



## Research article

## Impact of Covid-19 outbreak on psychological health—The case of Bangladesh

Sayema Sultana <sup>a,\*</sup>, Imran Shafique <sup>b</sup>, Nauman Majeed <sup>c</sup>, Samia Jamshed <sup>d</sup>, Akram Khan Shahani <sup>e</sup>, Fiza Qureshi <sup>f</sup><sup>a</sup> Saif Kashem & Co., Chartered Accountants, 104 Agrabad Commercial Area, Chittagong, Bangladesh<sup>b</sup> Department of Management Sciences, COMSATS University Islamabad, Lahore Campus, Lahore, Pakistan<sup>c</sup> Faculty of Social and Management Sciences, Lahore Garrison University, Sector C, Phase VI, DHA, Lahore, Pakistan<sup>d</sup> Department of Business and Management Sciences, Superior University, Lahore, Pakistan<sup>e</sup> Institute of Business Administration, University of Sindh, Jamshoro, Sindh, Pakistan<sup>f</sup> Institute of Business Administration, University of Sindh, Jamshoro, Sindh, Pakistan

## ARTICLE INFO

## Keywords:

Psychological distress  
Loneliness  
Social isolation  
Risk perception  
Financial distress

## ABSTRACT

**Background:** The outbreak of COVID-19, a profoundly contagious disease has unnerved the world in a calamitous manner from diverse aspects. The present study ventures to expand the literature by exploring loneliness, social isolation, risk perception, financial distress, and psychological distress amidst the lockdown phase of the general population of Bangladesh.**Methods:** Through an online survey among 474 respondents (between April 17th and April 23rd, 2020), data were collected from the Bangladeshi residents (21 years or above). Descriptive and inferential statistical analyses were conducted using IBM Statistical Package for Social Science (SPSS) and Warp-PLS.**Results:** Findings suggest a strong positive correlation among the factors and social isolation, risk perception, financial distress are manifested as the predictors of psychological distress. Besides, females, aged people, and lower-income group are found to be more psychologically distressed.**Conclusion:** This study yields new insights into the psychological facets of a lower-middle-income earning country, Bangladesh.

## 1. Introduction

Pandemics have petrified countries in different parts of the world, from time to time, causing havoc, panic, and economic downturns. This century, the world has been severely challenged by disparate pandemics, ranging from Severe Acute Respiratory Syndrome (SARS) in 2002–04, the Swine Flu in 2009, Ebola in 2014, and of late, COVID-19. Pandemics also cause numerous deaths, and this can lead to manifold adversities (Kleijberg et al., 2019). The COVID-19 (Corona Virus) pandemic which has shaken the whole world today is an intensely contagious disease that originated from China. This disease has already caused the death toll to exceed 2.7 million, with more than 127 million people being infected by the disease, worldwide. The infection and death rate is currently, on an ever-increasing trend (World Health Organization, 2020a). The COVID-19 disease has not only caused the economic downturn of many countries throughout the world, but also a

psychological brunt among people. Studies are continuously trying to understand such effects. For example, a systematic review of articles focussing on the effects of viral respiratory epidemics on psychological health examined the psychological aspects of anxiety, post-traumatic stress disorder symptoms, and depression (Luo et al., 2020). This study had suggested that the most vulnerable groups affected by pandemics tend to be females, older people, migrant workers, people with chronic illnesses, and also students. Pandemics impacts may last for as long as three years among those who had been infected, hence, this issue needs to be addressed. The present paper, therefore, aims to highlight how the pandemic had affected the psychological health of the Bangladeshi people during the pandemic.

The announcement of the global pandemic by the World Health Organization (WHO) in 2019 has forced nations to lockdown their cities, and to enforce the movement restriction order. This measure strives to restrict social interactions among people so as to avert the

\* Corresponding author.

E-mail address: [sayema0712@gmail.com](mailto:sayema0712@gmail.com) (S. Sultana).<https://doi.org/10.1016/j.heliyon.2021.e06772>

Received 30 December 2020; Received in revised form 3 March 2021; Accepted 8 April 2021

2405-8440/© 2021 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

spread of the disease, and if possible, to flatten the curve. As a result, the lockdown and quarantine practices were implemented, as had been practised in previous epidemic outbreaks noted in ancient times (Barbisch et al., 2015). The outcome of these practices has had a substantial, complex, and negative impact on the economic, psychological and social ramifications. These measures cannot be compromised. Survey findings have shown that during the partial lockdown phase caused by COVID-19, many people experienced accelerated levels of stress, depression, and anxiety, mainly among people who were classified as separated, single, widowed, jobless, and educated (Le et al., 2020a, b).

It seems obvious that prolonged lockdown and social distancing can be pernicious to people's mental health, as is evident in the various psychological complications noted to be rising progressively. For example, more uncertainties, loneliness, anxieties, frustrations, stress, and depression were noted (Serafini et al., 2020). The independent or combined influences of these factors can impose pressures on the normal lifestyles of the people, such as causing them to experience psychiatric conditions. Sher (2020) showed that various factors, such as feelings of hopelessness, social isolation, interpersonal problems, fear of contagion, mood disorders, chronic stress, and vast economic difficulties can cause psychiatric disorders, and for some, even suicide. It has been predicted that even after the pandemic has subsided, an increase in suicidal behaviors can occur, hence there is a necessity to address this issue.

From the onset of the COVID-19 pandemic, researchers have been actively examining the negative impact caused by the outbreak. Most of the studies, however, seemed to focus on the psychological effects caused to health care workers (Simione and Gnagnarella, 2020; Zhu et al., 2020). Some studies had chiefly focused on the impact of the pandemic on high-income or developed countries (Hossain et al., 2020) while others focused on the socio-demographic variables affecting mental health at the time of the COVID-19 outbreak (Roy et al., 2020; Zhang et al., 2020). During the COVID-19 outbreak which began in 2019, there were extensive reports made about the general public's mental and psychological health condition (Wang et al., 2020b).

Moving forward towards the Asian context, numerous studies have also been focusing on looking at the psychological conditions of the general population as well as the health workers, since the beginning of the COVID-19 outbreak. Some studies had narrated the psychological consequences of the pandemic, for example, in India, people were found to lack the supplies which can sustain their health. Healthcare workers (Rehman et al., 2020), and women (Gopal et al., 2020) were found to be suffering more from issues such as stress, anxiety, and depression. The most common reason noted for issues like suicide was traced to the people's fear of the pandemic, financial crisis, lack of alcohol, social boycott, work stress, and others (Dsouza et al., 2020). In the case of Nepal, the economic recession, poverty, and social isolation were the causes of suicides (Poudel and Subedi, 2020). Among the Pakistani population, medical students were found to be suffering from depression due to the delay in their online education during this pandemic (Dhahri et al., 2020). Studies also noted that during the pandemic, more females, the unemployed, and the chronically ill people suffered from psychological issues, comparatively (Khan et al., 2020). In the case of Sri Lanka, pregnant women were affected deeply by depression and perinatal anxiety during the same pandemic season (Patabendige et al., 2020).

Currently, nations around the world are highly interconnected because of globalization. The benediction of such connectivity is numerous; however, during the pandemic, the infection spread rate was also stiff. The USA, the UK, Spain, Italy, Germany, and Iran were the most badly affected while Bangladesh, a South Asian country was also not spared from the virus. With a Case Fatality Rate (CFR) of 1.49 percent, Bangladesh has more than half a million of COVID-19 infected cases, and around nine thousand deaths (World Health Organization, 2020b).

Despite having a lower death toll, when compared to developed countries so far, the country may be facing an increasing risk of infection due to its frail public health infrastructure (Ramachandran, 2020). The lockdown, imposed from March 26, 2020, had continued at different phases throughout the country. The trend of the infected and death cases in Bangladesh is illustrated in Figure 1.

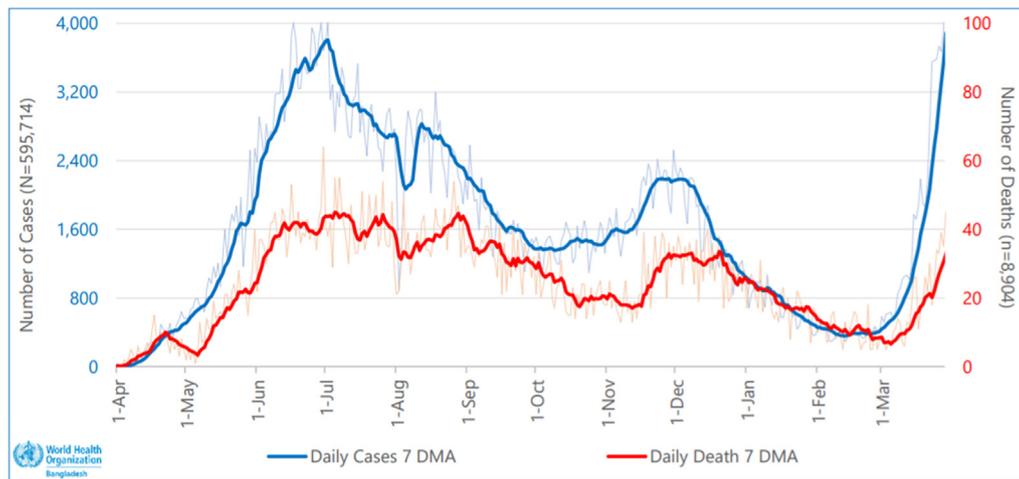
During this pandemic, different studies had uncovered several issues, such as suicidality among the general population and health workers (Mamun et al., 2020), post-traumatic stress disorders (PTSD), and depression among the quarantined people (Ripon et al., 2020), COVID-19 associated stress among the general population (Islam et al., 2020b), and anxiety, stress, and depression among the general people (Zubayer et al., 2020). The results showed that suicidal behaviour was common among females and divorced people (Mamun et al., 2020). Similarly, quarantined females were more depressed than males (Ripon et al., 2020). It appears that COVID-19 associated stresses also caused short temper, sleep shortness, and chaos in the family (Islam et al., 2020a, b). Fear of COVID-19 infection, and having contact with COVID-19 infected persons were the prime reason for the stress, depression, and anxiety (Zubayer et al., 2020).

