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Original Article

Psychological impact of COVID-19 on the population of Kazakhstan: a study of anxiety, depression, and stress

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SUMMARY

Objective

To analyse and explore the structure and psychological reactions of the population in the context of a coronavirus pandemic.

Methods

Methods of analysis, classification, deduction, questionnaires, synthesis and generalisation, which help to identify the adverse effects of coronavirus infection and self-isolation on the psychological and psychophysiological state of the population.

Results

The research covers the impact of coronavirus infection on the psychological state of an individual; demonstrates specific stressors during quarantine and illness; and demonstrates the occurrence of anxiety, asthenia, depression and stress disorder after illness; described the most vulnerable groups to the psychosocial and psycho-emotional consequences of COVID-19: a detailed literature review was performed and the main approaches to reducing risks and threats to mental health from the COVID-19 pandemic were specified; the most vulnerable groups were identified, considering gender and age characteristics; psychological and psychophysiological changes in people who survived COVID-19; models and methods of psychological support during the pandemic were considered.

Conclusions

The COVID-19 pandemic significantly impacts psychological health, causing anxiety, depression, and asthenia, particularly among young, elderly, and female populations in Kazakhstan, necessitating tailored distress management.

Key words: health, anxiety, pandemic, depression, emotional stability, mental health

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Introduction

In December 2019, the COVID-19 pandemic began to affect the physical and psychological health of populations worldwide. During this period, global morbidity and mortality rates increased markedly. The adverse effects of the pandemic on mental health remained evident in subsequent years and became the focus of numerous scientific investigations. Many studies concentrated on the clinical characteristics of the disease and the progression of chronic psychiatric disorders during coronavirus infection. Researchers emphasised that the management of mental health and psychosocial well-being was as important as the management of physical health. Barlattani et al.[1] conducted a rapid scoping review which found that the pandemic may have exacerbated suicidal behaviour in people

with mental disorders, although the exact causal link remains debated. In a comparative analysis of psychiatric hospitalisations during the COVID-19 pandemic and the L'Aquila earthquake, Barlattani et al.[2] observed that while hospitalisation rates remained stable during the initial lockdown, they rose significantly for all major psychiatric diagnoses after restrictions were lifted. Beyond acute psychiatric morbidity, Barlattani et al.[3] highlighted that post-COVID-19 syndrome frequently involves neuropsychiatric symptoms such as fatigue, anxiety, depression, and cognitive deficits, potentially linked to inflammation, oxidative stress, and neuro-glial damage. Moreover, Barlattani et al.[4] reported that pandemic-related behavioural changes have altered patterns of social cognition in both clinical and general populations, influencing adherence to preventive measures and interpersonal functioning.

Many studies have concentrated on the clinical characteristics of the disease and the progression of chronic psychiatric disorders during coronavirus infection. Researchers have emphasised that the management of mental health and psychosocial well-being is as important as the management of physical health. Moizrist and Tereshchenko[5] identified important risk factors for the medico-psychological and socio-psychological consequences of a coronavirus pandemic, namely increased anxiety and fear of becoming infected and losing one's job and life, the presence of new social conditions such as online education and quarantine, lack of a sense of security, changing social roles, and various economic aspects.

The pandemic's psychological toll can be conceptualised through the Transactional Model of Stress, which frames stress as the outcome of an individual's appraisal of environmental demands and their coping resources. Within this framework, COVID-19 acted as a chronic stressor, eliciting primary appraisals of threat (e.g., risk of infection, uncertainty about disease progression, disruption of daily life) and secondary appraisals concerning the adequacy of personal and social coping resources. Inadequate resources or perceived inability to cope intensified maladaptive responses, such as persistent anxiety, depressive mood, and physiological stress reactions. This model helps explain why identical pandemic conditions could provoke vastly different psychological outcomes across individuals and groups. Brooks et al.[6] explored the psychological effects of quarantine on the individual. Adverse psychological effects were diagnosed, which included symptoms of post-traumatic stress disorder, confusion and outbursts of anger. Important stress factors were the length of the quarantine, boredom, fear of infection, bad moods and an oppressive social environment. Quarantine and isolation have been identified as the most efficient measures to contain the spread of infection. House arrest and restriction to secondary social activities were common methods. Wang et al.[7] stated that the epidemic of coronavirus disease has become an important public health problem and has caused international concern. Researchers have noted the impact of the disease on psychological welfare, which has increased levels of anxiety, depression and stress. The results demonstrated that a large proportion of people experienced moderate to severe depressive symptoms. In addition, those interviewed tended to spend a lot of time at home and were very concerned about not infecting others. In addition, there was often a worsening of the physical condition (myalgia, dizziness, acute rhinitis) and a decrease in self-esteem.

Studies of the consequences of the severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) epidemics have demonstrated that a significant number of people have a wide range of psychopathological disorders that have manifested following an illness. Chan et al.[8] stated that the most common psychological disorders were asthenia, post-traumatic stress disorder, insomnia, depression, anxiety and various cognitive impairments. Baig[9] conducted a study of psychological and psychophysiological disorders in a population with the post-COVID-19 syndrome, which occurred in 10-35% of mild to moderate cases. But when hospitalised or with a severe course, approximately 76% of people had the post-COVID-19 syndrome. In addition, neuropsychiatric symptoms after COVID-19 are quite varied and dominant, and their frequency is only increasing. The relevance of the research is based on the fact that the effects of the COVID-19 pandemic have a significant impact on human vitality and activity and can impair psychological and physical well-being. In addition, anxiety about health, intolerance for uncertainty and new approaches to emotion regulation are common after illness[10]. It is now essential that new research on the impact of coronavirus on the psyche of the population is performed to guide policy-making during the spread of the infection.

Despite this growing body of evidence, there is a lack of research from Central Asia, and particularly from Kazakhstan, where cultural norms, healthcare infrastructure, and pandemic responses differ from contexts more frequently studied. Within Kazakhstan, regional variation is considerable. Aktobe, a key industrial and administrative centre in Western Kazakhstan, experienced unique pandemic dynamics shaped by its economic profile, patterns of internal migration, and healthcare resource distribution. No published study has comprehensively examined the psychological and psychophysiological impacts of COVID-19 in this region, stratified by age, gender, and infection status.

