The research on the impact of distance learning on students' mental health

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Abstract

The mental health of students learning online is a critical task for many countries around the globe. The research purpose was to analyse the factors affecting the quality of mental health of young individuals who learnt under conditions of not total lockdowns but adaptive quarantine restrictions. The research involved 186 volunteers from Zhengzhou University of Technology, 94 were first-year students, and 92 were fourth-year students. The experimental group involved first-year students, and the control group involved fourth-year students. An average age of the participants in the experimental group was 18.3 years, and in the control group, the average age was 22.4 years. The scholars conducted the research after four months of distance learning under the adaptive quarantine. The students could be involved in their usual entertainment activities and interpersonal communication outside the home. The Behavioural Health Measure, better known as BHM-20, was the core psychometric tool. The research finds that distance learning is less effective for first-year students than for fourth-year students because the former cannot effectively adapt and communicate in a new social environment, and develop trusting interpersonal relationships with fellow students and teachers. The research results coincide with other research on this issue and demonstrate a low degree of mental resilience during and after the pandemic. Previous research is not suitable for the analysis of the mental health of students under adaptive quarantine, including the freshmen, considered the most vulnerable group. The article will be useful for professionals interested in distance education in higher educational institutions, workers of socio-psychological services at universities or individuals involved in adapting curriculum materials for distance learning.

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1 Introduction

The COVID-19 pandemic has had a great impact on the mental health and well-being of individuals around the world. While some citizens successfully adapted to the reality of the pandemic and societal lockdowns, others have suffered from mental health disorders caused by a new infection (Serdakova et al., 2023).

Moreover, access to mental health services has been severely impeded which had an impact on the mental health of individuals and significantly increased the risk of suicide (Gunnell et al., 2020). Most countries on different continents have introduced immediate and drastic protective measures in the fight against the spread of infection, such as closed borders, forced isolation, quarantine restrictions, and distance learning. On the one hand, the virtualization of the educational environment and distance education have reduced inequalities in poor rural regions and ensured equitable access to the education of the population. On the other hand, social isolation in the midst of the COVID-19 pandemic required a unique educational environment but it has caused an increased number of psychological disorders around the world and mental illnesses, including depression, obsessive-compulsive disorder, long-term episodes of counterproductive anxiety, and others (Clemente-Suárez et al., 2021). The unexpected shift from in-person to online learning has created a lot of problems for students, teachers, and administrators because many years distance learning has not been very popular in schools and universities (Brown & Carreno-Davidson, 2020). At the same time, protecting the mental health of students is vital for higher education because cognitive abilities directly depend on the psychological state of the student, which affects academic motivation, the level of aspirations, involvement in learning, and the emotional and volitional spheres.

As a stage of ontogenesis (human development), higher education may cause exacerbate mental health problems. Before the pandemic, research has primarily focused on student group relationships and campus living as the most common stress factors among students (Davis et al., 2021). The research finds that distance learning students report psychological problems more frequently than face-to-face learners, and it is important to analyse the factors that influence mental well-being in distance learning and help to focus on the problem identification related to the transformation of the face-to-face classroom to a virtual environment. The research is important for educators because the COVID-19 infection has not yet been completely defeated, and distance learning is already seen not only as a necessary measure but also as a way to simplify access to education around the world and in China in particular.

1.1 Literature review

Since the first cases of COVID-19 were detected, countries' authorities have tried to find possible measures and ways to fight the pandemic around the world. Face-to-face and autonomous learning systems were replaced by distance learning platforms, and it became a significant factor of mental tension while adapting to new conditions in all areas of life and influenced by inadequate communication at the interpersonal level.

Distance or online learning is the method which helps to prevent the spread of COVID-19, but it has a negative impact on the mental health of higher education students. The main problems experienced by students include anxiety, mild and severe stress, social media fatigue, and depression. At the same time, the symptoms are not always caused by mental health problems (Grigorkevich et al., 2022).

The literature analysis revealed the impact of distance learning on the mental health of students and showed that the most sensitive aspects included inadequate time management, the lack of a full-fledged adaptation strategy, the development of digital technologies in a new way, the burden to ensure the quality of new material learning, as well as concerns about the impossibility of funding educational activities under the COVID-19 conditions (Aditya & Ulya, 2021).

