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Research Article

Psychological Reactions Among Adults During the COVID-19 Pandemic: A Cross-sectional Survey in Atyrau, Kazakhstan

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Abstract

This cross-sectional survey conducted in Atyrau, Kazakhstan aimed to underline the psychological reactions among adults during the COVID-19 pandemic. The study involved sampling individuals from different age groups and employed standardized questionnaires to assess psychological and psychophysiological profiles, considering factors such as gender, age, education, and social status. A total of 798 participants were surveyed with informed consent obtained from all participants. The findings revealed a wide range of psychological reactions experienced by the urban population during the pandemic. Vulnerable groups, including the young, the elderly, and predominantly females, exhibited a significant negative impact on their psychological and psychophysical health. Factors such as education, social living conditions, family status, and income level played crucial roles in influencing individuals' psychoemotional state. Comparative analysis between individuals diagnosed with COVID-19 and those without the disease showed that the pandemic acted as a trigger for the manifestation of psychoemotional, psychophysiological, and mental disorders. The study emphasized the importance of psychoprophylactic measures and psychoeducational methods for all population groups, particularly targeting vulnerable populations. Integration of mental health and psychosocial support services into the public health response was highlighted as crucial to mitigating the adverse effects on individuals' mental health and overall well-being. Understanding the psychological reactions during the COVID-19 pandemic provided valuable insights for developing effective interventions and support systems to alleviate the impact on individuals' mental health.

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The study's findings underscored the importance of addressing mental health needs and implementing targeted interventions to support the psychological well-being of the population.

Keywords: COVID-19, coronavirus infection, pattern of psychological reactions, asthenia, anxiety, depression, somatic disorders, psychological stress

1. Introduction

The COVID-19 pandemic has not only posed a serious threat to the physical health of populations around the world but also resulted in a wide range of psychological disorders [1–4]. Quarantine, social distancing, social isolation, exposure to media and social networks, stigmatization, and excessive mental stress on medical workers have all contributed to the sociopsychological impact of the pandemic. However, cognitive and emotional representations of symptoms and illness can vary greatly, leading to inconsistencies in the empirical information about the COVID-19 pandemic perception by the population.

According to existing literature, the most common psychological disorders associated with post-COVID syndrome included asthenia (17–71%), cognitive impairment (11–54%), anxiety (10–47%), depression (6–42%), insomnia (25–41%), and stress disorders (5–30%). These disorders, when combined, formed a unique asthenic-neurotic syndrome [5–7]. COVID-19 patients were twice as likely to develop this syndrome compared to patients with other acute respiratory viral infections. This syndrome was detected in almost a third of all COVID-19 cases and in two-thirds of patients with a severe disease course [5, 8]. Therefore, the presence of long-term disturbances in psychological reactions after a coronavirus infection was undoubtedly significant. A study on the consequences of the COVID-19 pandemic revealed that 27–42% of convalescents experienced a wide range of psychopathological disorders that persisted for up to several years after recovery [9, 10]. The most common disorders reported were asthenia, depression, anxiety, insomnia, and memory and concentration impairment [11, 12].

In this regard, several studies demonstrated that COVID-19 had triggered a simultaneous epidemic of anxiety and depressive reactions [13]. Additionally, certain population groups have been found to be more vulnerable to the psychological stress associated with the disease. Specifically, individuals with affective disorders have shown increased susceptibility to emotional reactions related to COVID-19, resulting in relapses of pre-existing mental disorders or deterioration of their condition. As the level of stress experienced by the population increases, stigma and discrimination against specific groups also rise, even in the absence of evidence indicating an increased risk of infection. While research already exists on the practical reasons for the population's noncompliance with anti-epidemic measures during the COVID-19 pandemic [14, 15], it is crucial to comprehensively understand all potential factors

influencing compliance, given the paramount importance and necessity for the population to adhere to these measures.

Due to regional differences in the psychological reactions of populations, such as ethnic, professional, gender, and other variations, it is important to study the pattern of psychological states of populations in reference to their assessment of life quality. While there have been several studies addressing the psychological states of populations during the COVID-19 pandemic [16], our research provided additional insights specific to the urban population in Kazakhstan, contributing to the broader understanding of the pandemic's psychological impact. This kind of methodological approach not only becomes the subject of scientific research but also serves as a reliable, informative, and economical method for assessing human health at both individual and group levels.

