

ALLOSTATIC NEUROPLASTICITY AND EPIGENETIC MECHANISMS IN PERSONALITY DEVELOPMENT

Oprea-Valentin BUȘU¹, Elena Cristina ANDREI²,
Mihai-Narcis POPESCU³

Abstract

Genetics is part of the life of every individual having a great influence not only in terms of the transmission of physical characteristics, but also in terms of the development of the human being. Genetics makes its mark on the character and lifestyle and relationship of an individual with the social environment. Epigenetics is a relatively new field of genetics that aims to elucidate the causes of the presence or absence of a pathology caused by the activation of genes. Epigenetics does not end its activity in intrauterine life, but is in a permanent dynamic. This dynamic is influenced by the individual's lifestyle and environmental factors. Thus, by adopting sanogenic practices to maintain good systemic and mental health, as well as ensuring an environment free from pollution, an optimal state of health of the human body can be obtained. An individual's adequate state of health encompasses three major factors: physical, mental, and social health. Alteration of one factor leads to the cancellation of the other two. Therefore, in order to maintain a balance, a good functionality of the bio-psycho-social complex is necessary. The novelty element brought by epigenetics compared to classical genetics is represented by the way in which certain factors act on human DNA and produce changes throughout life.

Key words: Epigenetics; Bio-psycho-social factors; AND.

1. Introduction

If only recently many specialists supported the idea that the nervous system cannot be subjected to modeling processes, nowadays the concept of neuroplasticity is advancing more and more. Neuroplasty is the ability of the neuronal cell to adapt to the conditions imposed by both the external environment and the internal dynamics of the body. Thus, the claim that the nerve cell cannot regenerate or develop other new neural networks is increasingly losing its scientific credibility.

Allostasis is the ability of the human body to react to internal or external stimuli. Through allostasis, the body takes over the information received and acts

¹ Junior Lecturer, PhD, Teaching Staff Training Department, University of Craiova, Romania, e-mail address: valentin_busu@yahoo.com, corresponding author.

² Student, Faculty of Dentistry, University of Medicine and Pharmacy of Craiova, Romania, e-mail address: andreicristina2201@gmail.com.

³ Student, Faculty of Dentistry, University of Medicine and Pharmacy of Craiova, Romania, e-mail address: mihnap@icloud.com.

through the constituent systems (nervous / digestive / cardiac / respiratory system, etc.) in such a way as to protect itself from harmful processes. The notion of allostasis is relatively new and had as a starting point the concept of homeostasis, which referred strictly to the body's ability to maintain its balance in different conditions (Vitalie, 2010).

Although the allostatic process is considered beneficial in some key situations, as it manages to prevent the deterioration of health, if it is active most of the time it can have negative consequences. One of the most common negative consequences is hypertension (Vitalie, 2010). Thus, it has been shown that in the case of individuals constantly subjected to negative stress (distress) there is a high level of catecholamines in the body which maintains an increase in blood pressure leading in extreme cases even to myocardial infarction.

Therefore, there is a major interdependence between chronic stress and cardiovascular diseases. Recent studies have shown that the onset of heart disease (in adolescents and children) is attributed to the mismanagement of their emotions (McEwen, 1993).

2. The link between human DNA and emotions

Unlike the cellular system, DNA has greater stability. Often, the body's cells are unstable, easily altered by harmful factors. However, even in the case of the structural architecture of the DNA, changes may occur. As is well known, DNA has a role in storing genetic information. Literature studies have highlighted the impact of emotions on DNA by conducting experiments: two groups of people were set up: the first group was subjected to positive emotions, and the second group was subjected to negative emotions. The results of the experiment showed that in the case of the group exposed to intense negative emotions, the DNA twist was approximately 25% larger. Researchers have concluded that the impact of negative factors on DNA is quite important and can lead to changes in individual behavior through mental destabilization (Dispenza, 2016).

Each individual has a quantum system. This quantum system stores waves from various emotional states. In the case of positive emotions, the waves are coherent, being much stronger and having a beneficial role on the whole body. Negative emotions, however, are characterized by the presence of out-of-phase waves that lower the individual's immunity.

- Studies have been performed to verify the predominant type of emotion in different areas of activity. The method used was that of the PANAS-X questionnaire and targeted workers in the medical, economic, tourism and construction fields. The results showed that positive emotions predominated in the tourism and financial sector, while in the medical and construction sector it was noted that negative emotions predominate (Dumbravă, 2014).

