

HUMAN PSYCHOLOGY AND PHYSIOLOGY IN EMERGENCY SITUATIONS*Yaqubova Khabiba Otabayevna**Samarkand Regional Emergency Situations Department**Life Safety Training Center Teacher**Email: yaqubovahabiba@gmail.com*

Abstract: This article studies the psychological and physiological characteristics of human responses in emergency situations. Understanding human adaptive mechanisms has become especially relevant in the context of increasing global risks such as natural disasters, technological accidents, pandemics, and social conflicts. The study analyzes stress reactions, emotional instability, cognitive changes, and behavioral changes that occur in extreme conditions. The article emphasizes the importance of interdisciplinary approaches that combine psychology, physiology, and emergency management to increase individual and collective preparedness. The results of the study emphasize that timely psychological support, stress management skills, and preventive training can significantly reduce negative consequences in crisis situations.

Keywords: Emergency situations, psychological response, physiological response, stress reaction, adaptation mechanisms, fight or flight response, resilience, coping strategies, nervous system management, crisis management.

Annotatsiya: Ushbu maqolada favqulodda vaziyatlarda insonning javoblarining psixologik va fiziologik xususiyatlari o'rganiladi. Tabiiy ofatlar, texnologik baxtsiz hodisalar, pandemiyalar va ijtimoiy mojarolar kabi global xavflarning ortib borishi sharoitida insonning moslashuvchan mexanizmlarini tushunish ayniqsa dolzarb bo'lib qoldi. Tadqiqotda stress reaksiyalari, hissiy beqarorlik, kognitiv o'zgarishlar va ekstremal sharoitlarda yuzaga keladigan xulq-atvor o'zgarishlari tahlil qilinadi. Maqolada individual va jamoaviy tayyorgarlikni oshirish uchun psixologiya, fiziologiya va favqulodda vaziyatlarni boshqarishni birlashtirgan fanlararo yondashuvlarning ahamiyati ta'kidlangan. Tadqiqot natijalari o'z vaqtida psixologik yordam, stressni boshqarish ko'nikmalari va profilaktika mashg'ulotlari inqirozli vaziyatlarda salbiy oqibatlarni sezilarli darajada kamaytirishini ta'kidlaydi.

Kalit so'zlar: Favqulodda vaziyatlar, psixologik javob, fiziologik javob, stress reaksiyasi, moslashish mexanizmlari, kurashish yoki qochish javobi, chidamlilik, yengish strategiyalari, asab tizimini boshqarish, inqirozlarni boshqarish.

Аннотация: В данной статье изучаются психологические и физиологические характеристики реакций человека в чрезвычайных ситуациях. Понимание механизмов адаптации человека стало особенно актуальным в контексте возрастающих глобальных рисков, таких как стихийные бедствия, техногенные аварии, пандемии и социальные конфликты. В исследовании анализируются стрессовые реакции, эмоциональная нестабильность, когнитивные и поведенческие изменения, происходящие в экстремальных условиях. В статье подчеркивается важность междисциплинарных подходов, сочетающих психологию, физиологию и управление чрезвычайными ситуациями, для повышения индивидуальной и коллективной готовности. Результаты исследования показывают, что своевременная психологическая поддержка, навыки управления стрессом и профилактическая подготовка могут значительно снизить негативные последствия в кризисных ситуациях.

Ключевые слова: Чрезвычайные ситуации, психологическая реакция, физиологическая реакция, стрессовая реакция, механизмы адаптации, реакция «бей или

беги», устойчивость, стратегии преодоления, управление нервной системой, управление кризисами.

Introduction. In the 21st century, the frequency and intensity of emergencies have increased significantly due to climate change, technological development, geopolitical instability and global health threats. According to reports from international organizations such as the World Health Organization and the United Nations Office for Disaster Risk Reduction, millions of people around the world suffer from natural disasters, armed conflicts and public health emergencies every year. These events not only threaten physical safety, but also have a profound impact on human psychological and physiological functioning.

Emergency situations activate complex adaptive mechanisms in the human body. From a physiological perspective, exposure to danger leads to the activation of the sympathetic nervous system and the release of stress hormones such as adrenaline and cortisol. This process, commonly described as the “fight or flight” response, prepares the body for rapid action. While this response can be life-saving in the short term, prolonged exposure to stress can lead to negative health outcomes such as cardiovascular disease, weakened immunity, and psychosomatic conditions.

Psychologically, people may experience fear, anxiety, panic, confusion, or, conversely, increased concentration and rapid decision-making. Cognitive processes such as perception, memory, and attention often change under extreme stress. In addition, personality traits, previous experiences, social support, and cultural factors significantly influence behavior in crisis situations.