It is worth noting that the timely assessment of the pattern of psychological reactions in the population and prevention of behavioral disorders that occur during infectious disease outbreaks was a priority for successfully overcoming both the immediate and long-term consequences of the COVID-19 pandemic and protecting the mental health of all population groups. Additionally, there cannot be a single approach to the implementation of mental health protection and psychosocial support measures for the population of countries where coronavirus has been recorded.

This research was carried out as part of the scientific and technical project "COVID-19: scientific and technological evidence to a response system to the spread of the novel respiratory diseases, including coronavirus," with the individual Registration Number of the project: BR11065386. The objective of the research was to study the psychological reactions and quality of life of the population during the COVID-19 pandemic.

2. Methods

2.1. Study design

This study was a sampling cross-sectional survey conducted in the city of Atyrau, Atyrau regional center from November 2021 to December 2023. The objective of the research was to study the psychological reactions of the population during the COVID-19 pandemic. The studied population groups were differentiated by age, according to the WHO classification (young age: 18–44, middle age: 45–59, elderly: 60–74). The questionnaire method was used to interview the adult population, with consideration of gender (male, female), age, education, and social status. A comparative analysis of the psychophysiological profile of the population diagnosed with COVID-19 and those who did not have COVID-19 was carried out as well.

2.2. Sampling

The quantitative survey in Atyrau amounted to 798 people and was conducted based on the city polyclinic No. 7 (Table **1**).

Table 1: Quantitative survey of the examined subjects in Atyrau to evaluate psychological reactions among adults during the COVID-19 pandemic.

Item	Total
Total survey number	798
Gender	
Females	493
Males	305
Average age (±SD)	48.2 ± 12.7
Age	
18-44	277 (men – 102, women – 175)
45-59	336 (men – 117, women – 219)
60-74	185 (men – 86, women – 99)
History of COVID-19	
Yes	293 persons (males – 112, females – 181)
No	505 persons (males – 193, females – 312)

Inclusion criteria included persons aged 18 to 75 years who were able to communicate and self-reported COVID-19 infection. Exclusion criteria included individuals under 18 and over 76 years of age, as well as those with communication difficulties or inability to self-report COVID-19 and social status, and those who refused or were unable to provide informed consent. To calculate the sample size in this study, G Power 3.1.9.7 (Dusseldorf, Germany) was used with a probability of 0.05, a power of 0.95%, and a sample size of 0.3.

This study reveals regional ethnic characteristics of the psychological reactions of the population during a pandemic. The Republic of Kazakhstan is a multi-ethnic state, at the same time, in the Atyrau region and, in particular, the city of Atyrau, the indigenous (Kazakh) population lives predominantly in 95% of cases. The significantly higher percentage of working men in a given city compared to working women was due to cultural and traditional beliefs that often place women in the role of caretaker and mother of children. Moreover, the Atyrau region is the main region of the country where oil, gas, and petrochemical enterprises are predominantly concentrated, which has led to serious environmental problems. This social difference was important in the formation of psychological disorders during the pandemic.

2.3. Questionnaires

The psychological and psychophysiological profile of the studied population groups of the regional center was carried out using standardized questionnaires and forms MFI-20 (Table S1), PHQ-9 (Table S2), GAD-7 (Table S3), PHQ-15 (Table S4), and PSM-25 (Table S5).

2.4. Statistical analysis

Statistical data processing was performed using STATISTICA 10.0 software package from StatSoft, Inc. USA. The null hypothesis of the absence of differences between the observed distribution of a characteristic and the theoretical expected normal distribution was tested using the Kolmogorov-Smirnov test. Differences between samples were assessed: with normal distribution of paired variables using Student's t-test; data were presented as Mean ± SD, where M is the arithmetic mean and SD is the standard deviation. To identify dependencies between the studied parameters, a correlation analysis was performed using the Spearman rank correlation coefficient (r). In all procedures of statistical analysis, the significance level was taken as $p \leq 0.05$. The collected data were analyzed using Chi-square test (x2) and MedCalc 20.106 (MedCalc., Belgium) to identify populations vulnerable to psychometric problems during the COVID-19 pandemic, with the significance level set at $p<0.05$. Multiple logistic regression analysis was used to assess the influence of independent factors on the binary variable of psychological reactions of the population during the COVID-19 period.