The purpose of this research is to identify the patterns of mental and behavioural disorders during the epidemic in Aktobe, determine the most vulnerable population groups, and develop strategies to mitigate adverse psychological and psychiatric effects during and after COVID-19. The novelty of the study lies in applying internationally validated assessment tools in a large, population-based sample to generate data that can be directly compared to international findings. By situating local evidence within the framework of recent systematic reviews and multi-country cohort studies, the work addresses a critical data gap and informs culturally tailored psychosocial interventions for Kazakhstan and similar settings.

Materials and methods

The following methods were used during the study: theoretical methods – analysis of social, psychological, and medical literature related to the subject of the study, including works on the psychological effects of quarantine and pandemics (Brooks et al.[6]; Wang et al.[7]; Chan et al.[8]), on post-COVID-19 cognitive and emotional disturbances (Baig[9]; Raspopova et al.[11]), and on psychological support models during COVID-19 (Velikodna[12]); analysis of the specific effects of COVID-19 on the cognitive sphere; generalisation of theoretical material on the issue under study; deduction in comparing approaches and materials to study the psychological and psychophysiological profile of the population; classification to identify the main risk groups. Diagnostic methods included a survey recording gender, age group (young, middle-aged, elderly), marital status, and education level. Empirical methods consisted of observation of psychological reactions of the population during the COVID-19 pandemic. Statistical data processing methods involved the use of "STATISTICA 10.0" software by StatSoft, Inc., USA, alongside correlation and comparative analyses. Finally, methods of graphic representation were applied to visualise results.

The study was performed in the region of Western Kazakhstan, in the regional centre, Aktobe. Quantitative sampling was designed with a margin of error (error size of 5%), which provides a 95% confidence level of the results obtained from the total population. A total of 1592 people (829 women and 763 men) were surveyed. The study is sample-based, one-stage cross-sectional. The psychological and psychophysiological state of the population studied was assessed using standardised surveys and questionnaires. Inclusion criteria required participants to be over 18, residing in Aktobe, and willing to participate, while exclusion criteria included those with psychiatric conditions or comprehension difficulties. The data from the scientific study were stated as M±SD (arithmetic mean and standard deviation). A correlation analysis using Spearman's rank correlation coefficient (r) was performed to identify the relationship between the aspects under study. At the statistical analysis stage, the degree of significance was $p \leq 0.05$. The study received ethical approval from the Ethics Commission of the West Kazakhstan Marat Ospanov Medical University, with approval number 02367. Informed consent was obtained from all participants, ensuring their voluntary participation in the study. Participants were provided with detailed information about the study's purpose, procedures, and their rights, including the right to withdraw at any time. Confidentiality was strictly maintained, and all data were anonymised to protect participant identities.

The study was conducted in three phases. The first stage involved the collection of theoretical information on the subject and an analysis of existing approaches in psychology, medicine and sociology regarding the question of the structure and psychological reactions of the population of Kazakhstan associated with COVID-19; examined the work of scientists who have been associated with this problem, its aspects and approaches to explaining it; reviewed informational data from books, dissertations, researches, monographs, and conferences, where the characteristics of medical and psychological and socio-psychological consequences of the coronavirus pandemic were exposed in-depth and comprehensively; presents the spectrum of psychopathological disorders that manifested themselves after the illness; demonstrates risk factors for medico-psychological deviations; identifies the importance of the problem and justifies the relevance of the work; draws conclusions from research by scientists; highlights the purpose, forms and methods of research into the phenomenon; outlines the experimental study.

In the second phase, an experiment was performed on the structure and psychological reactions of people under conditions of the pandemic coronavirus; the impact of quarantine on the psyche of the population was considered and the main risk groups among people were identified; the results of a study on the presence of depression in the population depending on age, gender and coronavirus infection were diagnosed using standardised surveys and questionnaires, namely: MFI-20 (The Multidimensional Fatigue Inventore – to obtain subjective quantification of asthenia levels); PHQ-9 (The Patient Health Questionnaire – to check the presence of symptoms of depression), GAD-7 (General Anxiety Disorder-7 questionnaire), PHQ-15 (The Patient Health Questionnaire – to assess the severity of somatic symptoms), PSM-25 (Psychological Stress Measure – to determine the phenomenological structure of experiences); systemised the findings obtained during the experimental work. Psychological tools were used in their

validated Kazakh and Russian versions, with confirmed reliability in the Kazakh context through previous studies and pre-tests.

The third stage involved the systematisation and classification of material that was obtained when working on the problem of the structure and psychological reactions of the population of Kazakhstan associated with COVID-19; the theoretical, and practical conclusions and results of the study were substantiated; a comparative analysis of studies that have explored the issue of psychological care for people who have contracted the coronavirus was presented; and the results of experiments by other psychologists and sociologists were summarised and logically outlined; clarifies the importance of the issue in contemporary society.

Results

Constantly changing and revised COVID-19 statistics and ineffective national policies to control the pandemic have been major factors in many of the challenges of infection control. Accordingly, a systematic approach to the study of the disease and its consequences in medicine, sociology and psychology can improve understanding of its onset and spread, and the development of psychological and psychophysiological mechanisms of coronavirus in both patients and those who have had the infection. The COVID-19 pandemic has had a severe adverse impact on mental health, affecting approximately one-third of the population. According to the World Health Organization (WHO), the most vulnerable groups include patients with pre-existing mental health disorders and low immunity who are at heightened risk of COVID-19, psychologically healthy individuals who have recovered from the infection, persons providing care to infected individuals such as relatives and neighbours, and medical workers. Additional high-risk categories comprise individuals with severe somatic disorders and comorbidities that increase the likelihood of complications, older adults regardless of their baseline health status, and children who, despite typically experiencing mild disease, are nonetheless susceptible to significant negative effects on mental health[13].

Fear, increased anxiety, psychosomatic symptoms and stress reactions often appear after illness, with adverse effects on public health. The study by Tsyganenko and Velikodna[13] highlighted that markers of a stressful state include irritation, anxiety, depressed mood, sleep disturbance, appetite changes, gastrointestinal disturbances, migraines and dizziness. In addition, it was during the quarantine period that an increase in alcohol, drug, tobacco and substance use was noticed. Significantly, there is a subjectivity in the perception of anti-epidemic measures, which can be constructive (social distancing) and destructive (social avoidance), which affects the development of adaptive anxiety in the individual. Notably, the anxiety associated with COVID-19 should not always be a cause for concern, as it may be related to the emergence of an adaptive type of population response to the pandemic. It is then that self-isolation and social distancing arise. In addition, the public may be concerned about the availability of personal protective equipment, the contagiousness of the coronavirus and the current availability of medicines for its complications. The issue of the availability/unavailability of essential medicines in pharmacies is often a cause for concern[5].