Another aspect of this study highlighted the fact that people working in areas where there were high levels of positive emotions (tourism, finance) achieved higher performance (Dumbravă, 2014). The presence of negative emotions among medical staff is somewhat justified given that they are often burdened with the problems

stated by the patient, leading to changes in mood and decreased enthusiasm. In the case of individuals working in the field of construction, negative emotions often occur due to physical exertion, as well as the rigor of the work performed.

In any work line it is necessary to regulate emotions in order to have a good self-control of the activities carried out. However, there is still a great difficulty between the process of generating emotions and the process of managing them. According to Mauss *et al.* (2007) emotional regulation is defined as “the deliberate or automatic attempt of an individual to influence what emotions to have, when and how to have them and how to express them”. This is a complex process and requires good self-knowledge as well as a lot of training. Owning self-control is based on clearly setting the goal, as well as prioritizing. Emotion regulation is a basic component of the self-control process and focuses mainly on the subjective side of the individual, on his emotional experiences (Vrasti, 2015).

3. Understanding the type of personality through the prism of acquired social masks

Each individual is exposed at a certain point in life or even repeatedly to experiences that greatly influence his personality. The main events that have a major impact on the individual are: rejection, abandonment, humiliation, betrayal and injustice. Of course, it is not mandatory for a person to be the victim of all these experiences, it can only be partially exposed. Total exposure leads to sometimes irreversible changes in behavior, but which can be ameliorated with the help of psychotherapy sessions.

Rejection should not be confused with abandonment. Rejection is a deep lesion and can manifest from the first years of life. An example of rejection manifesting itself since childhood is that of the unwanted child. This child will wear this soul injury all his life even if after a while it is possible that the parents have revised their idea and are satisfied. This is because when he is born, the child is transmitted a feeling of rejection that greatly influences him. Thus, the child will always have a tendency to run away from certain people or situations. Through this avoidance of people / conjunctures, the individual tries to protect himself, to avoid suffering.

From the point of view of physical appearance, individuals who have suffered because of the feeling of rejection are distinguished by a bodily inconsistency. Facial asymmetries can often occur, as well as significant differences between the development of the upper and lower body. Such a person may leave the impression of an incomplete body, it seems that a certain part is missing or it is insufficiently developed, and this situation can attract the attention of others in a negative way. Often, these people may look like children even if they are in adulthood. In the worst situations, the individual may have a deformed body, which leads to the appearance of inferiority complexes, thus aggravating the initial situation.

The facial appearance is characterized by the presence of small eyes, often with a lost look. The eyes of these people often convey fear, often having an unpleasant physiognomic appearance due to the presence of dark circles. The opposite can also

happen: it occurs when a child is overprotected. If in the early stages it seems to be a beneficial action for a child's development, it must be borne in mind that any overexerted action turns into a harmful action. Overprotection does nothing but prevent the child from creating his personality. At some point, the child will feel overwhelmed by affection, and when he grows up instead of giving affection to others he will react in the opposite way by rejecting others (Bourbeau, 2018).

Following the phenomenon of rejection, a series of somatic manifestations may appear:

- cardiovascular diseases by installing arrhythmias (uncontrolled heartbeat); high blood pressure can often occur if the individual feels a strong sense of fear;
- gastrointestinal disorders caused by repeated mental stress, as well as lack of proper nutrition;
- respiratory diseases in the case of individuals suffering from panic attacks;
- prolonged stress leads to a drastic decrease in immunity resulting in the appearance of autoimmune diseases or even tumors;
- other manifestations: diabetes (produced by excessive mental stress or excessive consumption of foods / drinks with a high sugar level); depressive states; episodes of bulimia nervosa;
- these people may develop rare pathologies that do not currently benefit from a curative treatment (Bourbeau, 2018).