3. Results

The assessment of the psychological state among the adult population of Atyrau during the COVID-19 pandemic revealed that individuals living in this city experienced significant psychological and psychophysiological discomfort.

An analysis of the asthenia parameters among individuals who had COVID-19 and those who had not did not reveal any significant differences (Table **2**). This suggests that there were no noticeable differences between those who had recovered from the disease and those who had never contracted it.

The evaluation of the asthenia parameters showed that in both groups, the highest values were observed in the assessment of physical (PhA) and mental (MA) asthenia as well as decreased motivation (DM). Moreover, both males and females showed changes in their psychological status in parameters such as general asthenia (GA), decreased activity (DA), and physical and mental asthenia. However, a more noticeable lack of impulse was found in women compared to men (16.6% vs. 24.2%, respectively).

Significant differences were found in the study of age-related features of asthenia prevalence among the studied population groups. The highest rates of general asthenia, decreased activity, decreased

Table 2: Indicators of asthenia in patients with COVID-19 and those who were not ill.

Parameters	COVID-19		Without COVID-19		P-value
	N	%	N	%	
General asthenia	293	36.7	505	63.3	0.46
≥12	96	32.7	181	35.8	
<12	197	67.3	324	64.2	
Reduced activity	293	36.7	505	63,3	0.16
≥12	113	38.6	165	32.7	
<12	180	61.4	340	67.3	
Decreased motivation	293	36.7	505	63,3	0.53
≥12	67	22.9	104	20.6	
<12	226	77.1	401	79.4	
Physical asthenia	293	36.7	505	63,3	0.46
≥12	96	32.7	181	35.8	
<12	197	67.3	324	64.2	
Mental asthenia	293	36,7	505	63.3	0.66
≥12	94	32.0	153	30.2	
<12	199	68.0	352	69.8	

motivation, and physical and mental asthenia were found in middle-aged (45-59-year-old) people compared to the young age (18-44-year-old) group and the elderly (60-74-year-old). These findings suggest that middle-aged individuals experienced more psychological and psychophysiological discomfort during the COVID-19 pandemic (Figure **1**).

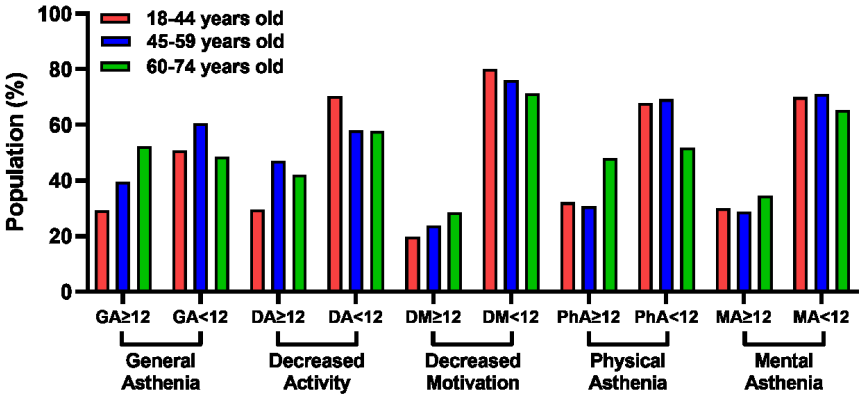

Figure 1: Indicators of the asthenic conditions (general and physical asthenia, decreased activity, decreased motivation, mental asthenia) depending on age.

The survey of the adult population in Atyrau revealed that people in the city experienced psychological and psychophysiological discomfort, which varied depending on gender and age. No significant differences were found between those who had recovered from COVID-19 and those who had not.

The questionnaire used in the study proved to be informative and demonstrative in assessing the pattern of asthenic experiences in the population.

Regarding depression indicators, minimal depression was found in all study groups, regardless of age, gender, and COVID-19 status. Severe and extremely severe depression were detected in individual cases, with extremely severe depression more prevalent among those who had not contracted COVID-19 (Table **3**).