Nevertheless, studies have been encouraged to delve into loneliness (Holmes et al., 2020; Sood, 2020), social isolation (Brooks et al., 2020; Sritharan and Sritharan, 2020), and risk perceptions (Gerhold, 2020; Hossain et al., 2020). This is because such factors can create negative impacts in diverse ways. Furthermore, social distancing imposed by the pandemic is most likely to prompt a recession (Hirschhorn, 2020). During the pandemic, a gigantic hit on the economy had generated much stress and financial insecurity among the general population (Sood, 2020). Therefore, the financial distress of the general population should be examined (Holmes et al., 2020; Sritharan and Sritharan, 2020). According to Dang et al. (2020), around 67% of the Vietnamese people had reported a decline in income during the first phase of the lockdown. Female respondents were found to be more affected than their male counterparts. Aiming to address some of the issues highlighted earlier, this study attempts to examine the impact of financial distress on the mental well-being of the Bangladeshi population amid the current COVID-19 pandemic. It is anticipated that the psychological effects of COVID-19 on Bangladeshis would differ based on cultural differences (Thurackal et al., 2020).

A lower-middle-income country with densely populated areas (World Bank, 2019), Bangladesh has a budget of only 4.9 percent for its health sector, with 60 percent of health expenditures paid by the households (Tembon, 2019). As a result of this, it might face high emotional challenges as the country implements the lockdown measure. This study aims to explore loneliness, social isolation, risk perception, financial distress, and the psychological distress of the Bangladeshi population. Additionally, the differences with regards to psychological distress among the demographic variables will also be explored, so as to gain additional insights.

The contribution of the present study is traced to the psychological health found to be affecting the Bangladeshi population amid the lockdown phase. In that regard, the outcome would be insightful for understanding the emotional state of the lower-middle-income group. The outcome will help to enlighten the country's economy as the country aims to confront the physical, psychological, social, and economic adversities during the COVID-19 pandemic, and after the pandemic. The time frame of the data collection (during the lockdown) presented by this study bears significance in that it represents one aspect of the early findings. Finally, the validation of the scales noted in the field of psychology which were used to depict the Bangladeshi context, in combination with the sophisticated statistical tools would make the study literature informative and insightful.

The remainder of this paper is composed as follows: Section 2 delineates the literature review. Section 3 chronicles the methodology adopted. Section 4 presents the findings. Section 5 focuses on the discussion, and Section 6 concludes the paper.



**Figure 1.** Trend of COVID-19 cases and deaths (seven days moving average) in Bangladesh (1 April 2020–28 March 2021). Source: World Health Organization (2020b).

## 2. Literature review

### 2.1. Psychological distress

Psychological soundness is imperative to human beings, as it makes human beings, especially during a crisis, more stable, logical, sound, resilient, strong, and able to move on in life. Nevertheless, unpleasant and unprecedented life events, disasters, stress, crisis, and numerous other social, emotional, physical, or economic factors, can also affect human beings, and cause them more psychological distress. The concept of psychological distress encompasses the obnoxious subjective state of anxiety and depression which can display many emotional and physiological manifestations (Mirowsky and Ross, 2003). Literature has been continuously trying to determine the predictors of psychological distress, and the global outbreak of COVID-19 which had led to the mass lockdown of communities around the world, has had many negative impacts. Among these, it has been noted that social (physical) distancing practiced in the time of the lockdown, has had an antagonistic psychological impact on people (Fiorillo and Gorwood, 2020). The systematic literature review conducted by Xiong et al. (2020) disclosed that there were increased symptoms of anxiety, depression, post-traumatic stress disorder, stress, and psychological distress among the general population of Spain, China, Italy, the USA, Iran, Nepal, Turkey, and Denmark. The study also noted that women, students, and unemployed people were most vulnerable to the condition. A certain level of psychological distress was faced by more than one-third of the general people in Italy (Moccia et al., 2020). Following this, Wang et al. (2020a) captured the psychological outcomes of COVID-19 in Poland and China. It was reported that Chinese people suffered from less anxiety, stress, and depression when compared to the Polish people. It was revealed that unemployment, home confinement, retirement, and COVID-19 related symptoms had ignited their anxiety, stress, and depression. In the case of Vietnam, the initial phase of the COVID-19 pandemic was found to affect more females, elderly people, and those living in large families. These people were suffering from psychological distress, especially post-traumatic stress symptoms (PTSS) (Le et al., 2020a, b). In the Philippines, the psychological impact of the COVID-19 lockdown had created a moderate to severe levels of anxiety among the people (Tee et al., 2020). Among them, single persons, females, students, less healthy people, and discriminated groups were found to be more vulnerable.

Literature has also indicated some disparate reasons for such psychological distress, hence studies have been urged to identify the predicting factors of such psychological distress among the diverse nations (Mahase, 2020). The psychological distress faced by the general population during the lockdown period could be attributed to many causes, hence this

phenomenon needs further investigation, particularly across geographical and cultural variations (Cao et al., 2020). Accordingly, the present study aims to examine the psychological distress caused to the general population of Bangladesh due to the COVID-19 pandemic of 2020.

### 2.2. Loneliness

Loneliness is an apathetic psychological state; it refers to the absence of a close relationship, which, if not addressed, can lead to many unpleasant consequences. Based on this, it becomes a crucial factor that contributes to psychological distress (Wu and Yao, 2008). Loneliness can be the outcome of the unpleasant life experiences of human beings (Ge et al., 2017), and the impact can be due to social isolation (Hawkley and Cacioppo, 2010). The outbreak of COVID-19 had led many governments to find ways to confine the virus spread, thereby leading to the lockdown. The physical distancing imposed has thus accelerated the chances of many people feeling ostracized, hence lonely. Due to that, research has been encouraged to analyse the impact of loneliness on the general population, particularly during the lockdown phase (Holmes et al., 2020). The outcome of such studies showed that some had focused on the psychological impact of COVID-19 on healthcare workers such as doctors, clinical technicians, and nurses (Zheng et al., 2020; Zhu et al., 2020). In their study, Zhu et al. (2020) found that depression and anxiety prevailed among health workers in China, but there were also mixed results. In the case of Italy, Moccia et al. (2020) tried to capture the psychological distress of the general population, but the result failed to reflect the effect of loneliness on psychological distress. Nonetheless, it can be argued that loneliness can impact widely on the health outcomes, particularly with a greater effect on mental health (i.e., anxiety, general mental health, depression, suicidality) than the overall well-being (i.e., life satisfaction, quality of life) (Park et al., 2020). It has been found that one-third of the UK population were suffering from loneliness after this outbreak (Li and Wang, 2020). In contrast, the findings of Luchetti et al. (2020) manifested no significant increase in loneliness among the USA residents during this pandemic. Research is thus encouraged to examine this context (Singh and Singh, 2020; Sood, 2020), particularly to identify the factors affecting the psychological distress of those living in low- and middle-income countries (LMICs) (Hossain et al., 2020). The present study, thus aims to explore the association of this psychological state with psychological distress.

### 2.3. Social isolation

Social relationship is an intrinsic part of human life, and most human beings thrive in such relationships. The lack of engagement and

interaction within the social web (e.g., colleagues, friends, and neighbours) is termed as social isolation (Weiss, 1973), and it appears that social isolation and loneliness may co-occur. Nonetheless, both may also occur independently of one another (Matthews et al., 2016). Social isolation can be detrimental to mental health. Socially isolated persons evidently have a paucity of social support and interactions, hence they may suffer from high psychological stress (Leigh-Hunt et al., 2017). In conjunction with this, the lockdown measures implemented in various countries due to the expansion of COVID-19 are most likely to accelerate social isolation among people. More people are expected to suffer from confusion and anxiety as a result of the uncertainty of the future, and studies are encouraged to examine how this affects the mental health (Ge et al., 2017). A systematic literature review demonstrates the possibility of an increased depression and anxiety due to the social isolation (Loades et al., 2020). In their study, Ammerman et al. (2020) found that social isolation due to COVID-19 led to an increase in suicidal thoughts among Americans. In another study, Zheng et al. (2020) found that mindfulness was a factor that enabled adults in China to increase their duration of sleep following the outbreak of COVID-19 in China. Past studies had focused on the psychological aspects of social isolation among high-income and developed countries (Hossain et al., 2020; Leigh-Hunt et al., 2017), hence it is apt to focus on lower-income and less developed countries, such as Bangladesh, so as to detect the cultural differences (Cheng and Tang, 2004), if any exist. Consequently, the effect of social isolation on the psychological distress of Bangladeshi general population is reconnoitred in this research.