Abandonment is also manifested from the first years of life, more precisely in the interval of 1-3 years when the child needs increased attention from the parents, not being able to understand certain notions or to distinguish between good and evil. The physical appearance highlights a weak person, lacking optimal muscle tonicity, the limbs are often weak. At the facial level, there are large eyes that attract the attention of those around them through sadness. Many children face the feeling of abandonment at least once during their childhood. It can be determined by situations such as:

- parents attention given mainly to the job and neglecting the daily activities to be performed with the child;
- the birth of another child; the attention on the newborn will be even greater if he suffers from a certain pathology;
- precarious health of parents who due to medical conditions can not focus on the needs of the child;

Children who suffer from abandonment will become adults who will show an exaggerated affectivity, often becoming dependent on their life partner. It is this absence of parental affection that contributes to the feeling of insecurity. These individuals will always be suspicious and will have difficulty establishing relationships based on trust. Basically, people affected by the feeling of abandonment will tend to put any event in doubt. Regarding the body aspect that is most commonly characterized by the absence of muscle tone, these individuals will seek to make corrections to the defects. Depending on the intensity of the defect, some individuals resort to remodeling through exercise that contributes to toning muscle mass. In severe cases, the affected people resort to reshaping plastic surgery.

The most common cosmetic interventions are breast augmentation, liposuction, and lip augmentation. Of course, aesthetic interventions are mainly required by females (Bourbeau, 2018).

Humiliation is a soul wound that can manifest itself after the age of 5, when the child is able to understand at least partially what is happening around. In order for a person to be affected by the feeling of humiliation, he must be able to understand the inter-human relationships that are established both in the family and in the social environment (in the group of friends, teachers, relatives). Often, humiliation occurs when the child enters the school environment. This happens because many teachers / educators believe that by "humiliation" a re-education of the student is achieved. In fact, the exact opposite effect occurs. Instead of remedying the unpleasant or erroneous situation caused by the student, it will only amplify the feeling of guilt that will lead to the development of an internalized child, unable to express his feelings and dissatisfaction.

Another cause of guilt is the situation in which the parents expose the child's problem to other people. Even if it is a minor incident that for parents can be noted as something comic or specific to young age, the child does not have the ability to accurately understand the seriousness of the situation and will interpret it as something very important that changes the perception of him by the people around. At maturity, the child who has been humiliated will often be distinguished by submissive behavior, desperately trying to help and please everyone around him. However, he does not exercise these actions in order to be good to those around him, but he wants to create for himself the image of a good person who does not disappoint and can always be counted upon. Humiliated people often lack a sense of self importance and are very easy to hurt. They perceive even the most insignificant reproach as a real drama, tending to exaggerate. The physical appearance of these people is characterized by the presence of obesity, and on the face there are large eyes with wide opening that give the impression of innocence.

Betrayal manifests itself especially in the interval of 2-4 years and is closely related to the Oedipus complex. This complex refers to the attraction of the young child towards the parent of the opposite sex, and if the presence of extreme cases is noticed, it is necessary to resort to cognitive-behavioral psychotherapy. Through therapy, the individual is helped to overcome the situation and to understand the normality of life through the prism of establishing inter-human relationships.

Also, betrayal is assimilated as an infidelity or as an unmasking of a situation that puts in a negative light the person concerned. Often, betrayed people reach the position of dominator and stand out by their imposing physical appearance. A dominant man is characterized by a well-developed trunk with broad shoulders, strong limbs, optimal muscle tone. In the case of women, it can be seen that the hips are well expressed, the lower limbs with very well developed muscles, have a "pear" silhouette. Dominant people have a good mental training and often anticipate the situations that will arise in the future. It can be said that there are people who seem to live in the future and neglect the present that they consider monotonous.

They manage with great difficulty to trust other people and they want to control everything, tending to get angry easily if their ideas are not accepted.

Injustice - a person whose merits are not recognized and whose value is not properly appreciated feels that an injustice is being done to him. This feeling occurs between 4 and 7 years when the child is in the process of developing individuality. An individual who has been repeatedly subjected to actions that have wronged him becomes rigid, often internalized. These people will frequently opt for a dark, sober (generally black) clothing, and may also notice the posture of the body which often highlights the crossing of the arms (in this way the person tries to show certain feelings, it seems that he uses a shield against suffering).

However, this person will become rigid in adulthood, and is in a constant search of justice. He tries to be "perfect" although this is not possible, being always a person who does not deviate from the rules, who is correct, punctual. He also claims that all these principles of his should be respected by those around him. He plans very carefully the things he wants to achieve and is very selective in terms of the group of friends, the employees he chooses, etc. In terms of physical appearance, the rigid individual is characterized by bodily harmony, balance tending to perfection, but also a constant fear of not changing its proportions. The clothing chosen by women highlights the waist, which is very thin. However, this preference to accentuate the small waist again refers to the minimization of emotions / feelings. In general, these individuals are confident, show optimism and prove to be strong people who manage to achieve their goal (Bourbeau, 2018).