Table 3: Presence of symptoms of depression in people (n=798) with and without COVID-19, as well as its prevalence depending on gender and age.

Parameters			Depression					Total	χ2
			Minimal	Mild	Moderate	Severe	Extremely severe		
COVID-19	Recovered	n	111	29	6	6	1	153	0.72
		%	72.5	18.9	3.9	3.9	0.6	100	
	Never had	n	492	102	21	20	10	645	
		%	76.3	15.8	3.3	3.1	1.5	100	
Gender	Male	n	257	51	11	8	4	331	0.73
		%	77.6	15.4	3.3	2.4	1.2	100	
	Female	n	346	80	16	18	7	467	
		%	74.1	17.1	3.4	3.8	1.5	100	
Age (years)	18-44	n	272	49	6	8	4	339	0.17
		%	80.2	14.4	1.8	2.4	1.2	100	
	45-59	n	211	48	15	10	4	288	
		%	73.3	16.7	5.2	3.5	1.4	100	
	60-74	n	120	34	6	8	3	171	
		%	70.2	19.9	3.5	4.7	1.7	100	

The results of the population survey using the PHQ-9 questionnaire revealed interesting patterns resulting from the peculiarities of the formation of the population's psychological state under conditions of coronavirus infection and the response of the body. The revealed dynamics of depression symptoms and pattern showed that minimal and mild depression was typical for all population groups, regardless of gender, age, COVID-19 history, or its absence. It should be noted that severe and extremely severe forms of depression were significantly more frequently detected in females.

Somatic symptoms were especially marked among the surveyed population groups in relation to gender and age. Mild somatic symptoms were most often detected in people who recovered from and never had COVID-19. At the same time, no differences were found in the group of those who never had and those who recovered from coronavirus, with regard to the severity of somatic symptoms (Table **4**). In females, the indicators of somatic symptoms of moderate and severe degree were several times higher than in men. In the age aspect, somatic symptoms were most pronounced in elderly and middle-aged people. However, a mild degree of somatic changes in the highest percentage of cases was found in the elderly.

At the same time, in young people, on the contrary, indicators of mild somatic changes were determined in the majority of cases (Table **4**).

Table 4: Presence of somatic symptoms in people (n=798) who have had and have not had COVID-19, as well as its prevalence depending on gender and age.

Parameters			Somatic Symptoms			Total	χ2
			Mild	Moderate	Severe		
COVID-19	Recovered	n	228	48	17	293	0.88
		%	77.8	16.3	5.9	100	
	Never had	n	391	88	26	505	
		%	77.4	17.5	5.1	100	
Gender	Male	n	263	30	12	305	<0.0001
		%	86.4	9.7	3.9	41.5	
	Female	n	350	112	31	493	
		%	71.1	22.7	6.2	58.5	
Age (years)	18-44	n	243	25	9	277	<0.0001
		%	87.6	9.1	3.3	42.5	
	45-59	n	269	46	21	336	
		%	80.2	13.5	6.3	36.1	
	60-74	n	97	74	14	185	
		%	52.6	39.8	7.6	21.4	

The analysis of the research results showed that the psychological reactions of the population during the COVID-19 pandemic were characterized by wide variability, indicating that the population experiences not only asthenia and depression but also somatic disorders. Moreover, the nature and severity of somatic disorders largely depend on gender, age, presence, or absence of coronavirus disease.

Another aspect considered in the study of the psychological and psychophysiological status of the population in Atyrau was the examination of anxiety levels. This investigation revealed distinct dynamics based on factors such as the presence or absence of coronavirus infection, gender, and age among the surveyed population groups (Table **5**). The utilization of this questionnaire provided further insight into the specific features of psychological disorders within the adult population during the COVID-19 pandemic.

