FUJIWARA, E., BORSUTZKY, S., KALBE, E., KESSLER, J., & MARKOWITSCH, H.J. Decision-Making Deficits of Korsakoff Patients in a New Gambling Task With Explicit Rules: Associations With Executive Functions. Neuropsychology, 2005, no19(3), p.267-277.
2. KORNILOVA, T.V. *Psikhologia riska i prinyatiya resheniy: Uchenbnoe posobie dlya vyzov.* Moskov: Aspect Press, 2003, p.286 [Psychology of risk and decision making: tutorial for students]

3. MALENKA, R.C., NESTLER, E.J., & HYMAN, S.E. *Reinforcement and addictive disorders. Molecular Neuro-pharmacology:* A Foundation for Clinical Neuroscience. 2nd ed. New York: McGraw-Hill Medical, 2009. p.364-375.
4. VERDEJO-GARCIA, A., CHONG, T.T.J., STOUT, J.C., YÜCEL, M., & LONDON, E.D. Stages of dysfunctional decision-making in addiction. Pharmacology Biochemistry and Behavior, 2017. no164, p.99-105.
5. BECHARA, A. Decision making, impulse control and loss of willpower to resist drugs: a neurocognitive perspective. In: *Nature neuroscience*, 2005, no8(11), p.1458-1463.
6. KO, C.H., YEN, J.Y., CHEN, S.H., YANG, M.J., LIN, H.C., YANG, C.F. Proposed diagnostic criteria and the screening and diagnosing tool of Internet addiction in college students. In: *Comprehensive Psychiatry,* 2009, no50(4), p.378-384.
7. KO, C.H., HSIAO, S., LIU, G.C., YEN, J.Y., YANG, M.J., & YEN, C.F. The characteristics of decision making, potential to take risks, and personality of college students with Internet addiction. In: *Psychiatry research,* 2010, no175(1-2), p.121-125.

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