The wronged individual wants fair appreciation. He wants to be rewarded according to his merit. Doesn't ask for anything extra. If he receives more than he knows he deserves, he will try to get rid of the surplus. Rigid persons know very well how to mask their emotions, but those can be detected by changing his vocal tone. It suddenly becomes inflexible. They are constantly afraid of making mistakes and are very demanding both with themselves and with other people. Burnout syndrome is common in this type of person, because they avoid asking for help and always have the ambition to push their limits. Another feature of rigid people is to disregard the concept of "luck" or "chance / coincidence". There is no luck for them. They work hard for everything they get and are reconciled to this attitude that they consider fair and just. If he is a lucky person he will feel a strong sense of guilt. Also, discipline is a watchword for this typology, and non-compliance with this lifestyle brings dissatisfaction. Physical health is generally unaffected, extremely rare in various conditions, but which have a low or moderate intensity. Most often they are subjected to psychological disorders caused by the chronic stress of the desire to achieve everything perfectly (Bourbeau, 2018).

4. Resolving internal conflicts

Resolving internal conflicts is absolutely necessary to have a state of balance in both the professional and personal environment. Teachers are often forced to confront students who have a hostile attitude towards academia or a difficult-to-understand personality typology. All these aspects must be managed with great care

in order not to obtain the opposite result from the one we want. Approaching this type of students requires, in addition to a good professional training in the field, a broad knowledge of school psychology.

Types of conflicts encountered in academia:

- **Discomfort:** there are students who constantly have a feeling that they do not find their place or think that they have not chosen correctly the field in which to work after completing their studies; communicating with them is quite difficult because they avoid expressing their feelings;

- **The incident:** there are situations in which a student or a group of students suddenly behaves atypically compared to the way they behaved previously; this raises an alarm for the teacher who is trying to better understand the causes that determined this reagent; it is a rather rare situation and has a short duration;

- **Misunderstanding:** this conflict occurs when the sender does not send the message clearly, objectively; the receiver will take the message from the sender and perceive it either erroneously or in contrast to what the sender wanted to say;

- **Tense situation:** it is common in adolescents and young people who tend to support their point of view even if it is not correct; in this case the teacher's intervention must aim at correcting the student's perception regarding a certain subject; this intervention requires a tactful and serious approach that does not come to "attack" the idea promoted by the student, but to bring justified clarifications that do not harm the student's personality;

- **Crisis situation:** it is quite rare, but not non-existent; over the years, many cases of verbal or even physical aggression by teachers or students / students who have sparked controversy have even been promoted in the media; in these situations psychological counseling is necessary (Iușcă, 2010).

The causes that led to these conflicts are extremely varied: different opinions, inefficient communication, inappropriate behavioral style.

5. Stimulating students' creativity

Stimulating students' creativity is a complex process in a continuous dynamic due to new teaching techniques, as well as due to technological development that facilitates access to a wide range of information in a very short time. By stimulating the student's creativity, special school performances are obtained, but it also contributes to the harmonious development of thinking in everyday life. However, it is not uncommon to notice that there are students who have a blockage of creativity.

These blockages may have the following etiology:

- **perceptive blockages:** this situation is often encountered in the first year of university study when the student comes into contact with a very large amount of new information. Perceptual blockage is all the more intense if the basis of the studied discipline is absent. Basically, it is impossible for the student to make the connection between the notions taught if he does not have a solid foundation. In this case, the creative process is out of the question.

- **emotional blockages:** occur especially in the case of anxious people who feel a strong sense of insecurity. Thus, the teacher must come to the aid of the student

and find methods of encouragement, to try to appreciate him in front of others when necessary in order to increase his self-esteem and to understand that he is in no way inferior to his colleagues;

- **cultural blockages**: the lack of basic notions in the studied field, as well as the knowledge of general culture can generate a series of blockages of creativity. This type of blockage can be overcome by in-depth study;

- **social blockages**: often occur in the case of individuals who grew up and developed in an authoritarian, rigid environment based strictly on compliance with certain rules; also, in our country the educational system was based and continues to be based on machine learning by reproducing information provided to students; this educational method hinders the development of students' creativity, because it imposes a limited thinking that does not promote originality or innovation in the studied field (Salavastru, 2004).

