
Is it possible to increase the cost-effectiveness of quitting smoking?

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Abstract

The theory of functional equivalence allows us to look at the problem of needs and their satisfaction from a different perspective. This theory allows better understanding of the causes of various addictions, including dependence on nicotine. The role of emotional stress as an indicator that equivalence has not been established is emphasized. The presence of stress means that the body is in the process of searching for "channels" to form the equivalence of the response necessary to ensure the functioning of the body. One of these "channels" may be the development of addictive behavior, such as smoking, for example. Stimulating motivation to quit smoking and using the right psychotherapy can make smoking cessation sustainable and cost-effective.

1. Introduction

For many years, the problem of the formation of human addictions continues to be relevant. In addition to drug, alcohol and nicotine addictions, gaming, computer, food and others have appeared. At the same time, it is known that "chemical" and "non-chemical" dependencies have a similar predisposition, similar risk groups, and are often combined (Sprints, Yeryshev, 2012).

A common property of addictions is the ability to elicit positive reinforcement. Positive reinforcement emotions, as well as negative emotions accompanying motivation, are formed by a trigger mechanism, reaching their apogee only when the initial dominant need is satisfied (Sudakov and Sudakov, 2003).

At the same time, according to experts of the World Health Organization (WHO, 2017), nicotine addiction is of particular importance, which is associated both with its massive spread and with a negative impact on human health, leading to a decrease in the quality of labor resources.

But why is there a need for those substances, for those behaviors that, leading to positive emotions, are accompanied by the development of addictions?

In my opinion, it is possible to answer this question, as well as the question of ways to prevent and correct addictions, using the basic provisions of the theory of functional equivalence. According to this theory, information, physical and chemical effects on the body should be equivalent to the sum of information, physical and chemical components of vital activity transformed in the body and isolated from the body (Avilov, 2019). In this regard, any need is the development of an imbalance of varying severity caused by an excess of information, physical and chemical factors formed in the process of vital activity, which cannot be removed by the body independently without the risk of structural disruption.

Satisfaction of needs is the search for "channels" of establishing equivalence, namely: informational, physical and chemical stimuli (on a conscious and unconscious level) to eliminate this excess. The end result of satisfying needs (the end result of functional systems) is the establishment of equivalence by converting an excess of informational, physical, and chemical components of vital activity into functional and structural changes in the body. Such, for example, as the synthesis and destruction of certain substances, cellular composition renewal, changes in the mass and volume of organs and tissues, motor activity, the formation of sensations, emotions and thoughts, and their manifestation in behavioral reactions.

Satisfaction of needs (wounding the imbalance), in my opinion, occurs at the expense of the potential of both the body as a whole and its individual components. By the potential of a living structure, we understand the innate capabilities of the body and its individual systems to eliminate the manifestations of imbalance that arise in the process of vital activity. The potential cannot but be realized in the process of individual development. It's just a matter of how fast this happens, how quickly the body realizes its capabilities due to potential (Avilov, 2020).

In the case when the severity of the imbalance is minimal, that is, when an excess of informational, physical and chemical manifestations of the results of functioning with the necessary speed is given with the help of stimuli coming from the external and internal environment of the body, the reduction of potential, in my opinion, is minimal. In the case of a decrease in the receipt of information, physical and chemical stimuli, for some time, due to the potential of the body, functioning is maintained at the same or even increased level, including to search for missing stimuli, but always equivalent to the situation and (or) its significance. Further, if the stimulation of the body remains at a reduced level, or stops completely, the potential for ensuring an adequate standard of living becomes insufficient. Either the death of the organism occurs, or a compensatory, equivalent decrease in the volume and mass of its tissues, as well as a change in the nature of functioning.

On the other hand, with an excessive supply of information, physical and chemical stimuli from the external and sometimes even from the internal environment of the body, the potential is additionally spent on achieving equivalence by gradually forming an increased volume and mass of tissues, which in this case represent the main "channels" for establishing equivalence.