The increasing relevance of emergency preparedness programs and psychological resilience training indicates the need for more in-depth scientific research into human behavior in extreme conditions. Therefore, studying the interaction between psychological and physiological processes in emergency situations is crucial for developing effective prevention strategies, improving crisis management systems, and ensuring public safety.

Literature review. The problem of psychological and physiological response to emergency situations has been widely studied in both international and national scientific literature. Researchers emphasize that extreme conditions activate complex adaptive mechanisms that include both mental and somatic processes.

One of the main theories explaining human stress reactions was proposed by Hans Selye, who introduced the concept of General Adaptation Syndrome. According to Selye, stress reactions occur in three stages: anxiety, resistance and exhaustion. This theory laid the foundation for understanding physiological reactions such as hormonal changes, activation of the autonomic nervous system and long-term health consequences under prolonged stress[1].

Later, Walter Cannon, emphasizing the role of the sympathetic nervous system and adrenal hormones in emergency reactions, developed the concept of the "fight or flight" response. His studies showed that physiological arousal prepares the body for immediate survival-oriented behaviors[2].

In psychological research, Richard Lazarus and Susan Folkman have made significant contributions to the cognitive appraisal theory of stress. They have argued that an individual's interpretation of a threatening situation determines emotional and behavioral outcomes. Their coping model distinguishes between problem-focused and emotion-focused coping strategies, which are important in coping with a crisis.[3]

Modern trauma research, including the work of Bessel van der Kolk, examines the neurobiological effects of extreme stress and posttraumatic stress disorder (PTSD) and shows how traumatic experiences alter brain function and physiological regulation.[4]

At the international policy level, organizations such as the World Health Organization[5] and the United Nations Office for Disaster Risk Reduction[6] have emphasized psychosocial support as a key component of disaster risk reduction strategies. Their reports have emphasized the need to integrate mental health services into emergency preparedness systems.

Emergency preparedness and population protection in Uzbekistan are regulated by the Law of the Republic of Uzbekistan "On the Protection of the Population and Territories from Natural and Man-Made Emergencies" and several presidential decrees[7]. In particular, the Decree of the President of the Republic of Uzbekistan Shavkat Mirziyoyev on Improving the Civil Protection and Emergency Response System emphasizes the importance of preventive measures, public awareness, and strengthening psychological preparedness[8].

Uzbek scientists have also studied stress resilience, adaptation processes, and psychological support mechanisms in extreme conditions. National research is mainly focused on developing psychological training programs, increasing stress resilience among young people, and improving emergency response systems in educational and health institutions.

Thus, an analysis of international and Uzbek literature shows that emergencies should be studied from an interdisciplinary perspective that combines physiology, psychology, and public policy. Despite significant theoretical progress, there is a need for empirical research that explores the cultural and regional characteristics of stress response and resilience mechanisms.

Methodology. This study used a mixed-method research design that combined quantitative and qualitative approaches to provide a comprehensive analysis of psychological and physiological responses to emergencies. The interdisciplinary framework combined the principles of psychology, physiology, and emergency management research. The study was conducted using both theoretical and empirical methods to provide a holistic understanding of stress responses and adaptation mechanisms in extreme conditions.

The methodology was designed to achieve the following objectives:

1. Identify the main psychological reactions (anxiety, fear, panic, cognitive impairment) that occur in emergency situations.
2. Analyze physiological indicators associated with acute stress reactions.
3. Study the relationship between psychological resilience and physiological regulation.
4. Evaluate the effectiveness of coping strategies in reducing negative stress outcomes.

Participants: The empirical component included 120 participants aged 18-45 who had experienced at least one emergency-related stressful event (natural disaster, accident, or public crisis). Participants were selected using purposive sampling to ensure appropriate exposure to extreme conditions. Gender balance and socio-demographic diversity were considered to increase representativeness.

Data collection methods:

Several research instruments were used:

1. Psychological assessment instruments; Perceived Stress Scale (PSS), State-Trait Anxiety Inventory (STAI), Coping Strategy Indicator (CSI)

2. Physiological measurements; Heart rate variability (HRV), blood pressure monitoring, salivary cortisol levels. These measures were chosen because previous stress studies initiated by Hans Selye and subsequent neurobiological studies have confirmed their reliability in measuring responses to acute and chronic stress.

3. Semi-structured interviews; Qualitative interviews were conducted to explore the subjective experiences of participants during emergencies, their emotional regulation mechanisms, and social support.

Data collection was carried out in three stages:

1. Initial psychological screening and informed consent.
2. Measurement of physiological parameters under controlled laboratory simulations of mild stress conditions.
3. In-depth interviews focused on personal experiences during real emergencies.