#### 2.4. Risk perception

The risk perception of the general population about infectious diseases is a good context to examine because the extent of how an infectious disease risk is grasped, can be a predictor of public response (Dryhurst et al., 2020). Public apprehension about risk is often complex, particularly, the risk perception of getting infected by the disease. This is because people may have fear, anxiety, or even hostility (Meredith et al., 2011). Studies have been conducted during the outbreak of various infectious diseases so as to understand people's risk perception. The study by Brug et al. (2004) indicated that women scored higher in perceiving SARS (Severe acute respiratory syndrome) as an extremely risky disease, in the Netherlands. The report of De Zwart et al. (2007) noted that the risk perception on avian influenza was higher among those in Europe when compared to Asia. Conversely, the risk perception of the pandemic of influenza in Australia was not considered to be a high threat in Australia (Jacobs et al., 2010). The recent study by Gerhold (2020) noted that the risk perception of the Germans concerning COVID-19 was covered. The study implied that older people scored higher in their perception of being infected with COVID-19 when compared to their younger counterparts. However, this study did not include examining whether risk perception was related to psychological distress or not. In another study conducted in Asia, the USA, and the UK, the report showed that the UK population carried the highest risk concerns among the entire population (Dryhurst et al., 2020).

A review of the literature showed that studies looking at the risk perception of COVID-19 are comparatively less. Risk perceptions among people may also vary according to the different contexts and cultural environments (Jacobs et al., 2010; Weber et al., 2002). Therefore, it is imperative to learn about the predictors of psychological distress on the general population, particularly about the risk factors and perceptions of the general public amid a pandemic outbreak (Duan and Zhu, 2020; Gerhold, 2020; Hossain et al., 2020; Jacobs et al., 2010). This study aims to examine the impact of COVID-19 risk perceptions on the psychological distress of the general population of Bangladesh.

#### 2.5. Financial distress

Disruptions, uncertainties, and insufficiency in income can be inimical to psychological health while financial distress originating from

unemployment, poor remuneration, increased inflation, can accelerate the condition. Add to this is the fact that people's limited access to required resources so as to sustain themselves during a debacle, can also affect people's mental wellbeing. As a result, feelings of stigmatization, anger, hostility, and agitation can erupt (Meredith et al., 2011). Studies have shown that financial distress and psychological well-being among people go hand in hand, aggravating each other, hence these factors warrant further investigations (Arampatzi et al., 2015). As has been noted, the lockdown imposed by COVID-19 had compelled many businesses to shut-down, and to lay-off employees. This has caused many serious economic setbacks. As a result, people of different levels of income groups throughout the world are very badly affected (Saleh, 2020). The closure of shops, restaurants, hotels, airports, and various other social transportations had caused businesses to suffer, with many ripple-effects on the world economy. In some professions, reduced working hours, as a measure to mitigate the spread of the virus had also accelerated more instances of poor mental health conditions among the working population (Hamouche, 2020). A global recession is predicted as a result of the COVID-19 outbreak (Gopinath, 2020), and if the world does not address this phenomenon duly, it could cause the world scenario to worsen. Although the effect of financial stress has been well-documented in previous literature, there remains a lack of understanding regarding the ongoing financial distress of the suffering population. The kind of pressure or stress generated by the pandemic had caused more financial insecurity among the general population (Sood, 2020), and this, inevitably, has influenced the people's psychological health. Learning about the psychological consequences of COVID-19 caused by financial stress, insecurity, poverty unemployment, uncertainty, and financial loss, therefore, needs to be examined (Holmes et al., 2020; Sritharan and Sritharan, 2020). This study endeavours to look into this aspect of financial insecurities on psychological distress.

### 3. Methodology

#### 3.1. Participants and procedure

This study uses an online questionnaire which was administered on the general population of Bangladesh, hence no specific institutional ethical approval was obtained. To comply with the ethical standards of research, this study however, observes the research procedures which adhere to the tenets of the Declaration of Helsinki. The participants were identified and they responded voluntarily to the survey, with their informed consent. The study also ensured that anonymity was adhered to so as to keep their identity confidential. No incentives were offered for the participation, and participants had the freedom to withdraw from the study anytime during their involvement. Participants were informed about the procedure, study purpose, and the confidentiality of their details. The eligible participants comprised those who were described as adults or 21 years and above, with income-earning capacities. This segment of the population was selected so that it represents an accurate scenario of the income-generating groups that may be facing relatively more hurdles than others.

The survey was administered between April 17<sup>th</sup> and April 23<sup>rd</sup>, 2020. This period was selected as a means to reflect the participants' responses amid the COVID-19 pandemic, following the Bangladeshi Government's declaration of the lockdown of the whole country from 26<sup>th</sup> March. The selection of participants was based on the snowball sampling method (Lewis-Beck et al., 2004) which was quite commonly used during the pandemic (Banna et al., 2020). Initially, ten participants who represented a vast range of geographical areas, income, age, education, gender, and occupation were chosen. Each respondent was requested to choose another ten people whom they believed would be suitable for the present study. They were then requested to forward the same questionnaire to their contacts. This process continued until sufficient data were obtained. Considering the lockdown situation, this method was regarded as a useful and efficient way of collecting data. In

total, 512 responses were received, but only 474 responses were used for the final analysis as others did not meet the eligibility of the inclusion criteria.

### 3.2. Measures

The survey instrument comprised of a set of English questionnaire including an informed consent, questions relating to the participants' socio-demographics, the Loneliness Scale, the Social Loneliness Scale, the Risk Perception Scale, the In-Charge Financial Distress/Financial Well-Being (IFDFW) Scale, and the Kessler Psychological Distress Scale. Details on the items' statement can be found in the Results section (4.3 Descriptive Analysis).

#### 3.2.1. Socio-demographics

The socio-demographic variables incorporated gender, age, religion, education levels, locality, marital status, and income levels of the participants.

#### 3.2.2. Loneliness

To measure loneliness, the 3-item loneliness scale ( $\alpha = 0.72$ ) of Hughes et al. (2004) was utilized and responses were based on the 5-point Likert scale ranging from 'hardly ever' to 'very often'.

#### 3.2.3. Social isolation

Social isolation was measured by the 3-item Social Loneliness Scale ( $\alpha = 0.73$ ) of Gierveld and Tilburg (2006) ranging from 'always' to 'never' (5-point Likert scale).

#### 3.2.4. Risk perception

Risk perception was assessed through a 3-item Likert scale (Brug et al., 2004; Goulia et al., 2010) ranging from 'strongly disagree' to 'strongly agree'. These items were adapted based on the SARS risk perception and the A/H1N1 influenza risk perception because of the unavailability of a standard scale to measure COVID-19 risk perception.

#### 3.2.5. Financial distress

Financial distress was evaluated through the 8-item (5-point Likert scale) In Charge Financial Distress/Financial Well-Being (IFDFW) Scale ( $\alpha = 0.95$ ) of Prawitz et al. (2006).

#### 3.2.6. Psychological distress

Psychological distress was measured via the Kessler Psychological Distress Scale (K6) ( $\alpha = 0.89$ ) with a 5-point Likert scale ranging from 'never' to 'always' (Kessler et al., 2002). This has been extensively used among the general population (Mewton et al., 2016) as it assesses the non-specific psychological distress based on a framework that combines emotional, cognitive, behavioural, and psychophysiological manifestations (Kessler et al., 2003). The K6 scale has robust psychometric properties (Mewton et al., 2016), and is highly predictive (Sunderland et al., 2012) in learning to understand the psychological distress among adults.

### 3.3. Data analysis

Quantitative data were analysed through the IBM Statistical Package for Social Science (SPSS) Statistics version 26.0, and Warp-PLS version 7.0. Descriptive analyses derived from SPSS were used to summarize the data as inferential statistics, for example, correlation analysis (Spearman's rank-order correlation) among the study variables and multi-group analysis (Mann-Whitney U test and Kruskal-Wallis H test) between the socio-demographic variables and psychological distress. Warp-PLS was used to determine the reliability and validity of the scales and regression analysis. The association of the constructs was considered statistically significant if the p-value was below or equal to 0.05.

## 4. Results

### 4.1. Socio-demographic characteristics of participants

The socio-demographic profile of the participants is illustrated in Table 1. The outcome indicates that more than half of the respondents (61.60%) were males, and less than half of the respondents (40.70%) were from the 31–40 years age group. Most of the participants were Muslims (87.97%) which represents the country's majority Muslim population (US Department of State, 2019). Almost all or 99.60% of the participants have the minimum educational qualification of Higher Secondary School Certificate (H.S.C.) (equivalent to 'A' levels). Most of the participants (88.60%) represent the urban population who have easy and frequent access to the internet in the country (Islam et al., 2020a). More than half or 62.20% of the participants were married, and 67.10% of the population has a yearly income of (Bangladeshi Taka) BDT 87,000 or above.