Notably, the main psychological aspects of the impact of the COVID-19 pandemic, namely: fear and anxiety about self, health and loved ones; constant concern about finances and their condition; changes in sleep and eating patterns; lack of good concentration and attention; having fears about health and worsening chronic health problems; frequent use of alcohol, smoking, etc.[14]. As for quarantines, their psychological impact is to be emphasised, and specific stressors are to be highlighted:

1. Duration of quarantine (if longer than 10 days, there is a high risk of developing post-traumatic stress symptoms).
2. Fear of getting infected and getting sick (often found in women).
3. The boredom, pain and frustration of isolation.
4. Too much fixation on stocks, which provoked anxiety and anger a few months later.
5. There is no explicit plan on what to do when sick and how to treat it[15].

Distress and post-traumatic stress disorder often occur in such circumstances, which are often associated with other psychological difficulties. These phenomena include depersonalisation and dissociative amnesia, which are associated with numbing emotions and distorted perception of time. In addition, the population can often experience a psychological state after illness, which is caused precisely by experiences during treatment. Other psychological effects include anxiety, obsessive-compulsive disorder, insomnia, psychosis and various addictions. In general, the emotional state of the population during a pandemic and quarantine cannot be described as critical, as the public perception of the disease is often overestimated due to fear and panic in society (namely for vulnerable populations). The results of a study on the presence of depression in the population according to age, gender and coronavirus infection should be presented.

In terms of gender, the parameters explored had particular characteristics that depended on the severity of depression. Thus, moderate, severe and extremely severe depression have been demonstrated to occur

frequently in women. The most common indicators of depression in the different genders were minimal, light and mild. There was a rather interesting correlation in terms of age: minimal depression was most common at the age of 45-59. Moderate, severe and extremely severe forms of depression were most significant in the older age group (60-74 years). The highest proportions among all age groups were for forms of depression such as mild, mild and moderate. The coronavirus infection had a considerable impact on the psycho-emotional and psychophysiological state of the study population. Those infected with COVID-19 were diagnosed with high values of moderate, severe and extremely severe depression compared to those who had not been infected with coronavirus (Tab. I). In addition, it is important to note that minimal and mild depression were significantly higher in individuals who did not have the infection.

An analysis of depression levels in relation to education and marital status revealed that individuals with higher education were more likely to exhibit all types of depression. Regarding marital status, married participants generally showed lower levels of depression compared to unmarried individuals. These patterns were consistent across minimal, light, mild, and severe depression categories. The survey also indicated that somatic symptoms were more prevalent among those who had recovered from COVID-19, with notable differences by gender and age: women were more prone to somatic disorders, and elderly respondents displayed the most pronounced symptoms, while younger individuals reported the least (18-44 years old) (Tab. II).

In addition, the work presented the psychophysical status of the study population who had contracted the coronavirus infection, as assessed by the MFI-20 scale. Quantitative-qualitative information was described, which exposed the presence of general fatigue, physical fatigue, mental fatigue, and reductions in motivation and activity, based on an assessment of one or another type of asthenia. A study of the mean asthenia value indicates a deterioration trend in each of the five indicators that describe the psychophysical state of Aktobe residents. It can be concluded that coronavirus infection adversely affects the psychophysical state of individuals and contributes to asthenia in different genders. A similar pattern was observed in indicators of general asthenia, reduced activity and decreased motivation. Indicators of the presence of asthenia symptoms in each group of individuals can be depicted (Tab. III).

TABLE I. *Presence of depression symptoms.*

Parameters		PHQ-9	Minimal depression	Light depression	Mild depression	Severe depression	Extremely severe depression	Total
Gender	male	n	587	134	22	15	5	763
		%	76.9	17.5	2.9	2	0.7	100%
	female	n	574	66	118	29	42	829
		%	69.2	8	14.2	3.5	5.1	100%
P*		< 0.001						
Age categories	18-44	n	384	33	20	7	5	449
		%	85.5	7.4	4.4	1.6	1.1	100%
	45-59	n	610	33	21	19	11	694
		%	87.9	4.8	3	2.7	1.6	100%
	60-74	n	44	200	137	22	46	449
		%	9.8	44.5	30.6	4.9	10.2	100%
P*		< 0.001						
COVID-19	Those who have been ill	n	372	46	92	29	30	569
		%	65.3	8.1	16.2	5.1	5.3	100%
	Those who have not been ill	n	789	154	48	15	17	1023
		%	77.1	15.1	4.6	1.5	1.7	100%
P*		< 0.001						

*Note: * – presented for χ^2 – Pearson criterion.*

TABLE II. *Presence of somatic symptoms.*

Parameters	COVID-19				P*
	Those who have been ill		Those who have not been ill		
	n	%	n	%	
PHQ-15					< 0.0001
not disturbed at all	124	21.8	687	67.2	
slightly disturbed	91	16	261	25.5	
were greatly disturbed	354	62.2	75	7.3	
	Gender				
	male		female		
PHQ-15					< 0.0001
not disturbed at all	400	52.4	411	49.6	
slightly disturbed	208	27.3	144	17.4	
were greatly disturbed	155	20.3	274	33	
	Age				< 0.0001
PHQ-15	18-44	45-59		60-74	
	n / %	n / %		n / %	
not disturbed at all	352/42.5	91/27.2		6/1.4	
slightly disturbed	459/55.4	58/17.3		177/41.3	
were greatly disturbed	17/2	186/55.5		246/57.3	