Ethical standards were strictly adhered to in accordance with the international research principles recommended by the World Health Organization. Participation was voluntary, confidentiality was assured, and participants were provided with psychological support when needed.

Quantitative data were analyzed using statistical software. Descriptive statistics were used to determine means and standard deviations. Correlation analysis was conducted to examine the relationship between psychological distress levels and physiological parameters. Regression analysis was used to identify predictors of resilience.

Qualitative data were analyzed using thematic analysis. Interview transcripts were coded, categorized, and interpreted to identify recurring themes related to emotional regulation, coping mechanisms, and adaptation strategies.

Standardized and internationally validated psychological scales were used to ensure reliability. Physiological measurements were performed using calibrated medical instruments. Triangulation of quantitative and qualitative data increased internal validity. Pilot testing was conducted prior to the main study to refine instruments and procedures.

The study adhered to ethical standards of psychological research, including informed consent, anonymity, and the right to withdraw at any stage. Special attention was paid to minimizing psychological discomfort during stress simulations.

Results and Discussion. The results of the study showed a strong correlation between psychological stress indicators and physiological responses in emergency situations. Descriptive statistical analysis showed that the majority of participants exhibited moderate to high levels of stress and state anxiety after exposure to emergency situations.

Physiological measurements showed significant increases in heart rate, systolic blood pressure, and cortisol levels during the stress simulation. Heart rate variability (HRV), an indicator of autonomic nervous system balance, was significantly reduced among participants with high anxiety scores. This confirms the activation of the sympathetic nervous system in acute

stress situations, which is consistent with the classical stress theories proposed by Hans Selye and the “fight or flight” mechanism described by Walter Cannon.

Correlation analysis revealed a statistically significant positive correlation between stress levels and cortisol concentrations. There was a negative correlation between resilience scores and physiological stress markers, suggesting that individuals with stronger coping mechanisms exhibit more stable cardiovascular and hormonal responses.

Regression analysis revealed that psychological resilience and problem-focused coping strategies were significant predictors of lower physiological arousal. Participants who reported higher levels of social support and adaptive coping techniques showed faster recovery rates after exposure to stress.

Qualitative data from semi-structured interviews revealed three main themes:

1. Cognitive narrowing under threat Participants described reduced attention span and rapid, survival-oriented decision-making during emergency situations.
2. Emotional arousal Fear and uncertainty were the most commonly reported emotional states.
3. Adaptive reorganization Over time, many people have developed stronger emotional control and problem-solving skills after experiencing crisis situations.

The results confirm that emergency situations trigger integrated psychophysiological responses that involve cognitive, emotional, and biological mechanisms. The activation of stress hormones and cardiovascular changes reflect the body's natural survival adaptations. However, prolonged activation can lead to adverse consequences such as chronic anxiety, hypertension, and psychosomatic disorders.

These findings are consistent with cognitive appraisal theory, which emphasizes that individual interpretations of risk determine stress intensity. Participants with constructive appraisal patterns and high resilience demonstrated better physiological regulation. This supports the coping model developed by Richard Lazarus, which emphasizes the importance of cognitive appraisal in stress outcomes.

Table 1. Human psychological and physiological responses to emergencies

Type of Emergency	Psychological Reactions	Physiological Reactions	Possible Consequences
Natural disasters (earthquake, flood)	Fear, panic, narrowing of attention	Increased heart rate, high blood pressure, increased cortisol	Acute stress, temporary disorientation
Technogenic accidents	Anxiety, worry, rapid decision-making	Adrenaline release, rapid breathing	Nervous tension, fatigue
Social crises or conflicts	Aggression or depressive state	Activation of the autonomic nervous system	Psychosomatic disorders
Pandemics or health-related threats	Persistent anxiety, feeling of uncertainty	Decreased immunity, sleep disturbance	Chronic stress, emotional exhaustion

The table systematizes psychological and physiological responses to various emergencies, demonstrating the multidimensional nature of human stress reactions. The analysis shows that, although different emergencies differ in their origin - natural, technological, social or epidemiological - psychophysiological response patterns have common adaptive mechanisms.

1. Natural disasters. In situations such as earthquakes and floods, the dominant psychological reactions include fear, panic and cognitive narrowing. These reactions are usually accompanied by rapid activation of the autonomic nervous system, increased heart rate, blood pressure and increased secretion of cortisol. Such physiological arousal reflects the classic stress response described in the biological stress theory. Although these reactions increase short-term survival, prolonged exposure can lead to acute stress disorder or temporary disorientation. Data confirm that sudden and uncontrolled events provoke the highest rapid physiological activation.