With both insufficient and excessive stimuli, an increased level of potential waste can lead to both diseases and death of the body, which can also be considered as forms of establishing equivalence. In this regard, the task of a person, if he wants to stay alive and healthy for many years, is to "walk on the razor's edge", without allowing either excessive or insufficient expenditure of his potential.

The path to addiction means that a person has difficulties in the process of establishing equivalence, and, as a result, there are problems with somatic and (or) mental health.

But how can one understand that the pace of establishing equivalence is far from the optimal level? In my opinion, the consequence of exceeding the rate of formation of an excess of informational, physical and chemical factors over the rate of their removal or transformation is the development of stress, including emotional stress.

Due to stress, an attempt is made to urgently establish an equivalent response through different "channels". Stress in the first phase of development is accompanied by negative emotions and significant disintegration in the functioning of functional systems (Sudakov, 1999).

Worries about what happened, fears about the future, obsessive thoughts can significantly strengthen the information component of the imbalance, and make the stress reaction more pronounced, moving into the next phase, and the consequences of stress more significant, up to the development of psychosomatic pathology, although it is an example of establishing equivalence. This pathology, it should be assumed, is formed not because of the severity of stress symptoms, but because one or another system involved in the process of establishing equivalence cannot provide the necessary pace of this process due to a lack of potential at the systemic, tissue or organ level. Or because stress takes on a chronic form, which, in the end, can lead to exhaustion of potential at various levels. At the same time, negative emotions accompanying the course of chronic emotional stress can be observed both at a higher than optimal and at a lower than optimal rate of equivalence establishment.

Long-lasting negative emotions indicate that a person cannot find "channels" for establishing equivalence. Or, having found a "channel", they cannot, for one reason or another, achieve the necessary result. In this case, we can say that the existing motivational excitement did not bear fruit.

If the body achieves the desired results (establishing equivalence), positive emotions are formed (Sudakov, 1999). They show that the imbalance has been overcome. It is known that anyone strives to maximize pleasure and minimize suffering, and the ability to hedonism can be defined as a vital resource (Vasilkova, 2019).

At the same time, there is a certain danger hidden in positive emotions. A prolonged lack of results in work, educational or other activities against the background of constant negative emotions can push a person to change his behavior model. Thus, a person is able to consciously create new imbalances, the elimination of which will be easier than the elimination of the imbalances of everyday life. Exposure to psychoactive substances, and in particular to smoking, indicates that a person has found a "channel" for establishing equivalence, movements along which will lead to positive emotions every time. Prevention and correction of addictions is desirable and possible. At the same time, speaking of smoking, according to Kahler et al (2018) improvements in the effectiveness of smoking cessation treatments are needed, as rates of sustained abstinence remain disappointingly low. What are the ways to improve the efficiency of working with those who, in principle, want to give up smoking?

First of all, with the help of education and training, it is necessary to form a hierarchy of imbalances and "channels" to eliminate them by building an equivalent response. If the imbalance eliminated by optimal behavior is more significant than the imbalance that can be eliminated by choosing behavior and substances that can potentially lead to the development of addictions, then you don't have to worry about the individual.

But to achieve this goal, a number of conditions must be met. First, the potential of a person must be known. All other things being equal, the effects of chronic emotional stress will be more pronounced for people with relatively little potential. Secondly, any burden on a person should be planned taking into account his potential. Thirdly, it is necessary to understand whether the emotional stress observed in an individual is due to a reduced or increased rate of equivalence establishment compared to the optimal level. Correction of this rate can significantly reduce the frequency of negative emotions. Fourth, it is necessary to find out whether a person has the necessary set of "channels" for establishing equivalence obtained during the formation of a personality. Stress also occurs when we are looking for a suitable behavior option (a "channel" for establishing equivalence) from among those previously used, and when we simply do not know what to do. In the latter case, the emotional state of a person will be difficult, and the choice of behavior leading to positive emotions, even at the cost of the subsequent development of addictions, is the most likely. Fifthly, if an individual does not have a system of "channels" for the formation of equivalence, it makes sense to use the possibilities of conductors of positive influence, into which it is desirable to send a person. At the same time, it should be borne in mind that satisfying the need for security, many are attracted to strong influential personalities. Very often, these are understood as persons who disregard the rules of behavior accepted in society, demonstrating antisocial or even criminal behavior. In this regard, a person should be taught to understand the difference between true strength and success and their similarity. An individual should have an understanding of mental health and strive for it.