5.1. Techniques for developing students' creativity

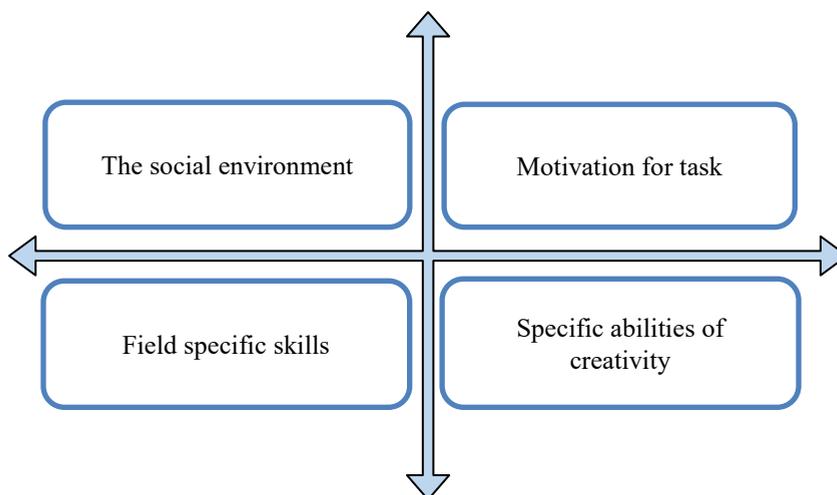


Figure no 1. The structural model of creativity (Amabile, 1996)

Starting from the creativity development scheme proposed by Amabile in 1996, we will try to exemplify its applicability in the case of dental students.

The first factor is the **social environment** in which the student lives. It is important not to be neglected, especially in the case of medical students, because it can influence the way he perceives the medical act. If the student has a group of friends / acquaintances who minimize the impact of the medical process on the patient instead of treating him responsibly, we will notice (in most cases, but it cannot be generalized) that the student in turn adopts you. such an attitude. That is why it is very important that during the years of study, the student chooses very carefully both the group of friends and the doctor coordinating the practice. The practical activity has a great weight in the learning process in the medical field, and

the coordinating doctor has the obligation to correctly train the student regarding the applicability of the theoretical notions.

It should also be emphasized that the student is explained and exemplified by the doctor how to communicate with the patient. Thus, the student-future doctor will understand how to approach patients according to their personality and you will have the opportunity to practice this activity during practice in the doctor's office.

Communication between doctor and patient must be interactive, being known two types of communication: verbal and nonverbal. Through verbal communication, the doctor must develop the ability to address patients differently depending on their personality. For an easier understanding of information, it is recommended to use common terms for explanations, taken from everyday life, close to the patient's occupation (Iorgulescu, 2017).

Particular importance in communicating with the patient is given to nonverbal communication through which patients' trust can be easily gained. Calm, eye contact conveys to the patient that he is important, that he is given attention and thus he will become more communicative. Communication with the patient also consists in assessing the patient's wishes (Pasca, 2006).

The second factor stated by Amabile is that of **motivation**. Following a university education system, but also post-university courses can be achieved only through the prism of a strong motivation, because it is about many years of schooling and training in the desired field (Jones, 2010). Of course there are many situations in which students complain of lack of motivation or reduced motivation for what they have to study. American psychologists attribute the lack of motivation to the fact that these people do not set a clear purpose for the activities to be performed. Thus, they focus on insignificant activities, which leads to decreased energy. Focusing attention on a particular goal imposed in the field of study results in achieving school performance (Maslow, 2007).

In 2009, Jones B. developed and proposed to teachers a motivational model for students called MUSIC ("Mpowerment", Usefulness, Success, Interest, and Caring). The five components of this model are meant to promote the need to change the classic teaching style based on machine learning and propose the implementation of interactive courses based on effective communication and understanding the usefulness of theoretical knowledge in everyday practice. The first component brought into discussion refers to student **empowerment**. This highlights the fact that the student / student has a great deal of control over how they learn. However, one cannot speak of absolute control, because every student needs the guidance of a teacher. The control is also influenced by the difficulty of the discipline, as well as by the student's ability to manage the information accumulated throughout the previous learning. Student empowerment can be achieved through several means:

- The teacher leaves to the free choice of the student the study topic;
- Students are not required to have a specific approach to the field studied or the obligation to use certain materials or sources of information;

- The evaluation of the knowledge accumulated by the student can be done in several dates, because there may be the possibility that the student may not be able to present at a certain date;

- The teacher to offer the student the opportunity to support his opinion (Jones, 2009).