In a significant percentage of cases (73.8–82.3%), those who recovered and those who never had the disease had minimal levels of anxiety. A moderate level of anxiety was significantly higher in those who had not been ill (17.7%) compared to those who recovered (9.8%). Average anxiety levels were found in 7.8–7.3% of cases, respectively. A high level of anxiety was detected in 1.2% of cases in those who had not been ill, while no high level of anxiety was detected in those who had recovered from COVID-19. Both males and females have the highest levels of minimal anxiety, and there were no significant gender differences in assessing the indicators of moderate, medium, and high anxiety levels. However, particularly significant differences were age-dependent and revealed in middle-aged and elderly people. If the average level of anxiety in the young age group was determined at the level of 5.3%, it increased

Table 5: Indicators of anxiety in people (n=798) who have had and have not had COVID-19, as well as its prevalence depending on gender and age.

Parameters			Anxiety				Total	P-value
			Minimum	Moderate	Medium	High		
COVID-19	Recovered	n	241	29	23	0	293	0.04
		%	82.3	9.8	7.9	0	100	
	Never had	n	373	89	37	6	505	
		%	73.8	17.7	7.3	1.2	100	
Gender	Male	n	227	52	22	4	305	0.86
		%	74.3	17.2	7.3	1.2	100	
	Female	n	376	76	37	4	493	
		%	76.2	15.4	7.5	0.9	100	
Age (years)	18-44	n	217	44	15	1	277	0.22
		%	78.2	15.9	5.3	0.6	100	
	45-59	n	247	55	32	2	336	
		%	73.6	16.3	9.4	0.7	100	
	60-74	n	135	30	16	4	185	
		%	73.1	16.4	8.2	2.3	100%	

to 9.4% in the middle age group and to 8.2% in the elderly age group. The high level of anxiety in the young age group was at the level of 0.6%, in the middle age group - 0.7%, and in the elderly - 2.3%.

An additional indicator used to study the psychological and psychophysiological status of the population in Atyrau was an assessment of anxiety levels, which also revealed certain dynamics with regard to the presence or absence of coronavirus disease, gender, and age in the surveyed population groups. The use of this questionnaire provided additional insights into the characterization of the pattern of psychological disorders in the adult population during the COVID-19 pandemic.

Interesting data were obtained when studying the stressful impact of the COVID-19 pandemic on the psychological state of the population (Table **6**). In people who recovered from coronavirus, the average stress level was higher (13.7%) than in those who never had it (9.9%). However, high-stress levels were determined in people who never had COVID-19 (13.8% in those who recovered and 16.6% in those who never had the disease). Both men and women showed the highest levels of low-stress levels. Medium and high levels of stress were determined in 10-16% of the population. Young adults had the highest rates of low stress (80%) and the lowest rates of high stress (11.5%). In middle-aged and elderly people, on the contrary, the highest rates of average (5.9% in middle age and 22.8% in elderly age) and high levels of stress (36.1% in middle age and 21.4% in elderly age) were revealed.

The conducted studies have clearly demonstrated the wide variability in the pattern of psychological and psychophysiological disorders in the population during the pandemic. The breadth and diversity of identified cognitive impairments range from anxiety disorders and asthenia, to the presence of depressive

Table 6: Indicators of stressful impact in people (n=798) who have had and have not had COVID-19, as well as its prevalence depending on gender and age.

Parameters			Stress			Total	P-value
			Moderate	Medium	High		
COVID-19	Recovered	n	212	40	41	293	0.31
		%	72.5	13.7	13.8	36.7	
	Never had	n	371	50	84	505	
		%	73.5	9.9	16.6	63.3	
Gender	Male	n	228	31	46	305	<0.0001
		%	74.9	10.0	15.1	38.2	
	Female	n	356	55	82	493	
		%	72.2	11.1	16.7	61.8	
Age (years)	18-44	n	222	23	32	277	0.68
		%	80.0	8.5	11.5	34.7	
	45-59	n	249	20	67	336	
		%	74.0	5.9	20.1	42.1	
	60-74	n	109	42	34	185	
		%	59.1	22.8	18.1	23.2	

states and stress. The latter was a very significant factor that provided a detailed characterization of psychological disorders in the adult population.

We also developed a predictive model to determine the psychological reactions of the population during the COVID-19 pandemic using the binary logistic regression method, which was calculated for each questionnaire. For the PHQ-15, PHQ-9, GAD-7, and PSM-25 questionnaires, the resulting regression model was statistically insignificant (p=0.052 and p>0.05, respectively).