2. Technological accidents. Man-made emergencies provoke anxiety and hasty decision-making processes. Physiologically, adrenaline release and accelerated breathing predominate. Compared with natural disasters, these situations often involve more cognitive activity, as people try to assess risks and take corrective measures. However, prolonged nervous tension can lead to fatigue and a decrease in cognitive performance. Research results show that the ability to control plays an important role in moderating the intensity of stress.

3. Social crises and conflicts. Social instability or conflict situations are associated with aggressive behavior or depressive emotional states. Activation of the autonomic nervous system indicates exposure to chronic stress, not acute shock. Unlike sudden disasters, social crises cause long-term psychological tension and increase the risk of psychosomatic disorders. This pattern suggests that constant uncertainty can be more damaging than short-term extreme events.

4. Pandemics and health threats. Public health emergencies such as pandemics are characterized by persistent anxiety and uncertainty. Physiological consequences include a weakened immune response and sleep disturbances, which can lead to chronic stress and emotional exhaustion. Unlike natural disasters, pandemics represent long-term stressors with cumulative psychophysiological effects. The table highlights that the duration of exposure is a key determinant of long-term health outcomes.

The comparative analysis reveals three main patterns:

1. Universality of stress activation – All emergencies trigger activation of the sympathetic nervous system and hormonal stress pathways.

2. Duration determines severity – Acute events trigger strong but short-term responses, while longer-lasting crises (e.g. pandemics, social conflicts) produce chronic stress effects.

3. Psychological factors regulate physiological stability – Emotional control, cognitive appraisal, and coping strategies influence the level of physiological dysregulation.

Importantly, the table shows that the impact of emergencies is not limited to immediate survival mechanisms, but also affects long-term mental and physical health risks. Therefore, effective emergency preparedness should integrate psychological resilience training, physiological monitoring, and community-based support systems.

Overall, the data confirm that human responses to emergencies are adaptive, but can be maladaptive without timely psychological intervention and structured coping mechanisms.

From a public health perspective, these findings are consistent with the international recommendations of the World Health Organization, which emphasize psychosocial support as a

key element of emergency preparedness systems. Integrating psychological resilience training into civil protection systems can significantly reduce long-term health risks.

In the context of Uzbekistan, as highlighted in the reforms initiated by Shavkat Mirziyoyev, strengthening psychological preparedness programs within civil defense structures can increase community resilience and reduce vulnerability during crises.

The study suggests that psychological resilience acts as a regulatory buffer between stress exposure and physiological dysregulation. These findings highlight the need for interdisciplinary interventions that combine medical monitoring, psychological training, and social support mechanisms.

Conclusions and recommendations. This article confirms that emergency situations activate complex and interrelated psychological and physiological mechanisms aimed at ensuring survival. Acute stress reactions are characterized by increased activation of the sympathetic nervous system, increased cortisol levels, cardiovascular changes, and increased emotional reactions such as fear and anxiety. While these responses serve adaptive and protective functions in the short term, prolonged exposure to stress can lead to adverse consequences such as chronic psychological distress and somatic health disorders. The findings suggest a strong link between psychological resilience and physiological resilience. Individuals with well-developed coping strategies and social support systems showed faster recovery and lower levels of physiological dysregulation. This suggests that resilience acts as a protective buffer that reduces the negative effects of stress on the human body.

The study also highlights that cognitive appraisal plays a central role in shaping stress intensity and behavioral responses. Therefore, emergency preparedness should not be limited to physical safety measures alone, but should also include psychological preparedness and stress management interventions. The study highlights the need for an interdisciplinary approach that integrates psychology, physiology, and public policy to strengthen individual and collective resilience in the face of growing global risks.

Based on the research findings, the following practical and scientific recommendations are proposed:

1. Integration of psychological preparedness programs. Emergency management systems should include structured psychological resilience training that includes stress management techniques, emotional self-regulation, and adaptive coping skills.
2. Regular psychophysiological monitoring. High-risk groups such as emergency responders, health workers, and disaster-affected populations should undergo periodic stress assessments, including psychological screening and physiological monitoring.
3. Develop training modules. Universities and vocational training institutions should introduce interdisciplinary courses on stress physiology, crisis psychology, and coping mechanisms in emergencies.
4. Strengthen social support systems. Community-based support networks should be expanded to reduce psychological vulnerability during crises.
5. Implement national policy measures. In line with international standards promoted by the World Health Organization and ongoing reforms in Uzbekistan under Shavkat Mirziyoyev, mental health services should be systematically integrated into civil protection and disaster risk reduction systems.

6. Further empirical research. Future research should focus on longitudinal analysis of post-emergency adaptation, cultural determinants of resilience, and underlying neurobiological mechanisms of stress management.

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