The second point: **utility**. Often, students complain that they do not attach importance to theoretical notions, because they do not know how to put them into practice. So they consider them useless. The teacher is obliged to make applications with his students so that they are aware of the applicability of the theoretical knowledge taught. In this case, techniques such as: brainstorming, the 6-3-5 method, the interview method, etc. can be used successfully, which gives the student the opportunity to better and correctly understand what has been taught (Jones, 2009).

Third point: **success**. Achieving school performance depends not only on the student's ability to assimilate the knowledge taught, but also on the way in which the teacher exposes the notions during the courses. Thus, the teacher must provide clear information, objectives that leave no room for misinterpretation by the student, come up with updated information in the field taught to attract the attention of interlocutors and provide feedback.

Fourth point: **interest**. This component of the MUSIC model is often difficult to achieve. In order to arouse students' interest in a particular topic or discipline, the teacher must bring new information, provide eloquent examples, encourage students to actively participate in classes and make arguments for or against the topic being discussed. The last point refers to care which is of two types: personal and academic. Personal care refers to the teacher's concern for the condition of his students, making sure that he does not encounter difficulties or ambiguities. Academic care is the teacher's concern for the success of his students. This will make it possible for them to achieve performance in the field of study they have chosen and become professionals (Jones, 2009).

This factor is the specific skills in the field. In the case of dental students, medical practice has a major influence on the quality of medical services that they will provide on the dental market after completing their undergraduate studies. Therefore, in the first years of college the emphasis is on theoretical notions, and in the last years of study practice becomes a priority in their formation. However, there are many teachers who believe that it is much more effective to combine theoretical and practical notions from the beginning, because the distance of two or three years between theory and practice often leads to the loss of valuable information. At the beginning of the practical activity, students are required to resume theoretical knowledge.

The last factor highlighted by Amabile refers to the student's ability to be **creative**. Creativity in the medical field is essential and beneficial for both the doctor and the patient. Often, the student-future dentist faces atypical medical cases that are not highlighted in the specialty books. The human body is unpredictable and often does not exactly meet certain criteria set out in textbooks. Dental (tooth) and gingival structures can undergo numerous changes during treatment, changes that were not

specified or described in the course of the faculty. Thus, the student has to adapt quickly and look for a solution to the patient's problem. It should also be emphasized that the creative process is dependent on the quantity and quality of the theoretical information held.

6. Conclusions

Epigenetics is essential in understanding how human personality develops. In addition to the professional training in the field, a teacher must have a good knowledge of the psychological component of his students in order to manage the teaching process correctly. The allostatic process guides us in obtaining mental balance, but also guides us in terms of changes that may occur under the action of internal or external factors.

REFERENCES

1. Bourbeau, L. (2018). *Cele cinci răni care ne împiedică să fim noi înșine*. Bucharest: ASCENDENT Publishing House.
2. Dispenza, J. (2016). *Distruge-ți obiceiurile nocive*. Bucharest: Curtea Veche Publishing House.
3. Dumbravă, E.(2014). Investigarea impactului emoțiilor negative asupra reglării emoționale în organizații. *Psihologia Resurselor Umane*, 12(2014), 48-58. Asociația de Psihologie Industrială și Organizațională (APIO) <https://core.ac.uk/download/pdf/25748765.pdf>.
4. Iușcă, D. (2010). *Psihologia educației. Suport de curs*. Iasi: Departamentul pentru Pregătirea Personalului Didactic Universitatea de Arte "George Enescu".
5. Jones, B.D. (2009). Motivating students to engage in learning: The MUSIC Model of Academic Motivation. *International Journal of Teaching and Learning in Higher Education*, 21(2), 272-285.
6. Jones, B.D. (2010). *Strategies to implement a motivation model and increase student engagement*, paper presented at the annual meeting of the International Society for Exploring Teaching and Learning Nashville, TN.
7. Maslow, A.H.(2007). *Motivație și personalitate*. Bucharest: TREI Publishing House.
8. McEwen, B.S. and Stellar E. (1993). Stress and the individual. Mechanisms leading to disease. *Arch Intern Med*, 153(18), 2093-2101.
9. Salavastru, D. (2004). *Psihologia educației*. Iasi: Polirom Publishing House.
10. Vitalie M. (2010). Studiul efectelor terțiare ale alostaziei. *Buletinul AȘM*, 2 (311).
11. Vrasti, R. (2015). *Reglarea emoțională și importanța ei clinică*. Bucharest: ALL Publishing House.