*Note: * – presented for χ^2 – Pearson criterion.*

TABLE III. *Presence of asthenia symptoms.*

PARAMETERS	COVID-19				P*
	Those who have been ill		Those who have not been ill		
	n	%	n	%	
MFI-20 General asthenia (GA)					< 0.001
GA > = 12	231	47.9	251	52.1	
GA < 12	338	30.4	772	69.6	
MFI-20 Reduced activity (RAc)					< 0.001
MA > = 12	270	47.3	301	52.7	
MA < 12	299	29.3	722	70.7	
MFI-20 Decreased motivation (DM)					< 0.001
DM > = 12	202	55.3	163	44.7	
DM < 12	367	29.9	860	70.1	
MFI-20 Physical Asthenia (PA)					< 0.001
PA > = 12	398	60.5	260	39.5	
PA < 12	171	18.3	763	81.7	
MFI-20 Mental asthenia (MA)					< 0.001
MA > = 12	205	46.8	233	53.2	
MA < 12	364	31.5	790	68.5	

*Note: *–presented for χ^2 – Pearson criterion.*

Analysis of indicators of changes in psychological well-being in the COVID-19 populations under study indicates that the cumulative score was much higher in younger people than in middle-aged and elderly people. The dynamics are established when characterising the presence of asthenia (physical and psychological), decreased activity and motivation. The women COVID-19 survivors had higher scores than the men: particularly significant differences were found in the "physical asthenia" and "mental asthenia" scales. The psychological state of women was identified as being more altered than that of men in all age groups. And the younger age group had changes that were most significant compared to the middle-aged and elderly population (Fig. 1).

The data from Figure 1 indicate that younger respondents exhibited consistently higher asthenia-related scores than middle-aged and older participants, suggesting a greater susceptibility to fatigue, reduced motivation, and lower activity levels in this group. This pattern points to a potentially higher psychosocial and physical burden of the pandemic among younger individuals, which may be linked to greater lifestyle disruption, academic or career uncertainty, and limited coping resources. In contrast, middle-aged respondents reported the lowest values across most indicators, possibly reflecting greater resilience or more stable life circumstances.

A study of anxiety levels in the city's population demonstrated several features that were influenced by coronavirus infection, gender and age differences. Those who had COVID-19 had significantly higher anxiety scores than those who had not had the coronavirus infection (Fig. 2).

On the GAD-7 survey, the lowest level of anxiety (49%) was diagnosed in females, while it was 66.2% in males. Moderate levels of anxiety were 37% for women and 29% for men. Notably, the average level was significantly higher for women (12.4%) than for men (3%). High levels of anxiety were twice as common in women. In coronavirus survivors, anxiety levels (as assessed by the GAD-7 questionnaire) were identified in the

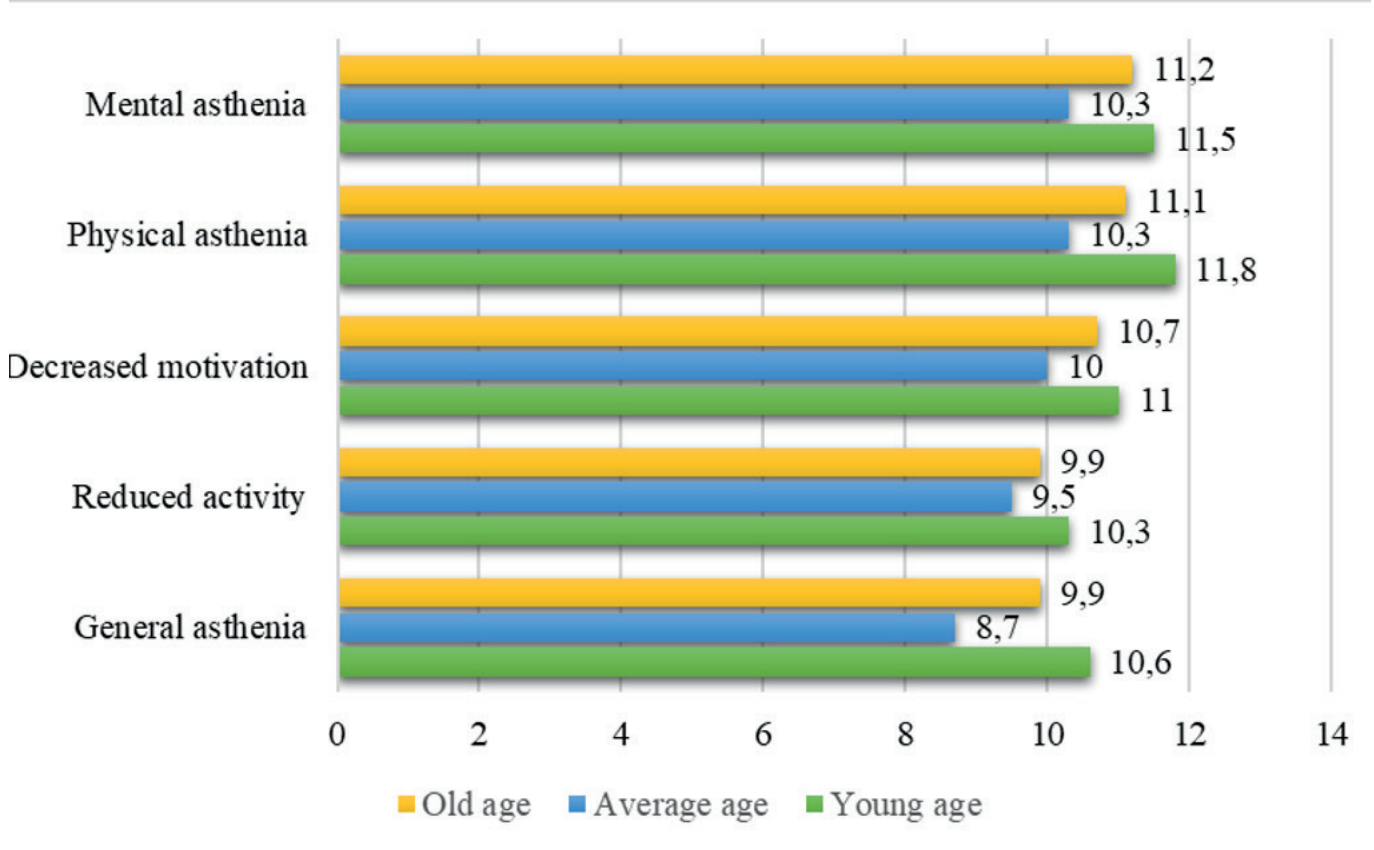


FIGURE 1. *Comparison of psychophysical health indicators in Aktobe by age group.*
Note: The figure includes the following anxiety level codes: 1 – minimal anxiety, 2 – light anxiety, 3 – moderate anxiety, 4 – high anxiety. Sample size: 1592 respondents, including 829 women and 763 men.