### 4.2. Valuation of measurement model

The reflective measurement model was assessed with the reliability test (composite reliability and Cronbach's alpha), and the validity test (discriminant validity and convergent validity) (Hair et al., 2019). Full collinearity VIF (variance inflation factor) of the constructs was found to be within the recommended range (less than 3.30 preferable, less than 5.0 acceptable) (Hair et al., 2019) with the assurance of no multi-collinearity being noted in the study model. The relevant test results are presented in Table 2.

#### 4.2.1. Reliability tests

The composite reliability (CR) test conducted suggests that internal consistency reliability was between 0.70 to 0.90 (Diamantopoulos and

**Table 1.** The demographic information of the participants.

Items	Characteristics	Response (%)
Gender	Female	38.40
	Male	61.60
Age	21–30 years	32.70
	31–40 years	40.70
	41–50 years	21.70
	51 years and above	4.90
Religion	Islam	87.97
	Hinduism	7.17
	Buddhism	3.80
	Christianity	1.06
Education	Secondary School Certificate (S.S.C.) or below	0.40
	Higher Secondary School Certificate (H.S.C.)	5.90
	Bachelor's degree	26.60
	Master's degree	56.10
	Professional Degree	11.00
Locality	Urban	88.60
	Suburban	5.50
	Rural	5.90
Marital Status	Single	32.50
	Married	62.20
	Divorced	5.30
Income Level	Less than *BDT 87,000	32.90
	BDT 87,000 to 3,40,000	20.70
	BDT 3,40,001 to 10,52,000	30.60
	Above BDT 10,52,000	15.80

Note. \*BDT = Bangladeshi Taka; 1 USD = BDT 84.92 as on February 18, 2021.

**Table 2.** Reliability, multicollinearity, and validity test results.

Constructs	Reliability Tests		Multicollinearity Test	Discriminant Validity Test
	Cronbach's $\alpha$	Composite Reliability (CR)	Full Collinearity VIF	Average Variance Extracted (AVE)
Loneliness (LN)	0.829	0.897	1.442	0.745
Social Isolation (SI)	0.794	0.879	1.647	0.708
Risk Perception (RP)	0.807	0.886	1.802	0.721
Financial Distress (FD)	0.914	0.930	2.905	0.625
Psychological Distress (PD)	0.881	0.910	3.081	0.627

Winklhofer, 2001), and the Cronbach alpha value should be at the minimum of 0.70 (Hair et al., 2019). All the scales of this study passed the recommended values by which the construct reliability of the scales was assured (Table 2).

#### 4.2.2. Validity tests

To maintain convergent validity, the constructs' factor loadings should be a minimum of 0.70 (Hair et al., 2019). Using confirmatory factor analysis, the factor loadings for loneliness scale were noted to be: 0.874, 0.856, and 0.859; for social isolation: 0.814, 0.877, and 0.832; for risk perception: 0.852, 0.856, and 0.840; for financial distress: 0.779, 0.792, 0.791, 0.763, 0.819, 0.746, 0.814, and 0.819; and for psychological distress: 0.762, 0.755, 0.778, 0.828, 0.798, and 0.826. As the factor loadings for all the items were greater than 0.70, all the items were retained. The average variance extracted (AVE) is preferred to be greater than 0.50 in order to maintain the measurement model's discriminant validity (Hair et al., 2016). As shown in Table 2, all the constructs' AVE were above 0.50, thereby affirming the discriminant validity of the current study's measurement model. Table 3 depicts the correlations of the latent variable with the square roots of the AVE noted to be above any other correlations among the latent variables, thereby demonstrating acceptable discriminant validity (Fornell and Larcker, 1981).

#### 4.3. Descriptive analysis

Participants were asked to respond to the questions by considering the existing situation of the COVID-19 pandemic. Loneliness was measured by 3-items with mean values of 2.71, 2.51, and 2.74 consecutively. 'Sometimes' to 'Very Often' "I often feel a lack of companionship" was felt by 55.10%; "I often feel left out" was felt by 50.40%, and "I often feel isolated from others" was felt by 55.90% of the participants. Social isolation was evaluated by 3-items with mean values of 2.63, 2.62, and 2.63 sequentially, ranging from 'Sometimes' to 'Never'. Almost half or 51.50% of the participants felt, "There are plenty of people I can rely on when I have problems"; half or 51.50% felt, "There are many people I can trust completely"; and half or 52.10% felt, "There are enough people I feel close to". Risk perception was measured by a 3-item scale with mean values of 3.53, 3.56, and 3.58 sequentially. Around half or 53.20% of the participants 'Agree' to 'Strongly agree' with "I feel the risk of getting infected by COVID-19"; half or 52.90% agreed that "I think that being infected with COVID-19 would have major consequences on my health", and 54.70% agreed that "I believe that COVID-19 infection is difficult to treat".

The mean values for financial distress were evaluated by 8-items ranging from 2.74, 2.78, 2.78, 2.82, 2.78, 2.84, 2.76, to 2.87. For the item "What do you feel is the level of your financial stress at this point?", around half or 58.90% felt 'Moderate' to 'Overwhelming Stress'. More than half or 61.20% of the participants felt 'Moderate' to 'Not at all satisfied' when asked, "How satisfied you are with your present financial situation?". Slightly more than half or 57.40% claimed to be 'Moderately Worried' with more than half or 61.80% claiming to be 'Very worried' when asked, "How do you feel about your current financial situation?" and "How often do you worry about being able to meet normal monthly living expenses?". To the question of, "How confident are you that you could find the money to pay for a financial emergency that costs about BDT 85,000? (equivalent to USD 1000)" around 62.50% noted 'Moderate' to 'No confidence'. Slightly more than half or 61.80% of the participants stated that they 'Sometimes' to 'Very often' faced difficulties in meeting their entertainment expenses. For the item, "How frequently you are using most or all of your monthly income to cover your monthly expenses - with no money left?", results showed that 60.00% of the participants responded 'Sometimes' to 'Very often'. More than half or 63.70% stated that they were 'Moderate to Overwhelming stress' when asked, "How stressed do you feel about your current and future financial position in general?"

Psychological distress was assessed by 6-items with mean values of 2.71, 2.45, 2.59, 2.42, 2.67, and 2.36. Here, participants were asked, "Since the outbreak of COVID-19 in your country, how frequently in the past 30 days you are bothered by the following problems?" To this question, more than half or 59.70% felt nervous, 51.60% felt hopeless, 54.60% felt restless or fidgety, 43.70% were so depressed that nothing could cheer them up, 55.40% felt doing everything (e.g: getting up, talking, walking, etc.) was an effort, and 47.70% felt worthless on the range of 'Sometimes' to 'Always'.

#### 4.4. Correlation analysis

Spearman's rank-order correlation ( $r_s$ ) was conducted to analyze the correlation among the constructs as data were not normally distributed (Pallant, 2013). The results suggest a strong positive correlation between loneliness and psychological distress, which was statistically significant,  $r_s = 0.489, p < .001$ . Further to this, social isolation also showed a strong significant positive relationship ( $r_s = 0.602, p < .001$ ) with psychological distress. Simultaneously, risk perception also showed a strong significant positive relation with psychological distress among the participants ( $r_s = 0.648, p < .001$ ). Finally, financial distress faced by the people served to

**Table 3.** Correlations among latent variables along square roots of the AVE exhibited diagonally.

Constructs	LN	SI	RP	FD	PD
Loneliness (LN)	0.863	0.465	0.406	0.485	0.466
Social Isolation (SI)	0.465	0.842	0.442	0.531	0.580
Risk Perception (RP)	0.406	0.442	0.849	0.619	0.627
Financial Distress (FD)	0.485	0.531	0.619	0.791	0.784
Psychological Distress (PD)	0.466	0.580	0.627	0.784	0.792

be the strongest positive significant relationship ( $r_s = 0.790, p < .001$ ) with psychological distress.

#### 4.5. Regression analysis

The association of the study constructs was evaluated through the effect size ( $f^2$ ), path coefficient ( $\beta$ ), and the coefficient of determination ( $R^2$ ). The path coefficient ( $\beta$ ) explains the linkage among the variables. The significance level was assessed by the  $p$ -value and the predictive power of the research model was gauged by the coefficient of determination ( $R^2$ ) (Hair et al., 2019). Effect sizes ( $f^2$ ) of 0.02 (small), 0.15 (medium) and 0.35 (large) can be regarded as standard (Cohen, 1988). Table 4 presents the summary of the regression analysis.

The path coefficient ( $\beta$ ) between loneliness (LN) and psychological distress (PD) was found to be not significant ( $\beta = 0.020, p = 0.334$ ). This means that loneliness was not a predictor of psychological distress. However, social isolation (SI) and psychological distress (PD) path coefficient ( $\beta$ ) indicated that the relationship was significantly positive ( $\beta = 0.226, p < 0.001$ ), with a moderate effect size ( $f^2 = 0.145$ ). Additionally, the impact of risk perception (RP) on psychological distress (PD) was positive and significant ( $\beta = 0.236, p < 0.001$ ), with a moderate effect size ( $f^2 = 0.158$ ). The significant effect of financial distress on psychological distress (PD) was further confirmed ( $\beta = 0.503, p < 0.001$ ), with large effect size ( $f^2 = 0.395$ ). Finally, the  $R^2$  of the model was noted to be 0.71, thereby confirming the moderate predictive accuracy power of the study model (Hair et al., 2019).