And finally, with the help of certain types of psychotherapy, it is necessary to replace the dynamic stereotype of behavior in which smoking is present with a dynamic stereotype in which there are no dependencies.

The recommendations on how to get a person out of nicotine addiction are quite well known (Maksimov, 2018). At the same time, based on the theory of functional equivalence, an improved approach to the psychotherapeutic support of smoking cessation was applied. The goal was to make quitting smoking cost-effective.

2. Materials and methods of research

Work on quitting smoking was carried out with 28 workers of the "Lafarge-Cement (Russia)" enterprise, who clearly expressed their desire to get out of the existing addiction. The age of the workers ranged from 30 to 40 years. All the workers were male. The smoking experience ranged from 15-20 years. The number of cigarettes smoked ranged from one to two packs per day. Each of the workers had sick leaves from 3 to 5 times during the year, which was associated with influenza or acute respiratory viral infection. The average time of disability was 5 days. The total number of days of disability for workers who participated in the smoking cessation program was 436 days before the start of training and consultations. All workers gave informed voluntary consent to participate in group and individual trainings and consultations on quitting smoking. At the general meeting before the start of the smoking cessation course, the workers were told that the goal of working together with a psychotherapist is to completely stop smoking. It was recommended not to set specific deadlines. It was acceptable to gradually reduce the number of cigarettes smoked until complete withdrawal from addiction. The workers were divided into 5 groups. Group motivational trainings were conducted once for each group before starting work for two weeks. Further, individual motivational trainings and individual consultations were conducted using modified cognitive psychotherapy (Beck, 1970). A schedule of consultations was proposed for the workers, which were supposed to be carried out within a month. In addition, workers were offered unscheduled consultations if they feel a craving to resume smoking after quitting it, or if they have a desire to increase the number of cigarettes smoked. Given that the slogan of the company "Lafarge-Cement" is "Health and safety above all", workers were allowed to come to consultations directly from their place of work. The number of paid consultations, if necessary, was not limited. For complete, confident smoking cessation, 5 workers needed 2 consultations, 11 workers – 5 consultations, 7 workers – 9 consultations, 4 workers – 12 consultations, one worker – 18 consultations. In total, consultations with the workers took three months. It was assumed that quitting smoking would lead to a decrease in the incidence of temporary disability. The economic effect was calculated using the formula $E = (H1 - H2) * Y$, where E is the economic effect; H1 is the number of cases of the disease before the application of the smoking cessation program; H2 – the number of cases of morbidity after the application of the smoking cessation program; Y – economic damage from morbidity with temporary disability. Economic damage (S) was defined as the amount of net output produced per working day per employee plus the average annual amount of temporary disability allowance per employee confirmed by sick leaves. Next, the amount of prevented economic damage was determined. Then the economic efficiency of the measures was calculated. To do this, the ratio of the amount of prevented economic damage to the amount of costs incurred during training and consultations on quitting smoking was determined.

3. Results and their discussions

A year after the start of work on the formation of a new model of behavior associated with the refusal of workers to continue smoking, the following became clear. It was found that 25 people stopped smoking. Three workers had from two to three cases of smoking recurrence during the year. At the same time, these workers expressed a desire to continue participating in the program after a break, during which they were recommended to read books that help get rid of a bad habit. Secondly, during the year, since the start of participation in the smoking cessation program, five workers did not have a single case of temporary disability; 12 workers had 2 cases of temporary disability; 9 workers had 3 cases of temporary disability; 2 workers had 4 cases of temporary disability. The total number of days of disability for workers participating in trainings and consultations amounted to 293 days a year after their start. When calculating the economic effectiveness of the smoking cessation program, it turned out that the profit amounted to 2.5 rubles per 1 ruble invested in the organization of trainings and consultations. If, when calculating the prevented economic damage, only the cost of net products produced per working day by one employee was taken into account, the profit amounted to 1.96 rubles per invested ruble.