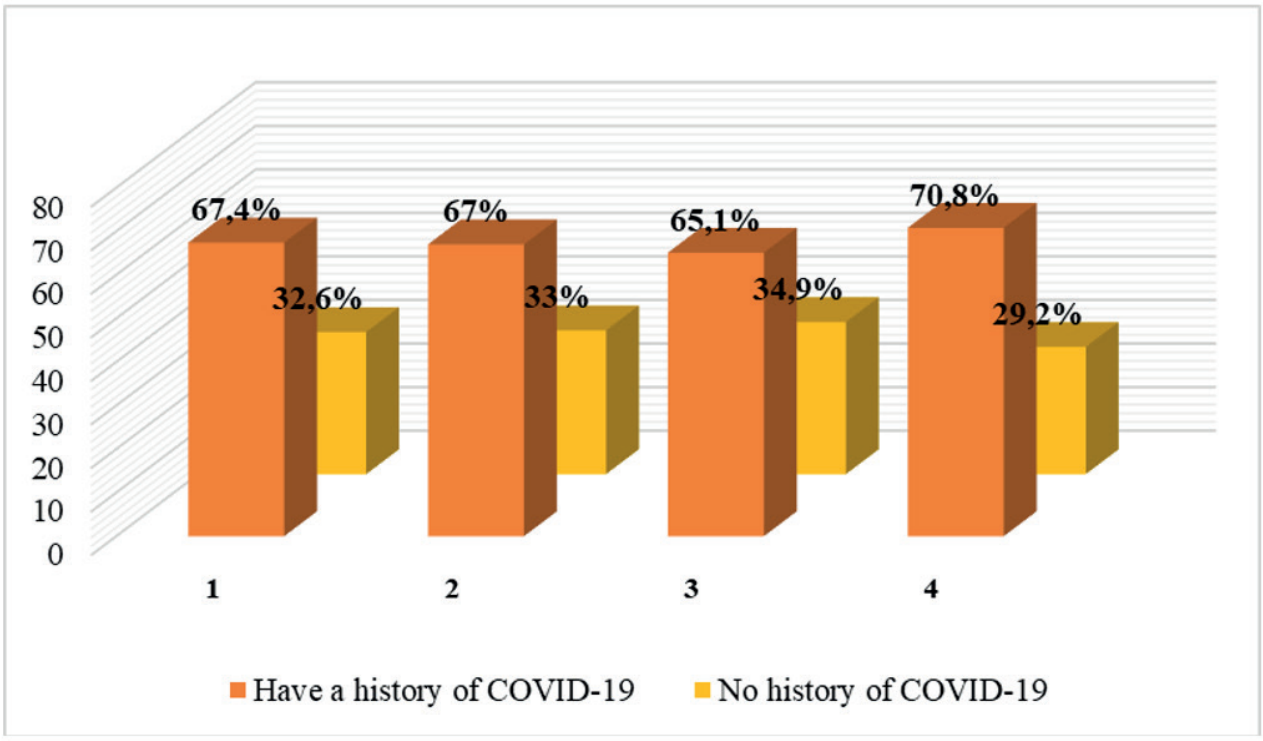


FIGURE 2. *Assessment of anxiety levels and detection of symptoms of anxiety disorders (GAD-7 scale) among COVID-19 survivors and non-survivors.*
*Note: 1-4 (minimal to the high level of anxiety); * – p = 0.00512 statistically significant difference by cPearson's i-square on the GAD-7 scale. Sample size: 1592 respondents, including 829 women and 763 men, with 569 survivors and 1023 non-survivors.*

middle-aged group (45-59 years), where scores were most significant. High levels of anxiety were identified when assessing minimal, light and mild levels of anxiety. The PSM-25 scale was used to diagnose stressful states in somatic, behavioural and emotional indicators. This scale differs from conventional methods of studying stress and allows the measurement of stress as a natural state of mental tension. An assessment of the psychometric properties of the study population demonstrated that the entire population is under stress in the presence of the coronavirus pandemic. Therewith, a population that has had an infection is significantly more stressed than individuals who have not been ill. A particular response was that young people reacted most acutely (high levels of stress); the middle-aged population (male) was affected to a lesser extent by mental stress (medium levels of stress). Therewith, stress levels were quite high in women, while the elderly had medium levels of stress. However, no significant difference was identified in this age group in terms of gender. The results of the research on the phenomenological structure of stress experiences are presented in Figure 3.

Models and methods of psychological support during the COVID-19 pandemic and quarantine were analysed. These methods are used in various countries (Italy, China, Spain, Korea, USA, UK, Switzerland) and have 5 key positions, which can become a reference point for the Kazakh health care system[16]:

1. Availability of access and facilities (when quarantined or isolated, the individual begins to value more internet research, mobile phones or apps where support from psychologists, psychiatrists, volunteers and other health workers is available as it is financially accessible).
2. Stability (when receiving psychological, social, and psychotherapeutic support, it can be extended and modified according to one's requirements).
3. Having a focus (concentrating on the patient's experience).
4. Interdisciplinarity (combining different areas and ar-

