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**ACTUAL PROBLEMS
OF PRACTICAL PSYCHOLOGY**

Collection of scientific works

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**МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
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Actual problems of practical psychology: Collection of scientific works of International Scientific and Practical Internet Conference(17 May 2024, m. Odessa). Odessa, 2024. 425 P.

The collection contains materials from an international scientific and practical conference dedicated to addressing current issues in practical psychological science. The scientific works primarily focus on theoretical and practical aspects of modern psychological science.

Attention to all applicants, post-graduate students, and young scientists from psychological and pedagogical universities.

Головська Ірина Георгіївна – кандидат психологічних наук, доцент кафедри теорії та методики практичної психології, Державний заклад «Південноукраїнський національний педагогічний університет імені К.Д. Ушинського» (м. Одеса).

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В збірник увійшли матеріали Міжнародної науково-практичної конференції здобувачів, яка присвячена актуальним проблемам практичної психологічної науки. Тематика наукових праць присвячена переважно теоретичним та практичним аспектам сучасної психологічної науки.

Для здобувачів, аспірантів, молодих науковців психологічних та педагогічних вузів.

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THE IMPACT OF GUT MICROBIOTA ON MENTAL HEALTH

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In modern psychology, increasing attention is being paid to the issue of mental health and mental disorders, which are becoming more prevalent and affecting more and more people around the world. Many people struggle with various forms of mental illness, ranging from anxiety and depression to bipolar disorder. These conditions can significantly impact an individual's daily functioning, limiting their ability to work, learn, and lead a satisfying personal and interpersonal life. As medical and psychological science advances, psychologists are gaining greater knowledge about the correlates of mental health and psychopathology. However, the causes and mechanisms of mental disorders remain an area of much mystery and ambiguity. Recently, there has been increasing research on the microbiota as a factor influencing mental state through the gut-brain axis. Data suggest that the composition of the gut microbiota, the use of prebiotics, probiotics or dietary intake may influence mental health. It is becoming increasingly important to understand the role of the gut microbiota from a mental health perspective. It may hold great promise for modern psychology in treating mental disorders and improving overall emotional and mental well-being. The purpose of this article is to describe the impact of the gut microbiota

on mental health and the potential for improving patient well-being through microbiota modification.

Gut microbiota

The gut microbiota is a collection of microorganisms such as bacteria, viruses, mycobiota along with a set of their genes. It resides in the human digestive system, particularly in the intestine. Most of the bacteria found in the gut belong to several groups such as Firmicutes (mainly *Clostridium*, *Lactobacillus*, *Faecalibacterium*, *Enterococcus*) and Bacteroidetes (mainly *Bacteroides* and *Prevotella*)^[1]. Bacteria from the Actinobacteria, Proteobacteria, Verrucomicrobia and Euryarchaeate groups are also found in the gut, but to a lesser extent. The composition of the intestinal microbiota is still incompletely known due to the inability to culture some of these microorganisms that inhabit our digestive system. However, the development of molecular biology has made it possible in recent years to detect the genetic material of thousands of different bacterial species, regardless of the ability to culture them. The impact of the microbiota on the human body is considerable, including resistance to pathogens, metabolism of pharmaceutical and dietary compounds, control of immune function, and influence on behavior through the gut-brain axis. The mechanisms of this interaction are complex and include interactions with the nervous, endocrine, and immune systems. Certain gut microbiota, particularly Firmicutes and *Bacteroides*, have been shown to influence mental health through the microbiota-gut-brain axis. Imbalances in the gut microbiota may be associated with mental disorders such as anxiety, depression, and other psychiatric disorders^[2]. The gut microbiota can affect mental health in a variety of ways, including by producing neurotransmitters (e.g., serotonin, dopamine, GABA)^[3], regulating inflammation, influencing immune responses, and producing chemicals that can enter the brain and affect cognitive function and mood. In addition, research suggests that modifying the composition of the gut microbiota may be an effective strategy to support mental health and prevent mental disorders^[4].