#### 4.6. Multigroup analysis

The participants' demographic variables were analysed with psychological distress so as to explore whether significant differences exist among the various groups. Mann-Whitney U test was conducted to explore the differences between the two groups and the Kruskal-Wallis H test were conducted to analyze the variations among three or more groups regarding psychological distress (Pallant, 2013). The results of the Mann-Whitney U test indicated that there was a significant difference between females and males ( $U = 22718, p = 0.008$ ) where the females (mean rank = 258.67) showed a greater psychological distress than the males (mean rank = 224.30). Surprisingly, there was no difference found ( $U = 23450, p = 0.769$ ) in terms of psychological distress regarding the employment status (full-time and part-time) of the respondents.

The Kruskal-Wallis H test was conducted to explore the differences between the age groups, and the result showed a statistically significant difference in the psychological distress among the age groups,  $\chi^2(3) = 10.99, p = 0.012$ , with a mean rank psychological distress score of 247.48 for 21–30 years, 227.61 for 31–40 years, 222.89 for 41–50 years and 317.96 for 51 years and above. This means that a higher distress level was noted among the older people. The result also noted a significant difference between the religious groups in terms of psychological distress with  $\chi^2(3) = 9.625, p = 0.022$ , with a mean score of 239.05 for the Muslims, 250.09 for the Hindus, 229.33 for the Buddhist, and 51.90 for the Christians. This means that a higher distress level was noted among the Hindus, followed by Muslims, Buddhists, and Christians.

**Table 4.** Summary of regression analysis.

Paths	$\beta$	$f^2$	$p$ -values
LN- > PD	0.020	0.010	0.334
SI- > PD	0.226	0.145	<0.001*
RP- > PD	0.236	0.158	<0.001*
FD- > PD	0.503	0.395	<0.001*
The coefficient of determination ( $R^2$ ) = 0.71			

Note.  $N = 474$ ; \* $p < 0.01$ .

The education levels of the participants were also analyzed to understand the group differences in psychological distress. The results showed no difference  $\chi^2(3) = 8.096, p = 0.088$  between the education levels. The different localities of the participants (urban, suburban, and rural) did not differ, with  $\chi^2(3) = 1.236, p = 0.539$  while the marital status (single, married, and divorced) also did not differ in terms of psychological distress, with  $\chi^2(2) = 0.359, p = 0.836$ . Nevertheless, the result noted a significant difference between the income groups in terms of psychological distress with  $\chi^2(3) = 16.460, p = 0.001$ , with a mean rank psychological distress score of 262.18 for those earning less than BDT 87,000, 256.57 for those earning BDT 87,000 to 3,40,000, 219.66 for those in the income level of between BDT 3,40,001 to 10,52,000 and 195.75 for those earning above BDT 10,52,000. This means that a higher distress level was noted among the lower income group (BDT 87,000 or less and BDT 87,000 to 3,40,000) while the higher income group suffered less psychological distress in this regard.

## 5. Discussion

This study serves as one of the pioneer studies for Bangladesh, providing empirical evidence which illustrates the level of loneliness, social isolation, risk perception, financial distress, and psychological distress of the general population of one of the lower-middle-income countries in the world. The findings of this study contribute to the literature by presenting the significant correlations between loneliness, social isolation, risk perception, financial distress, and emotional affliction amid the COVID-19 lockdown in Bangladesh. This study has also shown that financial distress has the strongest influence on people's psychological health. Furthermore, social isolation, risk perception, financial distress had manifested to be the predictors of psychological distress.

Evidence also showed that social (physical) distancing during the lockdown phase had affected the psychological health of the general population of Bangladesh. Considering the outbreak phase, people were feeling lonely and abandoned. Although hypothetically, this can be due to their exposure to news regarding the selfishness of people abandoning their COVID-19 infected family members, and peers in times of crisis. Nonetheless, the fear of being lonely (quarantined or being alone during the treatment phase) if infected by this virus, had possibly fuelled this kind of feeling. The findings derived from the current study confirmed the findings of Li and Wang (2020) in the UK, where loneliness was regarded as an obstacle to psychological soundness during the pandemic. The dominating influence of social isolation in this crisis period is relatable to the lack of close interactions within the social web. The findings of this study were thus consistent with previous literature (Loades et al., 2020). As had been noted, the sudden lockdown of regions, and the various movement controls had left many people unprepared to live on their own, hence the feeling of a lack of reliance, trust, and closeness. It is deduced that these factors had probably led to their psychological disturbances. Therefore, social isolation has a considerable effect on the emotional state of people. This study has also revealed the COVID-19 risk perception to be a cogent factor of psychological affliction among the Bangladeshi population. In that regard, the outcome also supports past literature (Gerhold, 2020; Meredith et al., 2011). It is deduced that most people consider the COVID-19 treatment to be a difficult one since there is a lack of required treatment for the people residing in the country (Chowdhury, 2020). Besides, the major consequences of COVID-19 on health, if infected, also affected the feelings of the citizens. This can be attributed to the media news touching on the adverse health effects of COVID-19 on patients' kidneys, heart, and brain (Citroner, 2020). Inevitably, people seemed to be considering themselves as vulnerable to COVID-19 infection.

Financial distress was the most efficacious predictor of psychological distress (Arampatzi et al., 2015; Meredith et al., 2011) during this pandemic. People were highly stressed about their current and future financial position. Many were facing difficulties in meeting their monthly

expenses which had also accelerated their anxieties, such as the extra expenses needed in case of infection, as well as other unprecedented economic consequences of the lockdown. In terms of emergency, people seemed to feel that they have less confidence in meeting those expenses. All these factors contributed to their psychological distress. This condition was thus noted to be contributory to the ongoing and predicted economic turmoil caused by the pandemic. Bangladesh is forecasted to lose 1.1 percent of GDP growth, impacting household income (Ramachandran, 2020), hence lay-offs, unemployment, hunger could seriously jeopardize the situation triggered by COVID-19.

People are going through many negative and unpleasant experiences, such as feelings of nervousness, fidgetiness, and heaviness in performing their daily chores. This has also led many people to feel a sense of worthlessness and hopelessness, although comparatively, it is less experienced by the general population. These factors are the major triggers of the general population's emotional disturbances in Bangladesh. These findings were also derived based on the people's anticipation of the adverse effects of social (physical) distancing, imposed by the time of the lockdown, which had an antagonistic psychological impact (Ammerman et al., 2020; Fiorillo and Gorwood, 2020).

The results of this study also revealed significant socio-demographic variations in psychological distress. For instance, females showed an accelerated level of psychological distress when compared to males. This outcome was consistent with the result of Lim et al. (2018) which indicated that nations that have a median human development index (HDI) tend to see more women suffering from depression (Bangladesh HDI value = 0.632) (Human Development Reports 2019). Similar findings have been described in earlier studies (Limcaoco et al., 2020; Moccia et al., 2020). This phenomenon may be due to the additional family responsibilities, in addition to the office responsibilities faced by female workers, for instance, the uncertainty of family earnings, children's education, and others. The findings of this study also indicated that older people experienced higher levels of distress, thereby contradicting the work of Limcaoco et al. (2020). The outcome may be due to the lack of medical, financial, and social support provided by this country. The age group of 21–30 years was noted to face higher distress (mean rank 247.48) when compared to 31–40 and 41–50 age groups. This outcome may be due to the additional stress brought about by the COVID-19 situation since this age group is at the early stage of their career, and those involved could be in an ambivalent position as a result of the overall condition.

Additionally, Hindus were found to be more stressed; however, the higher presence of Muslims in the sample should be considered in this regard. Further to this, the lower-income groups were found to be suffering from psychological distress when compared to the higher income earning counterparts. This can be due to the lower income group's tension of bearing the costs of COVID-19 treatment, other financial hurdles faced during the outbreak, or expenses incurred after the death of dependents. In contrast, no difference was found based on those working part-time or full-time workers, their educational levels, and their marital status. This outcome may be attributed to the stress faced by all groups, whether full-time or part-time earners, in losing their earnings. Although speculative, this outcome could be due to the fatal nature of COVID-19, such that psychological stress had impacted on all groups regardless of their demographic differences. To validate this finding, additional inspections are warranted.

### 5.1. Suggestions and practical implications

Owing to the fact that the COVID-19 pandemic is going to have some long term lingering effects on the people even when the infection subsides or departs (Fiorillo and Gorwood, 2020), various governments of the different countries have also resorted to taking some relevant steps to ease the emotional state of the general public. Further to this, psychological desolation screening by the general doctors is advised. Persons who are already emotionally challenged may face additional stress,

hence family members and friends are encouraged to play more active roles by taking additional care of them. Where necessary, virtual counselling with the psychiatrist and doctors can be conducted. The most effective treatment recommended would be evidence-based treatment, such as cognitive behaviour therapy (CBT) or Internet CBT, which is a kind of psychotherapeutic treatment. This can be used to aid in pinpointing and transforming the ominous thought patterns of people into a normal thought pattern or behaviour. Such virtual aids (Internet CBT or iCBT) have been noted to be helpful for people when coping with the existing worldwide psychological quandary. This strategy was recommended by Ho et al. (2020a) who suggested that in combination with mindfulness-based therapy (MBT), counselling can be done through internet platforms like Zoom or Moodle. This channel of interaction would decrease virus transmission. In today's technological era under the ongoing pandemic, such virtual aids can be helpful in facilitating mental wellness, and people's wellbeing in a more cost-effective manner (Zhang and Ho, 2017). During this pandemic, people had also been suffering from sleeping disorders which also hampered their normal mental condition (Ara et al., 2020). Studies have provided evidence showing the successful implication of the CBT for treating insomniac persons (Soh et al., 2020), hence it was proposed to be a useful option for combating the adverse psychological impact experienced by the general population. These virtual aids enable people to have virtual interactions through calls, chats, and video conferences without any physical proximity, thereby alleviating fears of any infection. Additionally, governments may consider offering their people with subsidized aids in their businesses such as providing more local and cheaper internet services.