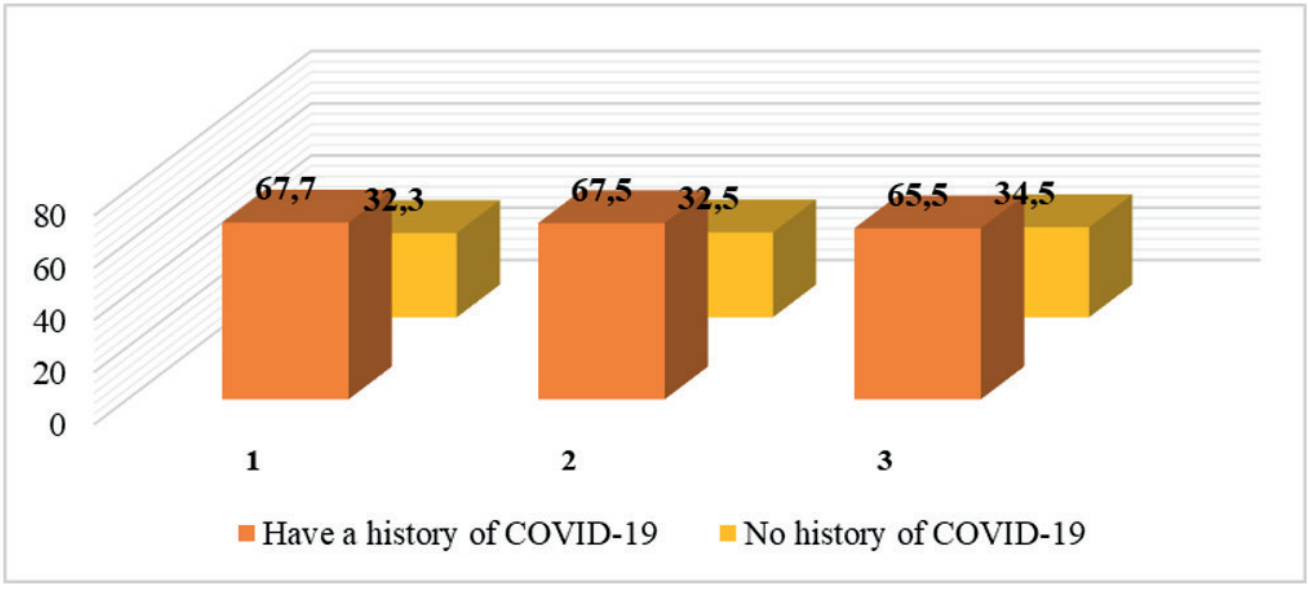


FIGURE 3. *PSM-25 somatic symptom scale among COVID-19 survivors and non-survivors.*
*Note: 1 – not disturbed at all; 2 – slightly disturbed; 3 – severely disturbed; * – p = 0.00512 statistically significant difference by cPearson's i-square on the PHQ-15 scale. Sample size: 1592 respondents, including 829 women and 763 men, with 569 survivors and 1023 non-survivors.*

eas of service, thus allowing all kinds of help from social services or medical professionals).

5. The educational nature of change and the availability of psychological improvement for people to become aware of the situation and make decisions for themselves.

Constantly changing and revised COVID-19 statistics and uneven national mitigation policies complicated infection control and amplified mental-health sequelae. Consistent with international evidence, population-level burdens of anxiety, depression and stress rose markedly during the pandemic, with vulnerable groups including people with pre-existing mental disorders, COVID-19 survivors, caregivers and healthcare workers. The WHO's evidence brief synthesises increases in common mental disorders and service disruption, stressing the need for scalable psychosocial support and continuity of care. The psychological effects of quarantine were shaped by identifiable stressors, duration of isolation, fear of contagion, boredom and frustration, uncertainty about care pathways, and resource scarcity. Early meta-analytical and narrative evidence linked quarantine longer than approximately ten days with higher post-traumatic stress-type symptoms, findings that later research partially nuanced by showing larger effects on depressive symptomatology than on anxiety or PTSD with repeated quarantine[17]. Systematic evidence from 2023 also confirmed elevated depression, anxiety and PTSD among healthcare workers, especially those exposed during early pandemic waves[18]. The present study's quantitative analyses using PHQ-9, PHQ-15, MFI-20, GAD-7 and PSM-25 scales confirmed that COVID-19 survivors exhibited higher rates of depression, somatic symptoms, asthenia, anxiety and stress, with disproportionate impacts among women, younger adults and older adults. Gender differences were particularly marked for physical and mental asthenia, as well as anxiety. Similar age- and sex-stratified patterns have been reported in multi-country syntheses and large national surveys, which also documented surges in help-seeking and symptom burden among young adults and women. Symptoms of distress identified in the current sample included irritation, depressed mood, sleep disturbance, appetite changes, gastrointestinal disturbances, migraines and dizziness. Quarantine appeared to amplify risk behaviours such as increased alcohol, drug and tobacco use, while public perception of anti-epidemic measures ranged from adaptive (social distancing) to maladaptive (social avoidance) forms of anxiety. Concerns over personal protective equipment and essential medicines remained persistent across the observation period.

The psychological impact of quarantine was closely related to specific stressors such as prolonged isolation exceeding ten days, fear of infection, boredom and frustration, lack of clear treatment plans, and anxiety-provoking overstocking behaviours. These factors were associated with or contributed to post-traumatic stress

disorder, depersonalisation, dissociative amnesia, obsessive-compulsive disorder, psychosis and various addictions. In the current dataset, COVID-19 survivors demonstrated higher prevalence of moderate, severe and extremely severe depression compared with non-infected individuals, while minimal and mild depression were significantly more common in those without infection. Age-related patterns showed minimal depression peaking in the 45-59 age group, and more severe forms most common among adults aged 60-74 years. Somatic symptoms were also more prevalent among those who had recovered from COVID-19, with women more prone to such disorders and elderly respondents displaying the most pronounced symptoms. Younger respondents, however, consistently recorded higher asthenia-related scores than middle-aged and older participants, suggesting greater susceptibility to fatigue, reduced motivation and lower activity levels, a pattern potentially linked to lifestyle disruption, academic or career uncertainty, and limited coping resources.

Anxiety levels were significantly higher among COVID-19 survivors than among non-infected individuals. Women demonstrated higher proportions of moderate and high anxiety than men, and middle-aged survivors recorded the most pronounced anxiety scores. Stress assessment using the PSM-25 scale confirmed that the entire population was under mental strain during the pandemic, with infection history associated with higher stress levels. Young people reacted most acutely, middle-aged men were affected to a lesser extent, and women generally reported higher stress than men, although among the elderly, no significant gender differences emerged.

To contextualise these results in an applied framework, the study examined psychological support models implemented in countries with pandemic management strategies relevant for Kazakhstan, focusing on Italy, South Korea and the United Kingdom. In Italy, nationwide telepsychology networks coordinated by the Italian Society of Psychopathology provided psychiatric counselling, cognitive behavioural therapy modules and psychoeducational materials via web platforms and smartphone applications. These services incorporated "psychological first aid" protocols for acute distress and scheduled follow-ups, and were publicly funded to ensure free access[19,20]. South Korea employed a hybrid approach combining digital triage, remote counselling and targeted in-person support through community mental-health centres. The National Center for Disaster Trauma deployed online assessments using validated instruments such as the PHQ-9, GAD-7 and PC-PTSD for confirmed patients, enabling systematic referral and stepped care[21]. Recent Korean studies have detailed core design attributes for mobile mental-health applications addressing anxiety, offering guidance for safe scaling and integration with conventional services, and have explored data-driven suicide risk prediction models for recent COVID-19 cases[22,23]. In the United Kingdom, the Improving Access to Psychological Therapies programme, renamed NHS Talking Therapies in 2023, was rapidly expanded to deliver NICE-recommended psychological treatments remotely. Guided self-help, telephone therapy and group sessions addressed anxiety, depression and health-related fears, while specialised interventions were developed for healthcare professionals, supported by public campaigns to normalise help-seeking and reduce stigma[24,25].