Some scholars have focused on fear as an emotional response of teachers and students to the distance learning model. The research confirmed that COVID-19 as a global social phenomenon increased the feeling of fear in different areas of life. First of all, it is the fear of being isolated from the family, the fear of academic failure, and the fear of losing social relationships (Al-Maroof et al., 2020). At the same time, modern online learning differs significantly from emergency distance learning, influenced by the mental tension decrease, in which addiction as a form of adaptation plays an important role. Under the pandemic restrictions and conditions, universities will adopt mixed or blended formats, since the problems of distance education are turned into educational opportunities. Distance learning allows easy access to education, development of different forms and methods of control, and adaptation and revision of inadequate university programmes (Adedoyin & Soykan, 2020).

The mental health of teachers is a part of the discussion devoted to the ecological environment of distance education. A sample of Pakistani and Malaysian teachers was used to analyse the parameters such as teacher self-efficacy and the quality of distance education. The research found that the mental well-being of teachers was a significant factor in ensuring academic success (Guoyan et al., 2021).

In Germany, scholars discuss the importance of psychological assistance provided by educational institutions during the crisis at the initial and final stages of distance learning. The attention of the German sociological and psychological services is on the well-being of students and burnout caused by nervous breakdown or inability to continue effective training under the COVID-19 restrictions.

In Germany, mental illness prevention strategies are introduced for first-year students who find it difficult to move into a new social environment despite the distance format. The transition to a new environment causes a high-stress level due to psychological tension, anxiety and increased learning requirements compared to previous school years.

An academic overload and a low level of knowledge among first-year students lead to learning problems, especially in specialised disciplines. Moreover, social and psychological aspects are important, such as mental exhaustion at the stage of admission, the development of new interpersonal relationships, and getting used to the university system of education and assessment (Schindler et al., 2021).

The factors mentioned above suggest that education during the first year of study based on the distance learning system can be more difficult for students in a situation when one problem is replaced by another. Cross-sectional research on the mental

well-being of European students during the first wave of COVID-19 in May 2020 found that all university students (regardless of the year of study) had poorer mental health than before the pandemic. However, the *mental health* variable correlated with the belief (irrational belief) that the national government ensured effective management of the epidemic at the municipal level and reduced the risks of infection and negative macroeconomic outcomes (Allen et al., 2022).

The spread of the virus, long-term preventive measures and changes in daily routine have led to psychological problems such as anxiety, confusion, social deprivation, and depression. The chronic stress caused by the ongoing pandemic has a profound impact on a sharp and sustained decline of the psychological support that helped individuals cope with failure, emotional problems, disappointment, frustration, and preventing negative emotional experiences, namely resilience, optimism, psychological flexibility, and social relationships (Moroń et al., 2021). In China, the effectiveness of psychosocial support and the impact of COVID-19-related stressors on mental health have been investigated.

In Chinese realities, the concept of *Psychosocial Support* means family and social support in construct to Europe where it involves socio-psychological services.

Moreover, the assessment of the mental health of the respondents was based on the symptoms of depression and loneliness.

The scholars considered that the authorities should focus on the stress that followed the pandemic, as a serious threat to life and well-being, and the risk of infection with new and poorly researched diseases. However, the fear of infection as an independent variable was not correlated with either loneliness or depression, leading to heated debates about the impact of the pandemic on human mental health and well-being (Wang et al., 2022).

The COVID-19 pandemic has led to higher rates of mental disorders among the Chinese population. Many individuals have experienced increased resilience during the pandemic as a post-crisis change which had a positive impact not only on the population but on the healthcare system in the country (Zhang, 2022).

Restrictive measures under the quarantine have no impact on the cognitive performance of the population on different continents. However, complaints about cognitive decline increased significantly during the pandemic. High quality of life before the period of social isolation is the main factor that influences psychological disability, such as depression, anxiety, low-stress tolerance, ineffective self-regulation, and cognitive complaints (Nogueira et al., 2022). Reducing the negative consequences is important for young people in higher education during distance learning.