Communication between the gut microbiota and the brain

There is a complex communication between the gastrointestinal tract and the central nervous system. The gut microbiota plays an important role in this communication, referred to as the "gut-brain axis". This axis regulates the homeostasis of the gastrointestinal tract and links areas of the brain to gut functions through the vagus nerve, sympathetic nervous system, and endocrine and immune pathways. Stress, diet, and other environmental factors can disrupt the gut microbiota. The microbiota can affect the production of cytokines - increasing the production of anti-inflammatory cytokines and decreasing the levels of pro-inflammatory cytokines - and ultimately lead to permeability in the gastrointestinal tract and antigen migration and inflammation. Cytokines act on the enteric nervous system, which can manifest, for example, in psychiatric disorders such as depression, which is often associated with elevated levels of inflammatory markers (IL-1, IL-6, TNF- α and CRP) or PTSD. Another way the gastrointestinal tract can communicate with the central nervous system is through neurochemical signaling - the production of neurotransmitters and neuromodulators such as histamine, serotonin, acetylcholine or GABA. Even if they

do not cross the blood-brain barrier, they can communicate with the brain by interacting with the vagus nerve. For example, lipopolysaccharide (LPS), an endotoxin that is a component of the outer cell membrane of gram-negative bacteria and cyanobacteria, can increase inflammation and mobilize the immune system to produce cytokines through the vagus nerve^[5].

Gut microbiota and mental health

Depression

Depression is a major public health problem because of its potentially serious consequences, including a high risk of suicide. There are clear differences in both the composition and abundance of the gut microbiota between healthy individuals and patients with depression. One study found differences in the composition of the fecal microbiota in four bacterial species and in the abundance of 16 bacterial families between healthy individuals and patients with depressive disorders^[6]. MDD patients were shown to have higher levels of *Prevotella*, *Streptococcus*, and *Clostridium* XI, but lower levels of *Bacteroidetes*^[7]. The implication is that some families of gut bacteria are positively associated with depression, while others are negatively associated. Recently, there has been a growing body of research on the efficacy of ketamine therapy in drug-resistant depression. It is hypothesized that part of the effect of ketamine in treating depression may be related to its effect on the gut microbiota. Ketamine may alter the composition of microbes in the gut, which in turn may affect mental status through the gut-brain axis^[8]. Understanding the relationship between ketamine and the gut microbiota may lead to the development of more effective therapies for depression. However, more research is needed to better understand the mechanisms of action of ketamine in the context of the gut microbiota and the potential clinical implications of these interactions.

Anxiety

Anxiety is one of the most common psychiatric disorders. The microbiota of patients experiencing anxiety shows significantly reduced microbial diversity and changes in microbiota composition and volume compared to those not experiencing anxiety. A study of individuals experiencing social exclusion showed that the abundance of *Prevotella* was increased, while the ratio of *Firmicutes*, *Bacteroidetes*, and the abundance of *Faecalibacterium* spp. were significantly decreased^[9]. In addition, patients with generalized anxiety disorder had lower microbial abundance and diversity, and lower levels of *Firmicutes* spp. and short-chain fatty acid (SCFA)-producing microorganisms, but higher levels of *Fusobacteria* and *Bacteroidetes*^[10]. Some types of gut microbiota were positively correlated with anxiety, such as *Prevotella*, *Lactobacillales*, *Streptococcus*, and *Enterococcus*, while some types of gut microbiota were negatively correlated with anxiety, suggesting that targeting them may be a promising approach to anxiety prevention^[2].

Bipolar affective disorder

Bipolar affective disorder is a debilitating illness. A study of bipolar patients found that they had reduced gut microbiota diversity, with higher abundance of

Clostridiaceae and Collinsella^[11]. Another study found that they also had increased abundance of Actinobacteria and Coriobacteria and decreased abundance of Ruminococcaceae and Faecalibacterium^[12]. Flavonoid bacteria may contribute to the risk of bipolar affective disorder due to their associated induction of oxidative stress^[13]. Changes in the composition of patients' gut microbiota have often been associated with subjective ratings of symptom severity^[14].