Across these settings, psychological first aid emerged as a foundational, low-intensity intervention for acute distress, adaptable for remote delivery and for healthcare workers as both a peer-support and skills framework[26]. The common elements underpinning the effectiveness of these models include accessibility and affordability of services, continuity of support beyond the acute crisis, patient-centred care, interdisciplinary integration of mental health with broader health and social systems, and psychoeducational outreach to improve mental health literacy. Incorporating these evidence-based and contextually adaptable components into Kazakhstan's mental health system could strengthen service reach, cultural appropriateness and long-term sustainability, thereby mitigating the enduring psychological consequences of the pandemic.

Overall, the findings indicate that COVID-19 infection is associated with pronounced psychological and psychophysiological disturbances in the population of Kazakhstan, with the most affected groups being women, the elderly, and younger individuals. Depression, somatic symptoms, asthenia, anxiety, and elevated stress levels were more prevalent among those with a history of COVID-19 compared to those without. The analysis highlights significant variations in mental health outcomes depending on gender, age, and prior infection status, underscoring the importance of targeted psychosocial interventions. These results provide an empirical basis for developing evidence-informed mental health strategies aimed at mitigating the long-term psychological consequences of the pandemic.

Discussion

The findings of this study indicate that in the Aktobe population, self-reported COVID-19 infection was associated with higher levels of depression, somatic symptoms, asthenia, anxiety, and stress compared to those without such a history. Pronounced gender and age differences emerged: women reported more severe depression, somatic complaints, and higher asthenia scores across all domains than men, while older adults

had the highest rates of moderate-to-severe depression and somatic symptoms. Younger participants showed the most pronounced asthenia and stress, suggesting that the psychosocial impact of the pandemic manifested differently across age groups, potentially reflecting varied coping strategies, economic pressures, and life-stage vulnerabilities. Middle-aged participants who had experienced COVID-19 also reported higher anxiety scores, and unmarried or more educated individuals tended to have higher depression rates. While these results highlight subgroups at greater risk, the cross-sectional design precludes determining whether COVID-19 infection preceded or resulted from these symptoms, and reverse causation is plausible, for instance, depressive symptoms may have influenced participants' recall or reporting of past infection.

Other studies have highlighted the distinctive features of all variants of post-cohort mental disorders, which were that each patient had some cognitive impairment and often felt clouded in thought. Raspopova et al.[11] identified different types of disorders: asthenic (difficulty with attention and concentration, high fatigue, exhaustion of mental processes); anxious-phobic (presence of anxious and intrusive thoughts); depressive (general retardation in cognitive processes and low level of attention); dissomniac (memory impairment and presence of a feeling of fogginess in the head, stiffness of associations). In addition, notably, a study examining the impact of COVID-19 on university students in Kazakhstan. Konstantinov et al.[16] concluded that Kazakhstan is demonstrating a trend towards resilience and overcoming coronavirus pandemic conditions, which is an important step towards a return to normal living conditions. These works align with our results by documenting the specific psychological impact of coronavirus in Kazakhstan, but our study extends this by comparing prevalence estimates to regional and global data, showing that Aktobe's rates are broadly consistent with Central Asian and worldwide meta-analyses.

In addition, Mustafa[27] conducted a study on the psychological impact of the spread of COVID-19 in Turkey. The sample consisted of 1130 people from 28 cities, where 53% reported moderate to severe mental health problems, 19% reported moderate to severe depressive symptoms, 26% reported moderate to severe anxiety symptoms and 8% reported moderate to severe stress. It was proven that the majority of respondents spent 20-24 hours a day in an enclosed space (88%). About 78% felt anxious about the condition of their loved ones infected with COVID-19, and 79% were satisfied with the wealth of information available about the coronavirus infection. Women, young people and those who were frequently ill had high rates of psychological effects of the pandemic, and frequent occurrences of anxiety, aggression and stress ($p < 0.05$). Timely treatment, understanding of the treatment situation, and identification of safety measures (hand hygiene and wearing a mask) were associated with low psychological effects of the pandemic on the individual, which contributed to low levels of depression and irritability ($p < 0.05$). Ellepola and Rajapakse[28] diagnosed that women and patients with psychiatric problems had a fairly high risk of psychological symptoms due to coronavirus (the study was conducted in Sri Lanka). These results correlate with those obtained in this research.

Curșeu et al.[29] explored the effects of adverse emotional reactions to the COVID-19 pandemic. The sample was 737 participants. Scientists have proved that anxiety and bad moods have been associated with fear of death. In addition, using humour and jokes has been demonstrated to help reduce the adverse mood towards COVID-19 and to reduce anxiety about the coronavirus. Often using such methods helped to reduce anxiety and social distance. To add, the results present that there is a link between fear of dying and social distance, which is associated with adverse feelings about COVID-19. Thus, this research differs from that academic work in that it explores specific ideas for specialised psychological interventions.