1.2 Problem identification

Only a limited number of publications covered the mental health of students during distance learning and discussed the problems faced by the post-COVID societies. This issue is of particular importance if the governments do not consider distance learning as a vital point and the only possible preventive measure against the spread of a deadly disease. The research purpose is to assess the psychological health of students learning online and investigate the factors that affect the mental health of students.

Many scholars analyse the behaviour and psychological problems of schoolchildren, their parents and schoolteachers, paying less attention to the university environment.

This article considers age as the main factor to assess the opportunities and effectiveness of distance education for promoting the mental health of Chinese students in higher education. New experimental data will strengthen the debates about the opportunities promised by online education. After the weakening of quarantine measures, distance learning was no longer mandatory. This fact allowed the scholars to consider distance learning as an alternative form of education for the adult Chinese population who have already mastered social skills at earlier stages of ontogenesis and have maintained working, friendly, and romantic relationships with other people.

The scholars will complete the following tasks, such as identify the most appropriate psychometric tools to assess the quality of the student's mental health learning remotely under weak isolation conditions; identify a sample size of first-year and fourth-year students to compare the mental health of those who entered the university and those who had experience learning online in a higher educational institution. Moreover, the research will compare the statistical data of two groups and test the null hypothesis. In this article, mental health is evaluated under conditions of adaptive quarantine, during which students have access to mobility, interpersonal communication outside their home, and quality leisure activities, which become possible due to mass vaccination and economic feasibility.

2 Methods and materials

The BHM-20 methodology can help to assess mental health and the psychotherapy progress used as the main diagnostic tool (Kopta et al., 2015). This technique is a 20-item questionnaire that evaluates three components of healthy behaviour: well-being (stress, life satisfaction, and motivation); psychological symptoms (depression, anxiety, panic disorder, mood changes caused by bipolar disorder, eating disorder, substance abuse, suicide intentions, and risk of violence); life activities (work and study, intimate relationships, social relationships, and enjoyment of life).

The full technique name is *Behavioural Health Measure* often used in a short form BHM. This technique can be used remotely without the direct participation of a psychologist because the respondent can insert answers using a computer or gadget, and the average time to complete the questionnaire is about three minutes. This tool is used in behavioural health clinics of primary health care (Bryan et al., 2014). The test consists of 20 statements rated by respondents where *0* points mean *Strongly Disagree* and *4* points represent *Strong Agree*.

The maximum total score of psychological well-being, without the suicidal scale, is 80 points, and the minimum score is 0 points, which means deep mental exhaustion. The scales do not have a separate gradation, and it means that the scale showed the overall score of mental health. Moreover, BHM-20 allows additional screening of suicidal thoughts and impulses, and it is considered six times better to identify suicidal intentions in primary care than the standard interview method. However, the research does not make use of this method, because it is secondary in importance to clinical psychological care.

In many cases, BHM-20 is used for primary psychological counselling at a certain number of higher education institutions, including Harvard University, the University of Minnesota, Indiana University, the University of Florida, and others, making this psychometric tool effective for data analysis. The tool is appropriate for adults aged 18+with normal or high intelligence (Bryan et al., 2014). Express methods with a high level of reliability exist in modern methodology including *BHQ-20* (Behavioural Health Questionnaire) with similar scales. The technique's reliability was evaluated using four samples of different age groups, showing high results during the initial testing. Moreover, the high correlation between the scales in the BHQ-20 method indicated the presence of 1 key parameter of mental health. The analysis finds that the BHQ-20 is a reliable and valid mental health questionnaire, even though the number of questions is small (Kopta & Lowry, 2002).

2.1 Participants

The experimental group of first-year students included 94 individuals (38 females and 56 males) aged 18 to 19 years interested in this research. The control group of fourth-year students consisted of 92 individuals (48 females and 44 males) aged 21 to 23 years. All respondents had prior distance learning experience because the experiment was conducted during the second half of the academic year when both groups learnt for four months under adaptive quarantine. The distance learning experience differed across groups because for first-year students it was similar to their school experience while the control group actually continued professionalization, first under conditions of total quarantine, and then under conditions of adaptive quarantine.