Consequently, the work on the formation of a healthy lifestyle, which included quitting smoking, proved to be effective not only from a psychological and medical point of view, but also from an economic point of view. Trainings and consultations have made it possible to change the dynamic stereotype of most workers.

In order to form a healthy lifestyle and give up bad habits, it is necessary to change the behavior of an individual. Speaking about methodological approaches to changing human behavior, it is impossible not to touch upon the problem of dynamic stereotypes. Dynamic stereotypes are built both on an innate, genetically determined basis in the process of embryonic development, and in the individual life of living beings based on acquired experience. Pavlov (1951) extended the emotional experiences of subjects to dynamic stereotypes. On this occasion, he wrote: "It seems to me that often difficult feelings when changing the usual way of life, when stopping habitual activities, when losing loved ones, not to mention mental crises and the logic of beliefs, have their physiological basis largely in the change, in violation of the old dynamic stereotype and the difficulty of establishing a new one." (Pavlov 1951). This idea highlights the difficulties that arise when trying to change human behavior. In my opinion, a dynamic stereotype is a stable combination of successive "channels" of establishing equivalence, designed to ensure a comfortable existence of an individual with typical changes in the

external and internal environment. From the point of view of the theory of functional equivalence, any dynamic stereotype is an example of the fact that a person, in certain typical situations, has found ways to eliminate constantly emerging imbalances, or in other words, "channels" for establishing equivalence. A change in behavior, a change in a dynamic stereotype will always be associated with the appearance of emotional stress and, accordingly, negative emotions. Does it make sense to abandon the old dynamic stereotype, even if it leads to deterioration of health, if a new one, in the phase of its formation, will lead to discomfort and unpleasant sensations? It makes sense if breaking the stereotype will lead to an understandable and desirable improvement in the state of health for the individual. Or, if a new stereotype leads to an improvement in the quality of life of an individual or (and) those who are extremely dear to him. A necessary condition for the success of building a new dynamic stereotype is a background of positive emotions at the end of each stage. In my opinion, there are only two possible behavioral changes. Firstly, when a person's potential is not spent enough due to a shortage of incoming incentives. In this case, the person already has emotional stress, since he does not know "where to put himself." And if the formation of a new dynamic stereotype allows us to find "channels" for establishing equivalence, get rid of negative emotions, then the task of correcting behavior can be successfully solved. Secondly, if, within the framework of the existing potential, a person independently, or with outside help, changes the hierarchy of his existing imbalances, then, in order to find new "channels" to eliminate the most significant imbalances, a person will be forced to act on a negative emotional background. Eventually, a suitable dynamic stereotype will be found and the behavior will be changed.

How can human behavior be influenced? By forming a conditioned reflex? For the formation of a conditioned reflex according to I.P. Pavlov, it is necessary that the individual and unconditional stimulus coincide in time. Another important condition for the formation of reflexes is repetition. The intensity of the neutral stimulus is important. If it is very weak, it is difficult to develop a conditioned reaction to it. I.P. Pavlov discovered the laws of extinction of conditioned reflexes. In the absence of an unconditional stimulus, the conditioned reaction begins to decrease, the latency period increases, and the frequency decreases until it completely disappears. There is a fading of the conditioned reaction.