As the disease progresses, the clinical manifestations often become severe and the psychological problems only worsen[30,31]. It is therefore important to develop psychological interventions, which should be targeted and adapted as necessary. Duan and Zhu[32] confirmed that survivors of public health emergencies had various manifestations of psychological stress disorder, which often manifested even after the illness when the patients were cured. Thus, it should be considered the course of the illness itself, the severity of the clinical symptoms, the place for therapy (quarantine) and other aspects highlight individuals who require psychosocial intervention. Due to strict infection control measures, staff (clinical psychiatrists, psychologists and social workers) mustn't enter COVID-19 patient isolation rooms. Thus, it is the medical staff who are the main personnel providing psychological support to patients in hospitals. People with suspected infections who are under quarantine or at home should be given primary health care and mental health care by community health care staff[33,34]. Often, due to complicated work procedures, heavy workloads and a lack of proper training in psychiatry, healthcare workers and medics in the field do not always know how to alleviate patients' psychological distress. A professional team composed of mental health staff is the basic principle for dealing with emotional distress and other mental health problems, and the stresses caused by epidemics and other health emergencies. A nationwide survey of psychological states in China found that 29%

of respondents had moderate levels of distress and 5% had severe distress. In addition, people who did not have much information about the new coronavirus did not trust doctors. In addition, the population tended to be stressed, and their contact with those who may have been infected with coronaviruses was based on hostility. During coronavirus illness, some physical problems and psychological difficulties can only be exacerbated[35]. Asthenia, cognitive impairment, anxiety, depression, insomnia and stress-related disorders are the most common psychiatric disorders after the pandemic, constituting clinical astheno-neurotic syndrome[36-38].

The psychopathological symptom itself is much more common in coronavirus than in other respiratory diseases. It is often the post-neuropsychiatric symptoms that can take more than 12 weeks to become chronic[39,40]. In addition, notably, the emotional state may have varied depending on the specific purposes adopted at the state level and the informational motives available. Such conclusions were reached in this research, which makes them of particular interest to other researchers. Yoo et al.[41] reported that teachers often presented with symptoms of stress, anxiety and depression during the pandemic. Such phenomena were particularly common among female teachers with children. Factors that influenced the excitement were: age, job stability, level of knowledge, mastery of information. Often these people experienced severe emotional burnout, had an emotional overload and felt insecure and fearful. In addition, teachers often played a key role in the educational environment during the epidemic, which makes the issue of researching their mental health particularly relevant[42-44]. In addition, there is currently no such system that can help assess and measure anxiety in teachers in response to COVID-19. Therefore, in this study, researchers developed an anxiety assessment system for educators using the SAVE-9 scale. This study proposes to explore the impact of coronavirus in an educational setting, thus making it equally important to understand the problem. Lee et al.[45] concluded that one year after the outbreak, patients still had elevated levels of stress and an alarming level of psychological distress. Support from mental health services was offered to help with rehabilitation. These results may complement the proposed benchmarks for the Kazakh health system.

This study has several limitations that should be considered when interpreting its findings. Firstly, it was limited to the city of Aktobe, which may not fully represent the diverse socioeconomic conditions, healthcare access, and cultural practices across Kazakhstan. The cross-sectional design captures psychological and psychophysiological states at a single point in time, preventing conclusions about causality or long-term trends. Cultural and social factors, such as strong collectivist traditions and varying trust in official health information, could have influenced risk perception and coping strategies. Additionally, stigma surrounding mental health may have led to underreporting of symptoms, while the economic impact of quarantine, particularly job insecurity, may have intensified distress for certain groups[46,47]. These factors suggest that future research should employ longitudinal, multi-regional, and culturally sensitive approaches to provide a more comprehensive understanding of the pandemic's psychological impact.

In summary, the current literature suggests that the manifestation of psychological and psychosomatic disorders during a coronavirus pandemic can vary from mild anxiety disorders to more severe mental states in a healthy population, and in people with poor mental health, aggravation occurs more frequently and causes chronic illness. Often, in COVID-19 hotbeds, depressions and anxiety spread rapidly, sufferers might have panic attacks, and their ideas were very strange due to the appearance of acute psychotic symptoms.

Conclusions

Thus, in the current context, COVID-19 has become an infection that carries a high stressogenic potential and threatens both physical health and an increase in anxiety-depressive reactions. The condition can result in long-term effects such as depression, anxiety, insomnia, irritability and constant fatigue. Traumatic stress disorder and post-traumatic stress disorder can often manifest themselves. Sometimes patients may have neurological manifestations of the disease, and those who have had a severe form of the virus may have cerebral vascular wall damage that impairs consciousness. Thus, it is essential that there is a public health response to the COVID-19 outbreak to address the psychological crisis. An important step is the involvement of respected professionals in medicine and epidemiology in the development of psychosocial care programmes for the population. In addition, it helps to inform the public about effective measures to prevent infection and how to cope with stress after an illness.

The study indicates significant changes in the psychological and psychophysiological characteristics of the population during the pandemic. The structure of these disorders is quite extensive and includes anxiety, asthenia, depression and other stress disorders. The symptomatology constitutes a specific astheno-neurotic syndrome, which is characterised by a manifestation of cognitive dysfunction. Psychological and psychophysiological changes in the COVID-19 survivor population have been demonstrated to be pronounced. It was established that psycho-emotional distress was common among the young and elderly, and among the female population. In general, a large proportion of the popu-

lation requires distress management, which should be tailored to their age, gender, education and other social categories.

The material in this research may be of relevance to medics, doctors, psychologists and sociologists who can help people with the post-convulsive syndrome to overcome their psychological difficulties and establish a supportive environment for their rehabilitation. The results of the study will be informative for scientists and the ministry of health, as the issue is still current and requires a lot of research. It should be further explored by deepening the study of the development of psychological stability in populations during the coronavirus pandemic, in Kazakhstan and other countries. The research performed does not exhaust all aspects of this socio-psychological problem and requires further consideration of such issues as: social exclusion and its discriminatory tendencies; training health professionals in working with patients with COVID-19; and a structured model of psychological care after the coronavirus. In line with these findings, it is critical to implement targeted, evidence-based mental health interventions within Kazakhstan's healthcare framework. Specifically, digital interventions, such as telepsychology and online counselling platforms, can improve access to care, especially for individuals in remote or underserved areas. Additionally, targeted screening and early intervention programs for high-risk groups, especially those with pre-existing mental health conditions, COVID-19 survivors, and caregivers, should be prioritized to mitigate long-term psychological distress. By adopting these strategies, Kazakhstan can enhance the resilience of its population and build a more robust mental health infrastructure in response to future public health crises.

Conflict of interest statement

The authors declare that there is no conflict of interests.

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Authors' contributions

Arstan Mamyrbayev, Maria Tamara Gonzalez, Umit Satybaldieva, Saule Bermagambetova, and Gulmira Umarova contributed to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript.

Ethical consideration

A study was approved by Ethics Commission of the West Kazakhstan Marat Ospanov Medical University, No. 02367.

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