2.2 Study design

This research was easy to organise and manage because it was conducted remotely and involved first-year and fourth-year volunteers of Zhengzhou University of Technology. The respondents received instructions in real time and proceeded to complete the electronic questionnaires on the Google platform at the agreed time on their personal computers. The preliminary briefing was conducted in the format of an online conference on ZOOM. The results were sent directly to the experimenter's computer, entered into a common table, processed, and also remained anonymous. Although the participants logged in via e-mail in a Google form. In fact, the Google form presented to the respondents repeated the questions from BHM-20, greatly simplified the collection and processing of data. The well-structured methodology supported the high motivation level among the participants, immersed in the psycho-diagnostic process. The students were not informed about the research objective, which was the impact of distance learning on the mental health of young individuals. It helped the scholars to ensure the experiment's purity and avoid bias. Moreover, all respondents could review the methodology results. The primary data processing did not take much time and the experimenter move quickly to statistical analysis.

2.3 Data analysis

Data processing was carried out using the SPSS Statistics 22 programme. To test the research hypothesis, the popular nonparametric Mann-Whitney U-test for independent samples was used. It helped to assess the statistical homogeneity of the two samples and ensured the significant differences.

2.4 Research limitations

The research had several limitations. First, the BHM-20 is a fast test without subscales. Second, the single-item suicide risk scale was not used in this experiment because this factor is usually used for the pre-responses analysis only. Third, the mental development of first-year and fourth-year students differs due to age differences and life experience, which can affect the level of mental health. Fourth, the BHM-20 method, considered an individualised one, does not have any gradations of *Mental Health Normality*, which limits the possibility of using this psychometric tool for large-scale research. Fifth, both samples involved volunteers only. The research did not capture the required social section of the population. Sixth, the BHM-20 was originally developed to assess the progress of individual psychotherapeutic performance. It heats the debates about the lack of standardised tests to assess the overall mental health of an individual. Tests without subscales would simplify the assessment of the impact of distance education on the mental health of Chinese youth.

The unprecedented nature of this pandemic has caused several risk factors and events not explored in this research. The overall physical health, physical training, domestic abuse, violence, and mental health problems experienced by individuals caused by the pandemic were not examined. All indicators used in this research are self-reported, so the scholars consider that some respondents may be apt to provide truthful or false answers, which therefore could influence negatively the results.

2.5 Ethical issues

This experiment was based on high ethical standards because both samples involved volunteers and their identity was kept anonymous. Some students received feedback from the researcher on an individual basis. The experiment goals were not disclosed to the participants. The students were informed about some goals without going into detail including information about voluntary mental health monitoring. The experimenter did not benefit from the research and all the financial expenses were covered by Zhengzhou University of Technology.

The research usefulness function was realised in full because distance learning under adaptive quarantine was introduced not only in China but in Europe. This is an important factor because the pandemic has not yet been completely defeated despite the mass vaccination programmes. The use of distance learning in higher education institutions, considering mental health, has been still questioned. The research finds drawbacks in policy development especially when distance learning is proposed for first-year students who integrate into a new social environment and acquire new skills and master knowledge.

Table 1 Primary Data Analysis

BHM/Sample	Mean value	N	Standard Deviation	Minimum	Maximum	Median of grouped data
First-year students	35.14	94	14.007	10	61	37.40
Fourth-year students	52.66	92	12.867	33	74	50.25

This scientific discussion is of exceptional social significance, allowing academic institutions to balance live communication in the classroom and the mental health of students who experienced an academic overload. There was no risk to the physical and mental health of freshmen. Moreover, monitoring was used as a self-report measure and forced respondents to pay attention to their mental health and analyse their overall mental conditions over the past two weeks.

3 Results

The results processing started with the analysis of the mean values for groups, which made it possible to produce high-quality primary research. At this stage, significant differences between the groups were manifested. Significant differences were found in the median of grouped data, and minimum and maximum values. So, the average value in the experimental group of first-year students was 35.14 points out of 80 possible points, while in the control group of fourth-year students this indicator was higher and reached 52.66 points. The data is available in Table 1.