In practical terms, the formation of conditioned reflexes according to I.P. Pavlov for the correction of behavior can be represented as follows. Let's assume that the desired change in human behavior is quitting smoking. A possible incentive to stop smoking may be a salary increase. Success in changing behavior, from the point of view of functional equivalence theory, can be achieved only if the imbalance caused by quitting smoking is less than the imbalance that is eliminated with the help of monetary rewards. At the same time, in order for the conditioned reflex not to fade, on the one hand, constant monitoring of a person is required in order to prevent possible smoking. On the other hand, it is necessary that the imbalance eliminated by additional financial or moral incentives remain more pronounced for as long as possible. In this regard, it is obvious that, firstly, the use of conditioned reflex methods is most appropriate in organized labor collectives. Secondly, the formation of reflexes, as well as the prevention of their extinction, may be quite expensive. Thirdly, the indicated option of using a conditioned reflex to correct behavior, and, in particular, to form a healthy lifestyle, can be most easily implemented in those persons who have significant financial problems (for example, credit). Fourth, the conditioned reflex according to I.P. Pavlov does not require the active participation of the individual for whom it is created.

A more active position of a person in organizing work on the formation of desirable behavior, or rejection of undesirable behavior, can be expected when applying the theory of appointment of A. Bandura (Bandura, 1977). Bandura does not consider external reinforcement and punishment as the only way to assign new behavior. From his point of view, people learn by observing the behavior of others, hearing about such behavior or reading about it. A person does not have to act on his own to learn a new behavior. The latter can also be acquired in the absence of external reinforcement. Learning through observation (modeling) is the formation by a person of a cognitive image of a certain behavioral reaction by observing the behavior of a model. Learning through observation is carried out through 4 interconnected processes: attention, model memorization, motor-reproductive processes and motivational processes. Attention is the process of understanding a model, the process of highlighting meaningful information in it for the subsequent implementation of this model, in action. From the point of view of Bandura (1977), associative models were the most significant determinants affecting attention. The formation of associative models is achieved due to the high frequency of human contacts with an object or a certain event. More formed associative models determine the focus of attention and the assimilation of only certain information. The choice of the model that a person chooses to follow is also influenced by other determinants, such as the functional value of the behavior represented by a particular model, that is, whether this behavior received encouragement or punishment. Reinforcement determines how quickly everything that was learned earlier will be implemented in action. Positive reinforcement increases the likelihood of an overt display of appropriate behavior. This is the motivational function of reinforcement. External reinforcement is not necessarily reinforcement received by the person himself. Reinforcement received by another (indirect reinforcement) can play the same role as that received by the individual himself. In addition to external ways of

regulating behavior, Bandura mentions such a method as self-imposed reinforcement. Setting internal standards is a particular example of self-imposed reinforcement. Reaching the standard is sufficient reinforcement, although external reinforcements may be missing. The concept of self-reinforcement explains how people use assessments of their actions to reward or punish themselves, what role internal praise or condemnation plays, how they choose certain external rewards from many options. From the point of view of the theory of functional equivalence, A. Bandura's representations can be supplemented. Thus, learning can be considered as one of the forms of adaptation (Avilov, 2019). And the choice of a role model is inextricably linked to meeting the need for security (Avilov, 2020). It is possible to eliminate the imbalance associated with a lack of a sense of security by using such a "channel" for establishing equivalence as the realization of the desire to belong to a certain group of people, in particular, like-minded people. And if a creative team or a group of fans of a certain start is important to a person, then in order to belong to this group, an individual is able to change his behavior, for example, to give up smoking. The second "channel" of establishing equivalence in order to feel safer may be a person's attempt to imitate those whom he considers stronger, more successful than himself. If those who are imitated show the dynamic stereotype that the imitator does not have, then the task of changing his behavior can be successfully solved. In this case, the imbalance eliminated by the fullest possible imitation of authoritative people should be greater than the imbalance that arises from the rejection of behavior that is not typical for these people. These approaches to behavior change can be implemented at the group and individual levels. If correctional work is carried out in a labor collective, then the task will be simplified by the presence of an elite interest club at the enterprise. Membership in which is possible only with appropriate behavior. It is also very important that, both during work and outside it, a person has the opportunity to contact the conductors of positive influence, which should be imitated. At the same time, it is worth considering the fact that very often, if explanatory work is not carried out with those persons whose behavior needs correction, strong, authoritative people worthy of imitation may be those who commit antisocial or even illegal acts. It is when using these two "channels" to get rid of imbalances that, in my opinion, are what A. Bandura called learning occurs, that is, the formation of a new dynamic stereotype.