At the same time, when surveying the population using the MFI-20 questionnaire, quite significant changes were found (p = 0.017). Based on the value of the Nigelkirk coefficient of determination, 2.4% of the variance in the probability of developing psychological disorders during the COVID-19 pandemic was determined by the factors included in the model (Table **7**).

Table 7: Characteristics of the relationship between model predictors and the likelihood of developing psychological reactions during a pandemic.

Predictors		Adjusted		
		OR	95% CI	p
Age	18 - 44	Ref	-	0.034*
	45 - 59	0.889	0.583 – 1.354	0.583
	60 - 74	1.614	1.024 – 2.544	0.039*
MFI-20 Reduced activity (PA)		1.667	1.54 – 2.634	0.029*
MFI-20 Physical asthenia (FA)		0.592	0.369 – 0.949	0.029*

* - the influence of the predictor is statistically significant (p <0.05).

Based on the values of regression coefficients, it is shown that age plays an important role in the formation of downgraded activity (PA) and physical asthenia and (FA) that had a direct connection with the likelihood of getting sick coronavirus infection. Predictors such as age 60-74 years had a direct relationship (OR=1.667) with the likelihood of morbidity from COVID-19.

4. Discussion

The COVID-19 pandemic had triggered a wide range of psychological reactions, which pose serious threats to the physical health of the adult population, according to research results. Variability in the pattern of psychological disorders among the population had been observed, depending on factors such as age, gender differences, and the presence or absence of a coronavirus disease. It is worth noting that available literature data were largely correlated with the dynamics of changes in the psychological reactions of the studied population group, leading to impairment in the psychoemotional state and an increase in social frustration [17, 18]. The dynamics of psychoemotional reactions varied from borderline anxiety disorders to severe mental conditions in the healthy population, and the exacerbation of existing chronic mental illnesses in the mentally ill [13, 14].

It is worth adding to the above that the weakness of the managerial and organizational measures of the national policy to combat the pandemic had created additional objective prerequisites for the emergence of problems in forming an effective response to the coronavirus disease. Therefore, the complexity and interdisciplinarity of a systematic approach to researching the pandemic and its consequences in medicine, sociology, and psychology will contribute to a better understanding of the occurrence and spread of the coronavirus, as well as the nature of psychological and psychophysiological reactions in the context of the COVID-19 pandemic. The methodological approaches used in this work were based on the use of appropriate questionnaires and sufficiently sensitive, valid, and labor-intensive screening tools, which were highly informative and capable of providing a complete picture of the pattern of psychological reactions of the population and the quality of life in an emergency situation.

Our research results have shown that the level of education, social living conditions, and family status were important factors that regulate the psychoemotional state. Specifically, people with higher education and those in single-parent families have more pronounced shifts in indicators of asthenia, anxiety, and depression. However, some researchers do not find a connection between the level of stress, anxiety, and perceptions of the COVID-19 pandemic, on the one hand, and the level of education and region of residence of the respondents, on the other hand [19]. Instead, these researchers found that the most significant factor was the level of income per family member per month, as a low level of income was associated with high levels of stress and anxiety. Studies have provided evidence that the emotional state of the population changed during the spread of the pandemic and depended on the appropriate support measures taken at the state level.

The results of our own research indicate a significant negative impact of the COVID-19 pandemic on the psychological and psychophysical health of the urban population as a whole. This impact can be considered not only as an adaptive mechanism of psychoemotional response to coronavirus but also as a trigger for the manifestation of new cases of psychoemotional, psychophysiological, and mental disorders. The most vulnerable segment of the population in terms of age and gender was young and old, mostly female. Educational level and marital status also play a significant role in individual perceptions of the COVID-19 pandemic. The results obtained highlight the necessity of psychoprophylactic measures and psychoeducational methods for all population groups.

Furthermore, it is important to target and focus the implementation of distress correction measures on vulnerable groups of the population. The provision of mental health and psychosocial support services should be a key component in the public health system's response to the spread of coronavirus. Understanding the importance of measures for the protection of psychological and psychophysical health and psychosocial support is crucial for stopping the disease incidence and preventing long-term consequences associated with the population's well-being and life quality.