The media can also play a considerable role by restricting 'fake news' and 'negative news' whilst promoting more activities which can encourage people to do creative things or to assist each other during such a crisis. Moreover, *hope*, an emotional aspect, needs to be felt by people because it is the prime drive of human existence amidst the pandemic period. In this regard, people should be inspired to be optimistic about the future, and to be assured that today's pandemic is a temporary phase of life which is going to end soon. In addition, various interesting relaxations and stress management methods with easy illustrations can be advertised to encourage people in using appropriate media.

Financial distress was noted to be the strongest influencer of psychological distress, hence it may require more appropriate attention at this stage. The government is the prime authority to provide the necessary support to the people so as to ease their difficulties during a pandemic. Thus, the government should consider taking up some urgent steps, such as making a reduction or a waiver of utility bills for a while, providing food and cash support to the needy, and ensuring job security for various working groups. The governments' efforts could help people to feel less stressed both physically and mentally. It is also advised that owners of business organizations pay heed to the situation and realize the hurdles of their employees so as to ensure the fulfilment of their basic needs in this trying situation.

### 5.2. Limitations of the study

As is the case for all studies, the current study also bears some inherent limitations. The non-random sampling method applied in this study constricts the generalization of the findings. Additionally, the study did not incorporate the views of the people who do not have internet access. The participants were also made up of more educated people residing in the urban areas of Bangladesh, hence the results disclosed may be biased. Further to this, the current study mainly used self-reported questionnaires to measure the psychiatric symptoms only, no clinical diagnosis had been conducted. The gold standard for establishing psychiatric diagnosis involves a structured clinical interview and functional neuroimaging, which had not been considered for this study (Ho et al., 2020b; Husain et al., 2020). Self-reported results have a certain level of probable prejudice, for example, social desirability bias and memory reminiscence.

### 5.3. Future research direction

Future research may incorporate additional insights into the psychological afflictions of the people by taking an in-depth analysis of several predictors of psychological distress and socio-demographic variability. Such findings may add value to existing literature. Future research may also consider examining the coping strategies used or the psychological resilience of people during a pandemic or other crises. Finally, more studies need to look into the psychological state of COVID-19 survivors as well as family members who had lost their relatives to this pandemic.

## 6. Conclusion

Implementing the lockdown during a pandemic has been the measure taken since ancient times, despite the economic, psychological, and social consequences. A pandemic's physical and economic debris is given higher emphasis because of its magnanimous impact caused to human life. Unfortunately, its psychological impacts are often less gratified. While psychological health is arguably, as important as physical health, there exists a rift in understanding the emotional impacts of COVID-19 on the psychological impact caused to the general population. This study addresses the current gap and attempted to link the association between loneliness, social isolation, risk perception, and financial distress on the psychological distress of the general population in Bangladesh. Findings suggest that there was a strong positive correlation among the factors and social isolation, risk perception, financial distress. Other than loneliness, these factors have been identified as the predictors of psychological distress.

As a country with a lower-middle-income, Bangladesh seems to be comprised of a population that also requires attention because the people's financial distress may also fuel their psychological wounds. Findings have suggested that females, aged peoples, and the lower-income groups were more susceptible to psychological distress. This outcome carries a great significance for the government of Bangladesh in apprehending the psychological repercussions faced during the lockdown caused by the COVID-19 pandemic. The government may be able to use the findings to develop more formidable steps to help these groups of people so that the mental or psychological health of the country can be duly addressed.

## Declarations

### Author contribution statement

Sayema Sultana: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Imran Shafique, Samia Jamshed: Analyzed and interpreted the data; Wrote the paper.

Nauman Majeed, Akram Khan Shahani, Fiza Qureshi: Conceived and designed the experiments; Wrote the paper.

### Funding statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

### Data availability statement

Data will be made available on request.

### Declaration of interests statement

The authors declare no conflict of interest.

## Additional information

No additional information is available for this paper.

## References

- Ammerman, B.A., Burke, T.A., Jacobucci, R., McClure, K., 2020. Preliminary Investigation of the Association between COVID-19 and Suicidal Thoughts and Behaviors in the U.S. Center for Open Science.
- Ara, T., Rahman, M., Hossain, M., Ahmed, A., 2020. Identifying the associated risk factors of sleep disturbance during the COVID-19 lockdown in Bangladesh: a web-based survey. *Front. Psychiatr.* 11, 966.
- Arampatzi, E., Burger, M.J., Veenhoven, R., 2015. Financial distress and happiness of employees in times of economic crisis. *Appl. Econ. Lett.* 22 (3), 173–179.
- Banna, M.H.A., Sayeed, A., Kundu, S., Christopher, E., Hasan, M.T., Begum, M.R., Chowdhury, S., 2020. The impact of the COVID-19 pandemic on the mental health of the adult population in Bangladesh: a nationwide cross-sectional study. *Int. J. Environ. Health Res.* 1–12.
- Barbisch, D., Koenig, K.L., Shih, F.-Y., 2015. Is there a case for quarantine? Perspectives from SARS to Ebola. *Disaster Med. Public Health Prep.* 9 (5), 547–553.
- Brooks, S.K., Webster, R.K., Smith, L.E., Woodland, L., Wessely, S., Greenberg, N., Rubin, G.J., 2020. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet* 395, 912–920.
- Brug, J., Aro, A.R., Oenema, A., De Zwart, O., Richardus, J.H., Bishop, G.D., 2004. SARS risk perception, knowledge, precautions, and information sources, The Netherlands. *Emerg. Infect. Dis.* 10 (8), 1486.
- Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., Zheng, J., 2020. The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatr. Res.* 287, 112934.
- Cheng, C., Tang, C.S.K., 2004. The psychology behind the masks: psychological responses to the severe acute respiratory syndrome outbreak in different regions. *Asian J. Soc. Psychol.* 7 (1), 3–7.
- Chowdhury, T., 2020. COVID-19: Bangladesh Hospitals Forced to Turn Away Patients. *Aljazeera*. Retrieved from <https://www.aljazeera.com/news/2020/04/covid-19-ban-gladesh-hospitals-forced-turn-patients-200407131633280.html>.
- Citroner, G., 2020. What We Know about Long-Term Health Effects of COVID-19. *Healthline*. Retrieved from <https://www.healthline.com/health-news/what-we-know-about-the-long-term-effects-of-covid-19>.
- Cohen, J., 1988. *Statistical Power Analysis for the Behavioral Sciences*. Lawrence Erlbaum Associates Inc, Hillsdale, NJ.
- Dang, A.K., Le, X.T.T., Le, H.T., Tran, B.X., Do, T.T.T., Phan, H.T.B., Nguyen, Q.T., 2020. Evidence of COVID-19 impacts on occupations during the first Vietnamese national Lockdown. *Annal. Glob. Health* 86 (1), 112.
- De Zwart, O., Veldhuijzen, I.K., Elam, G., Aro, A.R., Abraham, T., Bishop, G.D., Brug, J., 2007. Avian influenza risk perception, Europe and Asia. *Emerg. Infect. Dis.* 13 (2), 290–293.
- Dhahri, A.A., Arain, S.Y., Memon, A.M., Rao, A., Khan, M.M., Hafeez, G., Iqbal, M.H., 2020. The psychological impact of COVID-19 on medical education of final year students in Pakistan: a cross-sectional study. *Annal. Med. Surg.* 60, 445–450.
- Diamantopoulos, A., Winklhofer, H.M., 2001. Index construction with formative indicators: an alternative to scale development. *J. Market. Res.* 38 (2), 269–277.
- Dryhurst, S., Schneider, C.R., Kerr, J., Freeman, A.L.J., Recchia, G., van der Bles, A.M., van der Linden, S., 2020. Risk perceptions of COVID-19 around the world. *J. Risk Res.* 23 (7–8), 994–1006.
- Dsouza, D.D., Quadros, S., Hyderabadwala, Z.J., Mamun, M.A., 2020. Aggregated COVID-19 suicide incidences in India: fear of COVID-19 infection is the prominent causative factor. *Psychiatr. Res.* 290, 113145.
- Duan, L., Zhu, G., 2020. Psychological interventions for people affected by the COVID-19 epidemic. *Lancet Psych.* 7 (4), 300–302.
- Fiorillo, A., Gorwood, P., 2020. The consequences of the COVID-19 pandemic on mental health and implications for clinical practice. *Eur. Psychiatr.* 63 (1), 1–4.
- Fornell, C., Larcker, D.F., 1981. Evaluating structural equation models with unobservable variables and measurement error. *J. Market. Res.* 18 (1), 39–50.
- Ge, L., Yap, C.W., Ong, R., Heng, B.H., 2017. Social isolation, loneliness and their relationships with depressive symptoms: a population-based study. *PLoS One* 12 (8), e0182145.
- Gerhold, L., 2020. COVID-19: Risk Perception and Coping Strategies. Center for Open Science.
- Gierveld, J.D.J., Tilburg, T.V., 2006. A 6-item scale for overall, emotional, and social loneliness. *Res. Aging* 28 (5), 582–598.
- Gopal, A., Sharma, A.J., Subramanyam, M.A., 2020. Dynamics of psychological responses to COVID-19 in India: a longitudinal study. *PLoS One* 15 (10), e0240650.
- Gopinath, G., 2020. The Great Lockdown: Worst Economic Downturn since the Great Depression. *IMFBlog*. Retrieved from <https://blogs.imf.org/2020/04/14/the-great-lockdown-worst-economic-downturn-since-the-great-depression/>.
- Goulia, P., Mantas, C., Dimitroula, D., Mantis, D., Hyphantis, T., 2010. General hospital staff worries, perceived sufficiency of information and associated psychological distress during the A/H1N1 influenza pandemic. *BMC Infect. Dis.* 10 (1), 322.
- Hair, J.F., Hult, G.T.M., Ringle, C., Sarstedt, M., 2016. *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Sage Publications, USA.
- Hair, J.F., Risher, J.J., Sarstedt, M., Ringle, C.M., 2019. When to use and how to report the results of PLS-SEM. *Eur. Bus. Rev.* 31 (1), 2–24.
- Hamouche, S., 2020. COVID-19 and employees' mental health: stressors, moderators and agenda for organizational actions. *Emerald Open Res.* 2 (15), 15.