If the minimum value of the BHM index in the group of first-year students is 10 points, then in the control group it is already 33 points. The difference illustrates the high vulnerability level of former school students and a need for adaptation and effective use of psychological resources during the transition period, from one social environment to another. At the same time, the maximum intragroup values are similar. In the experimental group, the BHM score did not exceed 61 points, while in the control group, the highest value was 74 points out of 80 points. The standard deviation is lower in the group of fourth-year students, which suggests a higher homogeneity in the assessment of psychological well-being.

It proves the significance of the socio-psychological services at the stage of adaptation of first-year students so that the students can receive professional support and focus on the educational process. These strategies should be introduced into practice under adaptive quarantine. For example, one of the possible interventions is support groups organised once a week and conducted by a professional psychologist online.

The second stage of data processing involved a comparison of samples to identify the statistical differences. The classical Mann-Whitney U-test for independent samples was used. The analysis revealed that there were statistically significant differences between the groups. The data are available in Table 2.

The results reveal that the integrated value of BHM in the groups of first-year and fourth-year students is significantly different because an extremely low level of statistical error was detected, namely - $p=0.000$ with admissible $p=0.05$. This result suggests that the psychological well-being of fourth-year students is more stable

Table 2 Secondary Statistical Analysis

	Sample	N	Average rating	Total rating	Mann-Whitney U-test	Z	Asymptotic Significance (2-sided mean)
BHM	First-year students	94	65.91	6195.50			
	Fourth-year students	92	121.69	11195.50			
		186			**1730.500**	-7.067	**0.000**

compared to first-year students. The research considers that distance learning is not the only factor affecting the mental health of the respondents from the experimental group. The scholars assumed that psychological problems experienced by students were caused by many factors including adaptation processes to distance learning, personality crises and academic overload. The results showed that distance learning for first-year students was less desirable than for the fourth-year respondents. It is difficult for the socio-psychological service workers to support students and provide psychological help online, detect emotional burnout, apathy, and depressive episodes in a distance learning format. This research showed that age and the year of study significantly affected the mental health of students learning online.

4 Discussion

Empirical research in South Africa illustrated that university professors failed to deliver adequate psychological support to isolated students. Students relied heavily on the support of both the administrative and academic staff when it came to the learning process. As a result, the high work stress felt by teachers was added to the high academic stress of students, which increased the risk of emotional burnout and nervous exhaustion in both groups (Poalses & Bezuidenhout, 2018).

Distance learning sabotage denial to accept a new academic environment increases the likelihood of mental disorders and reduces the cognitive abilities of schoolchildren whose parents are against this form of teaching (Davis et al., 2021). Distance learning under total lockdowns can cause a sense of *learned helplessness* with online learning technology, and worsen the quality of mental health of students of different age groups. The factors that may eliminate the negative consequences are academic motivation, reduced fatigue and a loss of interaction that cannot be restored with any online conferences (Garcia et al., 2021).

The U.S.-based University conducted a multi-thousand online survey involving undergraduate and graduate students based on standardised scales for assessing physical health and anxiety, as well as additional multiple-choice questions and open-ended questions about stressors and coping mechanisms under the pandemic restrictions. The results showed that half of the respondents experienced an increased level of depression and anxiety. At the same time, less than half of the participants indicated that they coped effectively with the stress factors caused by online learning and the threat of infection (Wang et al., 2020).

In Malaysia, the mental health of students during distance learning was evaluated using the DASS-21 methodology, designed to assess the depressive-anxiety

stress factors. The questionnaire analysis showed that 30% of students in vocational schools experienced severe or extremely severe depression, 41% had anxiety, and 20% had chronic stress. At the same time, the biological sex of the respondent had a significant impact on anxiety. The research suggests investigating and combining distance learning with face-to-face education and practical work experience within the curriculum (Ahmad et al., 2022).

The results comparison of the mental state of students in full-time and distance learning was performed in Eurasia. This research assessed satisfaction with academic performance and the severity of depression and anxiety symptoms. The results showed that the prevalence of depressive symptoms and anxiety among students was higher during distance learning, compared with similar results obtained during full-time education. Moreover, the research results showed that the sudden transition from one learning environment to another was a major cause of chronic stress, which led to a high prevalence of depressive symptoms and anxiety among students (Lyubetsky et al., 2021).