To provide a broader context for our findings, we have compared our results with studies conducted in other countries. For instance, in Italy, research had shown a significant increase in anxiety and depressive symptoms among the general population, similar to our findings in Kazakhstan [20]. In China, the psychological impact of the pandemic also revealed high levels of distress, especially among healthcare workers and those directly affected by the virus [21]. Studies from the United States highlighted the disparities in mental health impacts, with minority groups and low-income families experiencing more severe psychological effects due to existing socio-economic inequalities [22]. By comparing these international findings with our results, we can better understand the global nature of the psychological impact of COVID-19, while also emphasizing the unique socio-cultural and economic factors influencing the population in Kazakhstan. This comparative approach not only enriches our discussion but also underscored the need for tailored mental health interventions that consider both global trends and local contexts.

5. Conclusions

The findings of the conducted studies demonstrate a substantial adverse effect of the COVID-19 pandemic on the structure of psychological reactions within the population. These reactions were contingent upon factors such as the presence or absence of coronavirus infection, as well as age and gender. The specific aspects of the population's psychoemotional experiences, along with their mental and physical components, were significantly influenced by the presence of coronavirus infection and were further shaped by gender, age, and other socio-economic factors. In such circumstances, the timely

implementation of psychoprophylactic and psychoeducational measures plays a crucial role in enhancing the adaptive capabilities of the population.

Supplementary Material

It is included in Table S1 to Table S5.

Declarations

Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Resolution of the Bioethics Committee of the Medical University of Karaganda nonpublic joint stock company (Protocol No.18). This study was approved by the local research ethics committee (protocol 18 from 12 April 2021).

Consent for publication

Informed consent was obtained from all participants before the survey. The name of the protocol is “COVID-19: Scientific and technological rationale for a response system to the spread of new respiratory infections, including coronavirus infection”. This research was funded by the Ministry of Health of the Republic of Kazakhstan (Individual Registration No. BR11065386). There is a decision of the Local Ethics Commission of the head university responsible for the implementation of the scientific and technical project (04/12/2021 No. 64).

Availability of data and materials

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Competing interests

The authors declare no conflict of interest.

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References

[1] Team CC-R. Severe outcomes among patients with coronavirus disease 2019 (COVID-19) - United States, February 12-March 16, 2020. MMWR Morb Mortal Wkly Rep. 2020;69(12):343-6. https://doi.org/10.15585/mmwr.mm6912e2

[2] Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. N Engl J Med. 2020;382(13):1199-207. https://doi.org/10.1056/NEJMoa2001316

[3] Qiu J, Shen B, Zhao M, Wang Z, Xie B, Xu Y. A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: Implications and policy recommendations. Gen Psychiatr. 2020;33(2):e100213. https://doi.org/10.1136/gpsych-2020-100213

[4] Wankowicz P, Szylinska A, Rotter I. Assessment of mental health factors among health professionals depending on their contact with COVID-19 patients. Int J Environ Res Public Health. 2020;17(16):5849. https://doi.org/10.3390/ijerph17165849

[5] Baig AM. Chronic COVID syndrome: Need for an appropriate medical terminology for long-COVID and COVID long-haulers. J Med Virol. 2021;93(5):2555-25556. https://doi.org/10.1002/jmv.26624

[6] Nalbandian A, Sehgal K, Gupta A, Madhavan MV, McGroder C, Stevens JS, et al. Post-acute COVID-19 syndrome. Nat Med. 2021;27(4):601-615. https://doi.org/10.1038/s41591-021-01283-z

[7] Sudre CH, Murray B, Varsavsky T, Graham MS, Penfold RS, Bowyer RC, et al. Attributes and predictors of long COVID. Nat Med. 2021;27(4):626-631. https://doi.org/10.1038/s41591-021-01292-y

[8] Pavli A, Theodoridou M, Maltezou HC. Post-COVID syndrome: Incidence, clinical spectrum, and challenges for primary healthcare professionals. Arch Med Res. 2021;52(6):575-81. https://doi.org/10.1016/j.arcmed.2021.03.010

[9] Liu D, Baumeister RF, Zhou Y. Mental health outcomes of coronavirus infection survivors: A rapid meta-analysis. J Psychiatr Res. 2021;137:542-553. https://doi.org/10.1016/j.jpsychires.2020.10.015