- Hawley, L.C., Cacioppo, J.T., 2010. Loneliness matters: a theoretical and empirical review of consequences and mechanisms. *Ann. Behav. Med.* 40 (2), 218–227.
- Hirschhorn, L., 2020. Pandemic Lockdown Must Fail: Save Lives without Crippling the Economy. Jefferson Digital Commons, Thomas Jefferson University, Philadelphia, Pennsylvania.
- Ho, C.S., Chee, C.Y., Ho, R.C., 2020a. Mental health strategies to combat the psychological impact of COVID-19 beyond paranoia and panic. *Ann. Acad. Med. Singapore* 49 (1), 1–3.
- Ho, C.S., Lim, L.J., Lim, A., Chan, N.H., Tan, R., Lee, S., Ho, R., 2020b. Diagnostic and predictive applications of functional near-infrared spectroscopy for major depressive disorder: a systematic review. *Front. Psychiatr.* 11, 378.
- Holmes, E.A., O'Connor, R.C., Perry, V.H., Tracey, I., Wessely, S., Arseneault, L., Bullmore, E., 2020. Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. *Lancet Psych.* 1–14.
- Hossain, M.M., Sultana, A., Purohit, N., 2020. Mental health outcomes of quarantine and isolation for infection prevention: a systematic umbrella review of the global evidence. *SSRN Elect. J.*
- Hughes, M.E., Waite, L.J., Hawley, L.C., Cacioppo, J.T., 2004. A short scale for measuring loneliness in large surveys: results from two population-based studies. *Res. Aging* 26 (6), 655–672.
- Human Development Reports, 2019. Retrieved from. <http://hdr.undp.org/en/content/latest-human-development-index-ranking>.
- Husain, S.F., Yu, R., Tang, T.-B., Tam, W.W., Tran, B., Quek, T.T., Ho, R.C., 2020. Validating a functional near-infrared spectroscopy diagnostic paradigm for Major Depressive Disorder. *Sci. Rep.* 10 (1), 1–9.
- Islam, M.S., Rahman, M.E., Moonajilin, M.S., Griffiths, M.D., 2020a. Validation and evaluation of the psychometric properties of bangla nine-item internet disorder scale—short form. *J. Addict. Dis.* 38 (4), 540–549.
- Islam, S.D.-U., Bodrud-Doza, M., Khan, R.M., Haque, M.A., Mamun, M.A., 2020b. Exploring COVID-19 stress and its factors in Bangladesh: a perception-based study. *Heliyon* 6 (7), e04399.
- Jacobs, J., Taylor, M., Agho, K., Stevens, G., Barr, M., Raphael, B., 2010. Factors associated with increased risk perception of pandemic influenza in Australia. *Infl. Res. Treat.* 2010, 1–7.
- Kessler, R.C., Andrews, G., Colpe, L.J., Hiripi, E., Mroczek, D.K., Normand, S.-L., Zaslavsky, A.M., 2002. Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychol. Med.* 32 (6), 959–976.
- Kessler, R.C., Barker, P.R., Colpe, L.J., Epstein, J.F., Gfroerer, J.C., Hiripi, E., Walters, E.E., 2003. Screening for serious mental illness in the general population. *Arch. Gen. Psychiatr.* 60 (2), 184–189.
- Khan, A.A., Lodhi, F.S., Rabbani, U., Ahmed, Z., Abrar, S., Arshad, S., Khan, M.I., 2020. Impact of coronavirus disease (COVID-19) pandemic on psychological well-being of the Pakistani general population. *Front. Psychiatr.* 11.
- Kleijberg, M., Ahlberg, B.M., Macdonald, A., Lindqvist, O., Tishelman, C., 2019. Navigating power dynamics in engaging communities in end-of-life issues—Lessons learned from developing community-based intergenerational arts initiatives about death and loss. *Death Stud.* 1–14.
- Le, H.T., Lai, A.J.X., Sun, J., Hoang, M.T., Vu, L.G., Pham, H.Q., Le, X.T.T., 2020a. Anxiety and depression among people under the nationwide partial lockdown of Vietnam. *Front. Public Health* 8, 656.
- Le, X.T.T., Dang, K.A., Toweh, J., Nguyen, Q.N., Le, H.T., Toan, D.T.T., Ta, N.K.T., 2020b. Evaluating the psychological impacts related to COVID-19 of Vietnamese people under the first Nationwide partial lockdown in Vietnam. *Front. Psychiatr.* 11, 824.
- Leigh-Hunt, N., Baguley, D., Bash, K., Turner, V., Turnbull, S., Valtorta, N., Caan, W., 2017. An overview of systematic reviews on the public health consequences of social isolation and loneliness. *Publ. Health* 152, 157–171.
- Lewis-Beck, M., Bryman, A.E., Liao, T.F., 2004. *The Sage Encyclopedia of Social Science Research Methods*, 3. Sage Publications, USA.
- Li, L.Z., Wang, S., 2020. Prevalence and predictors of general psychiatric disorders and loneliness during COVID-19 in the United Kingdom. *Psychiatr. Res.* 291, 113267.
- Lim, G.Y., Tam, W.W., Lu, Y., Ho, C.S., Zhang, M.W., Ho, R.C., 2018. Prevalence of depression in the community from 30 countries between 1994 and 2014. *Sci. Rep.* 8 (1), 1–10.
- Limcaoco, R.S.G., Mateos, E.M., Fernandez, J.M., Roncero, C., 2020. Anxiety, Worry and Perceived Stress in the World Due to the COVID-19 Pandemic, March 2020. Preliminary Results. *medRxiv*.
- Loades, M.E., Chatburn, E., Higon-Sweeney, N., Reynolds, S., Shafan, R., Brigden, A., Crawley, E., 2020. Rapid systematic review: the impact of social isolation and loneliness on the mental health of children and adolescents in the context of COVID-19. *J. Am. Acad. Child Adolesc. Psychiatry* 59 (11), 1218–1239 e1213.
- Luchetti, M., Lee, J.H., Aschwanden, D., Sesker, A., Strickhouser, J.E., Terracciano, A., Sutin, A.R., 2020. The trajectory of loneliness in response to COVID-19. *Am. Psychol.* 75 (7), 897–908.
- Luo, Y., Chua, C.R., Xiong, Z., Ho, R.C., Ho, C.S., 2020. A systematic review of the impact of viral respiratory epidemics on mental health: an implication on the coronavirus disease 2019 pandemic. *Front. Psychiatr.* 11.
- Mahase, E., 2020. Covid-19: mental health consequences of pandemic need urgent research, paper advises. *Br. Med. J.*, m1515.
- Mamun, M.A., Akter, T., Zohra, F., Sakib, N., Bhuiyan, A.I., Banik, P.C., Muhi, M., 2020. Prevalence and risk factors of COVID-19 suicidal behavior in Bangladesh population: are healthcare professionals at greater risk? *Heliyon* 6 (10), e05259.
- Matthews, T., Danese, A., Wertz, J., Odgers, C.L., Ambler, A., Moffitt, T.E., Arseneault, L., 2016. Social isolation, loneliness and depression in young adulthood: a behavioural genetic analysis. *Soc. Psychiatr. Psychiatr. Epidemiol.* 51 (3), 339–348.
- Meredith, L.S., Eisenman, D.P., Tanielian, T., Taylor, S.L., Basurto-Davila, R., Zazzali, J., Shields, S., 2011. Prioritizing “psychological” consequences for disaster preparedness and response: a framework for addressing the emotional, behavioral, and cognitive effects of patient surge in large-scale disasters. *Disaster Med. Public Health Prep.* 5 (1), 73–80.
- Mewton, L., Kessler, R.C., Slade, T., Hobbs, M.J., Brownhill, L., Birrell, L., Chapman, C., 2016. The psychometric properties of the Kessler Psychological Distress Scale (K6) in a general population sample of adolescents. *Psychol. Assess.* 28 (10), 1232.
- Mirowsky, J., Ross, C.E., 2003. *Social Causes of Psychological Distress*, second ed. Aldine De Gruyter, Hawthorne, New York.
- Moccia, L., Janiri, D., Pepe, M., Dattoli, L., Molinaro, M., De Martin, V., Di Nicola, M., 2020. Affective temperament, attachment style, and the psychological impact of the COVID-19 outbreak: an early report on the Italian general population. *Brain Behav. Immun.*
- Pallant, J., 2013. *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using SPSS*, fifth ed. McGraw-Hill, New York, USA.
- Park, C., Majeed, A., Gill, H., Tamura, J., Ho, R.C., Mansur, R.B., Wong, E., 2020. The effect of loneliness on distinct health outcomes: a comprehensive review and meta-analysis. *Psychiatr. Res.* 1–13.
- Patabendige, M., Gamage, M.M., Weerasinghe, M., Jayawardane, A., 2020. Psychological impact of the COVID-19 pandemic among pregnant women in Sri Lanka. *Int. J. Gynecol. Obstet.* 151 (1), 150–153.
- Poudel, K., Subedi, P., 2020. Impact of COVID-19 pandemic on socioeconomic and mental health aspects in Nepal. *Int. J. Soc. Psychiatr.* 66 (8), 748–755.
- Prawitz, A., Garman, E.T., Sorhaindo, B., O'Neill, B., Kim, J., Drentea, P., 2006. In Charge financial distress/financial well-being scale: development, administration, and score interpretation. *J. Finan. Counsel. Plan.* 17 (1), 34–50.
- Ramachandran, S., 2020. The COVID-19 Catastrophe in Bangladesh: the Virus Risks Plunging Bangladesh into Social, Economic, and Political Turmoil — Not to Mention the Public Health Crisis. *The Diplomat*. Retrieved from. <https://thediplomat.com/2020/04/the-covid-19-catastrophe-in-bangladesh/>.
- Rehman, U., Shahnaawaz, M.G., Khan, N.H., Kharshing, K.D., Khursheed, M., Gupta, K., Uniyar, R., 2020. Depression, anxiety and stress among Indians in times of Covid-19 lockdown. *Community Ment. Health J.* 1–7.
- Ripon, R.K., Mim, S.S., Puente, A.E., Hossain, S., Babor, M.M.H., Sohan, S.A., Islam, N., 2020. COVID-19: psychological effects on a COVID-19 quarantined population in Bangladesh. *Heliyon* 6 (11), e05481.
- Roy, D., Tripathy, S., Kar, S.K., Sharma, N., Verma, S.K., Kaushal, V., 2020. Study of knowledge, attitude, anxiety & perceived mental healthcare need in Indian population during COVID-19 pandemic. *Asian J. Psychol.* 51, 102083.
- Saleh, A., 2020. Bangladesh, COVID-19 Threatens to Cause a Humanitarian Crisis. Retrieved from. <https://www.weforum.org/agenda/2020/04/in-bangladesh-covid-19-could-cause-a-humanitarian-crisis/>.
- Serafini, G., Parmigiani, B., Amerio, A., Aguglia, A., Sher, L., Amore, M., 2020. The psychological impact of COVID-19 on the mental health in the general population. *QJM: Int. J. Med.* 113 (8), 531–537.
- Sher, L., 2020. The impact of the COVID-19 pandemic on suicide rates. *QJM: Int. J. Med.* 113 (10), 707–712.
- Simione, L., Gnagnarella, C., 2020. Differences between Health Workers and General Population in Risk Perception, Behaviors, and Psychological Distress Related to COVID-19 Spread in Italy. Center for Open Science.
- Singh, J., Singh, J., 2020. COVID-19 and its impact on society. *Elec. Res. J. Soc. Sci. Human.* 2 (1), 168–172.
- Soh, H.L., Ho, R.C., Ho, C.S., Tam, W.W., 2020. Efficacy of digital cognitive behavioural therapy for insomnia: a meta-analysis of randomised controlled trials. *Sleep Med.* 75, 315–325.
- Sood, S., 2020. Psychological effects of the Coronavirus disease-2019 pandemic. *Res. Human. Med. Educ.* 7, 23–26.
- Sritharan, J., Sritharan, A., 2020. Emerging mental health issues from the novel Coronavirus (COVID-19) pandemic. *J. Health Med. Sci.* 3 (2).
- Sunderland, M., Mahoney, A., Andrews, G., 2012. Investigating the factor structure of the Kessler Psychological Distress Scale in community and clinical samples of the Australian population. *J. Psychopathol. Behav. Assess.* 34 (2), 253–259.
- Tee, M.L., Tee, C.A., Anlacan, J.P., Aligam, K.J.G., Reyes, P.W.C., Kuruchittham, V., Ho, R.C., 2020. Psychological impact of COVID-19 pandemic in the Philippines. *J. Affect. Disord.* 277, 379–391.
- Tembon, M., 2019. A Larger Health Budget Essential. *The Financial Express*. Retrieved from. <https://thefinancialexpress.com.bd/views/a-larger-health-budget-essential-1576075637>.
- Thurackal, B.J., Chith, E.N., Mascarenhas, P., 2020. The outbreak of novel coronavirus in India: psychological impact. Available at SSRN 3562062.
- US Department of State, 2019. 2019 Report on International Religious Freedom: Bangladesh. Retrieved from. <https://www.state.gov/reports/2019-report-on-international-religious-freedom/bangladesh/>.
- Wang, C., Chudzicka-Czupala, A., Grabowski, D., Pan, R., Adamus, K., Wan, X., Xu, L., 2020a. The association between physical and mental health and face mask use during the COVID-19 pandemic: a comparison of two countries with different views and practices. *Front. Psychiatr.* 11, 901.
- Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C.S., Ho, R.C., 2020b. Immediate psychological responses and associated factors during the initial stage of the 2019 Coronavirus disease (COVID-19) epidemic among the general population in China. *Int. J. Environ. Res. Publ. Health* 17 (5), 1729.
- Weber, E.U., Blais, A.R., Betz, N.E., 2002. A domain-specific risk-attitude scale: measuring risk perceptions and risk behaviors. *J. Behav. Decis. Making* 15 (4), 263–290.
- Weiss, R.S., 1973. *Loneliness: the Experience of Emotional and Social Isolation*. MIT Press, Cambridge, MA.
- World Bank, 2019. Data for Bangladesh, Lower Middle Income. Retrieved from. <https://data.worldbank.org/?locations=BD-XN>.