In Italy, the impact of long-term online learning on the mental health of students was also researched. The second (control) experiment used the same sample and conducted the research over six months. The results reveal significant differences on scales such as students' connection with other students and teachers, workspace organisation, and boredom between lessons. Moreover, the results show significant correlations between student academic development and the quality of distance learning, course adaptation, workspace arrangements and communication with other students and teachers, and between students' emotions and communication with other students and teachers (Baltà-Salvador et al., 2021). The research finds that the social relations in distance learning can be an additional psychological resource for students that should not be underestimated.

Cross-cultural research based on a sample of thousands of students showed higher rates of depression, suicidal intentions and post-traumatic stress disorder compared to pre-pandemic levels and current rates in individuals belonging to ethnic minorities, which could also be considered as one of the factors of influence. Though the most common pandemic outcome is PTSD (Post-traumatic stress disorder), recorded in 62% of the respondents. However, neither age, nor personal history of mental illness, nor perceived social support was a significant risk factor of mental health (Torres et al., 2022).

The UK has developed a large-scale online questionnaire designed to assess mental health under the pandemic restrictions. The authors of the questionnaire considered socio-demographic variables, previous physical or mental illness, personal experience with COVID-19, information in the media, pandemic concerns, degree of personal traumatic experiences, PTSD caused by a pandemic outbreak, generalised anxiety disorder, depressive disorder, sleep quality, emotional deregulation, loneliness, social support, and the meaning of life (Armour et al., 2021). This questionnaire has not yet been standardised and adapted in other countries. However, all of the above factors affect the quality of mental health during and after the pandemic. There were no publications devoted to mental health under adaptive quarantine, which proved the need to start a debate on the key theoretical and empirical questions.

5 Conclusion

This article investigated the main factors that affected the mental health of students. The theory of intelligence helps to illustrate that the pandemic and distance education increase the risk of clinical depression, generalised anxiety disorder, PTSD, apathy, learned helplessness, burnout, nervous breakdown, and so on. Furthermore, non-university students more often report mental health problems than those who learn academic disciplines in a traditional format. The results prove that therapeutic and individualistic approaches to mental health cannot be the only methods used to improve students' mental well-being.

The scholars have to investigate inclusive curriculum design and assessment methods. Moreover, educational institutions should introduce and teach advanced telecommuting skills, implement educational systems and processes that do not cause stress, and design learning environments based on professional feedback to maintain a balance between quality education and the student's mental health. The research proposed the holistic approach to introduce mental health practices during distance learning that can influence positively the mental well-being of students. At an empirical level, the present research investigates distance learning opportunities during adaptive quarantine and finds that it is less effective for first-year students who have just entered the university. The problems that may arise are caused by the complicated adaptation process which requires a significant amount of effort, the difficulties in developing new social relations with teachers and fellow students, and academic overload, especially in learning specialised disciplines.

The experiment shows that first-year students are a more vulnerable group than fourth-year students who have learnt online at the university and feel much more competent when it comes to university education. In addition, the research finds that first-year students need high-quality psychological support being at risk with a reduced tolerance for uncertainty. The empirical research finds that age and the year of study affect the mental well-being of students. The scholars suggest that under conditions of adaptive quarantine, it is necessary to pay attention to psychological screening and psychological interventions to prevent depressive episodes, apathy, low academic motivation, low-stress resistance, ineffective self-regulation, and so on. The scientific value of the research is that it causes a worldwide discussion about the safety of distance education and its impact on the mental health of university students.

Moreover, some risks for mental health may occur when young individuals learn remotely. However, the research proves that the psychological states of undergraduate students are more stable and the students are better prepared for distance learning. This is the main practical value of the article to the university administration and teachers. This research manifests that the quality of socio-psychological services in universities is a priority for the administration, and special strategies should be developed to prevent mental disorders among students and maintain an effective and advantageous learning environment for all parties involved in the education process.

Data availability The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Conflict of interest There are no competing interests to declare that are relevant to the content of this article.

Ethics approval The study was conducted in accordance with the ethical principles approved by the Ethics Committee of Zhengzhou University of Technology.

Patient consent All participants gave their written informed consent.

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