[10] Rogers JP, Chesney E, Oliver D, Pollak TA, McGuire P, Fusar-Poli P, et al. Psychiatric and neuropsychiatric presentations associated with severe coronavirus infections: a systematic review and meta-analysis with comparison to the COVID-19 pandemic. Lancet Psychiatry. 2020;7(7):611-627. https://doi.org/10.1016/S2215-0366(20)30203-0

[11] Lee SH, Shin HS, Park HY, Kim JL, Lee JJ, Lee H, et al. Depression as a Mediator of Chronic Fatigue and Post-Traumatic Stress Symptoms in Middle East Respiratory Syndrome Survivors. Psychiatry Investig. 2019;16(1):59-64. https://doi.org/10.30773/pi.2018.10.22.3

[12] Mak IW, Chu CM, Pan PC, Yiu MG, Ho SC, Chan VL. Risk factors for chronic post-traumatic stress disorder (PTSD) in SARS survivors. Gen Hosp Psychiatry. 2010;32(6):590-598. https://doi.org/10.1016/j.genhosppsych.2010.07.007

[13] Goldberg JF. Psychiatry's Niche Role in the COVID-19 Pandemic. J Clin Psychiatry. 2020;81(3):20com13363. https://doi.org/10.4088/JCP.20com13363

[14] Yang Y, Li W, Zhang Q, Zhang L, Cheung T, Xiang YT. Mental health services for older adults in China during the COVID-19 outbreak. Lancet Psychiatry. 2020;7(4):e19. https://doi.org/10.1016/S2215-0366(20)30079-1

[15] Kimathi M, Mwalili S, Ojiambo V, Gathungu DK. Age-structured model for COVID-19: Effectiveness of social distancing and contact reduction in Kenya. Infect Dis Model. 2021;6:15-23. https://doi.org/10.1016/j.idm.2020.10.012

[16] Aljaberi MA, Al-Sharafi MA, Uzir MUH, Sabah A, Ali AM, Lee K-H, et al., editors. Psychological toll of the COVID-19 pandemic: An in-depth exploration of anxiety, depression, and insomnia and the influence of quarantine measures on daily life. Healthcare; 2023: MDPI.

[17] Fortea L, Solanes A, Pomarol-Clotet E, Garcia-Leon MA, Fortea A, Torrent C, et al. Study Protocol-Coping With the Pandemics: What Works Best to Reduce Anxiety and Depressive Symptoms. Front Psychiatry. 2021;12:642763. https://doi.org/10.3389/fpsyt.2021.642763

[18] Yoo S, Lee J, Ju G, Lee S, Suh S, Chung S. The Schoolteachers' Version of the Stress and Anxiety to Viral Epidemics-9 (SAVE-9) Scale for Assessing Stress and Anxiety During the COVID-19 Pandemic. Front Psychiatry. 2021;12:712670. https://doi.org/10.3389/fpsyt.2021.712670

[19] Pervichko EI, Mitina O, Stepanova OB, Koniukhovskaia JE, Dorokhov EA. Perception of COVID-19 During the 2020 Pandemic in Russia. Clin Psychol Spec Ed. 2020;9(2):119-46. https://doi.org/10.17759/cpse.2020090206

[20] Medda E, Toccaceli V, Gigantesco A, Picardi A, Fagnani C, Stazi MA. The COVID-19 pandemic in Italy: Depressive symptoms immediately before and after the first lockdown. J Affect Disord. 2022;298(Pt A):202-208. https://doi.org/10.1016/j.jad.2021.10.129

[21] Xiong N, Fritzsche K, Pan Y, Lohlein J, Leonhart R. The psychological impact of COVID-19 on Chinese healthcare workers: a systematic review and meta-analysis. Soc Psychiatry Psychiatr Epidemiol. 2022;57(8):1515-1529. https://doi.org/10.1007/s00127-022-02264-4

[22] Maffly-Kipp J, Eisenbeck N, Carreno DF, Hicks J. Mental health inequalities increase as a function of COVID-19 pandemic severity levels. Soc Sci Med. 2021;285:114275. https://doi.org/10.1016/j.socscimed.2021.114275