Probiotics

The genetic makeup of the microbiome depends on many different factors, including external ones. Because of the possibility of influencing the gut microbiota, its use in therapy may represent a breakthrough in modern psychology. One form of therapy for mental disorders is the use of prebiotics, especially psychobiotics. In recent years, there has been an increase in the number of reports elucidating the potential mechanisms by which probiotics affect processes such as neurotransmission, neurogenesis, and neuroinflammation^[15]. Many studies confirm that a well-chosen selection of bacterial strains can influence psychiatric disorders by reducing the severity of their symptoms. For example, the probiotic *Bifidobacterium infantis* has shown antidepressant effects and the ability to reduce the negative effects of stress by affecting levels of neurotransmitters such as serotonin and GABA^[16]. Another example of a probiotic is *Lactobacillus plantarum* DR7, which in healthy individuals causes an increase in anti-inflammatory cytokines, serotonin, and a decrease in pro-inflammatory cytokines, cortisol, and overall reduces the severity of anxiety and stress. It also appears to improve associative learning, emotional cognition, and attention^[17]. Researchers have also tested whether the use of probiotics would be effective in the treatment of bipolar disorder. Patients hospitalized for a manic episode were given the probiotics *Lactobacillus rhamnosus* strain GG and *Bifidobacterium animalis* subsp. *lactis* strain Bb12 or a placebo after discharge from the hospital. They found that supplementation with these probiotics was associated with a lower rate of hospital readmission (24 vs. 8 patients) and a shorter time to hospital readmission (8.3 vs. 2.8 days)^[18].

Conclusions

The gut microbiota affects not only physical health, but also mental health. It can significantly influence mood, cognitive function and the risk of various mental disorders. Its status, both quantitatively and qualitatively, can be an indicator that distinguishes people with disorders from healthy individuals. An important aspect from the perspective of supporting mental health is the possibility of modifying the composition of the microbiota through the use of probiotics and prebiotics, or adjusting the diet for therapeutic purposes. For example, diets rich in fiber, polyphenols, and micronutrients have been shown to positively affect microbiota composition and are associated with improved brain health. In addition, the amount of complex carbohydrates and tryptophan consumed affects the production and release of serotonin^[4]. For better psychological care, it would be important to provide patients

with comprehensive support through collaboration between psychologists and nutritionists or psychodietitians. Understanding the interaction of the microbiota with the brain could be a breakthrough in supporting mental health and treating mental disorders. However, more research is needed to better understand these interactions.

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PSYCHEDELIC-ASSISTED THERAPY – THE POSSIBLE FUTURE OF PTSD TREATMENT

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Many researchers and activists who are skeptical of psychotropic drugs are coming around to the proposal of popularizing the role of psychedelic substances in treating mental disorders.

Among the most common effects characteristic of psychedelic substances are multisensory hallucinations and the so-called ‘blurring of the senses’ (synaesthesia), giving the impression of being able to taste a color or smell a sound^{[1][2]}. Such effects evoke different emotions and experiences and can be subjectively considered positive, referred to as a ‘good trip’, and negative, known as a ‘bad trip’^[2]. In addition, the ingestion of larger amounts of substances can cause unpleasant and dangerous physiological reactions, such as muscle spasms, convulsions, loss of consciousness, loss of motor coordination, and psychological issues like psychosis, panic, paranoia or dangerous and aggressive behavior towards oneself and others^[3].

The psychedelic effect itself can be divided into 5 levels. Each successive one is an intensification of the previous one and introduces additional elements into the experience^{[4][5][6]}.

Post-traumatic stress disorder (PTSD) is a mental disorder that originates from the experience of a traumatic event (most commonly associated with war veterans). It is characterized by negative thoughts, feelings, dreams and flashbacks associated with the event that triggered the trauma, as well as a significant risk of suicide and self-harm^[7]. Treatment for PTSD includes psychotherapy (for example, Cognitive behavioral therapy [CBT] or Eye movement desensitization and reprocessing [EMDR]) and pharmacological treatment, with SSRIs (for example, sertraline, paroxetine) or SNRIs (for example, venlafaxine)^[8]. Duration (for psychotherapy and pharmacotherapy) and side effects (for case of pharmacotherapy) mean that faster, more effective and safer alternatives are still being sought, hence the research into Psychedelic-Assisted Therapy.

Substances used

N,N-Dimethyltryptamine (DMT)

DMT is an organic chemical compound that has found its use for centuries in the religious rituals of some of the South American regions, where it is extracted from certain plants^[9], and is administered in the form of ayahuasca to participants, thus providing multisensory distortions and hallucinations. It can be administered orally