Cognitive psychotherapy can provide additional help in changing the dynamic stereotype. Its main postulate is that by changing our way of thinking about a problem, we change our attitude towards it. At the same time, thought itself is one of the forms of establishing equivalence. So, if there is an imbalance on a conscious or unconscious level, emotional stress necessarily develops, accompanied by negative emotions. If, as a result of a stress-related search, a thought appears that is accompanied by a decision, then positive emotions may appear. They indicate that the idea was successful and that the equivalence has been established. From this point of view, there are no rational or irrational thoughts. If a thought, when it appears, leads to the appearance of positive emotions, it is already rational for the individual who has it. The judgment about the irrationality of thoughts is usually made by an outside observer, especially in the case when thought-conditioned behavior goes beyond socially acceptable limits, or, for example, leads to poor health. The point of cognitive therapy, when we talk about breaking a dynamic stereotype, is to create a new imbalance, more pronounced than the one that led to thoughts and subsequent undesirable behavior. Therapy should be accompanied by finding a "channel" for the individual to establish equivalence, through which the imbalance is eliminated and new thoughts appear, leading to the desired behavior. If at the same time positive emotions appear, which arise every time an individual eliminates an artificially created imbalance with the help of recommended behavior, then the goal is practically achieved. A new dynamic stereotype is being formed, especially if the suggested thought has become a belief. The use of cognitive therapy is possible both on a group and individual level. At the same time, constant monitoring of the stability of beliefs in those persons whose behavior we want to change in the desired direction is required.

In my opinion, the most effective is the simultaneous application of both the technique of conditioned reflex formation, and the theory of learning and cognitive psychotherapy. In this case, a change in the dynamic stereotype is practically guaranteed, which was confirmed practically when removing workers from nicotine addiction. At the "Lafarge-Cement (Russia)" enterprise, one of the forms of developing conditioned reflexes for those who want to quit smoking was their moral encouragement, both for participating in the smoking cessation program and for achieving specific results. In addition, reputable workers who gave up smoking, experienced all the benefits of it, and became conduits of positive influence were used as a role model. These workers shared their experiences of overcoming addictions during motivational trainings for program participants. As for cognitive psychotherapy, during individual consultations it was possible to influence the motivational sphere of those who wanted to stop smoking, and form a new imbalance and, at the same time, a new "channel" for establishing equivalence in which there was no place for smoking.

4. Conclusion

In order to form a healthy lifestyle for employees of the “Lafarge-Cement (Russia)” enterprise, a program to get out of nicotine addiction was developed. 28 people took part in the program, 25 of whom achieved sustainable smoking cessation a year after the start of the program. The results of the work proved to be cost-effective. For one ruble invested in the implementation of the program, a profit was received from 1.96 to 2.5 rubles. The theory of functional equivalence was used as a theoretical basis for conducting trainings and consultations on quitting smoking. According to this theory, the development of emotional stress means that a person is in the process of searching for a "channel" to establish equivalence. If the "channel" that would be necessary in a particular situation is not found, a person randomly, or copying the behavior of others, can find such a "channel" as smoking. Establishing equivalence when moving through this "channel" can lead to the development of positive emotions. Repeated repetition of the experience can lead to addiction. Overcoming addiction is possible by creating a more pronounced imbalance than that eliminated by smoking. To achieve this goal, it is also necessary to find an appropriate "channel" to establish equivalence, and to teach those who want to quit smoking how to use this "channel". Thanks to the support of the management of “Lafarge-Cement (Russia)”, an integrated approach was used to remove workers from nicotine addiction: a combination of the formation of conditioned reflexes with the active involvement of positive influence conductors and the use of modified cognitive psychotherapy.

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