- World Health Organization, 2020a. Coronavirus (COVID-19). Retrieved from. <https://covid19.who.int/>.
- World Health Organization, 2020b. Coronavirus Disease (COVID-2019) Bangladesh Situation Reports. Situation Report-57. Retrieved from. [https://www.who.int/bangladesh/emergencies/coronavirus-disease-\(covid-19\)-update/coronavirus-disease-\(covid-2019\)-bangladesh-situation-reports](https://www.who.int/bangladesh/emergencies/coronavirus-disease-(covid-19)-update/coronavirus-disease-(covid-2019)-bangladesh-situation-reports).
- Wu, C.-h., Yao, G., 2008. Psychometric analysis of the short-form UCLA Loneliness Scale (ULS-8) in Taiwanese undergraduate students. *Pers. Individ. Differ.* 44 (8), 1762–1771.
- Xiong, J., Lipsitz, O., Nasri, F., Lui, L.M.W., Gill, H., Phan, L., McIntyre, R.S., 2020. Impact of COVID-19 pandemic on mental health in the general population: a systematic review. *J. Affect. Disord.* 277, 55–64.
- Zhang, J., Lu, H., Zeng, H., Zhang, S., Du, Q., Jiang, T., Du, B., 2020. The differential psychological distress of populations affected by the COVID-19 pandemic. *Brain Behav. Immun.*
- Zhang, M., Ho, R., 2017. Moodle: the cost effective solution for internet cognitive behavioral therapy (I-CBT) interventions. *Technology and Health Care. Off. J. Eur. Soc. Eng. Med.* 25 (1), 163–165.
- Zheng, M.X., Yao, J., Narayanan, J., 2020. Mindfulness Buffers the Impact of COVID-19 Outbreak Information on Sleep Duration. Center for Open Science.
- Zhu, Z., Xu, S., Wang, H., Liu, Z., Wu, J., Li, G., Sun, W., 2020. COVID-19 in Wuhan: Immediate Psychological Impact on 5062 Health Workers. medRxiv.
- Zubayer, A.A., Rahman, M.E., Islam, M.B., Babu, S.Z.D., Rahman, Q.M., Bhuiyan, M.R.A.M., Habib, R.B., 2020. Psychological states of Bangladeshi people four months after the COVID-19 pandemic: an online survey. *Heliyon* 6 (9), e05057.