Long-term Impact of COVID-19: Psychological Disturbances and Cognitive Functioning of Recovered Professionals in Dhaka

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Hospitalization or home isolation may have an acute effect on the mental health and cognitive functioning of COVID-19 recovered professionals, but there is a lack of studies in this regard. This cross-sectional study examined the possible psychological disturbances and impairment in cognitive functioning among COVID-19 recovered professionals in Bangladesh. A total of 118 COVID-19 recovered professionals participated in an online survey, in which they completed a questionnaire including personal and pandemic-specific questions, as well as measures of psychological disturbances and cognitive failure. Results revealed that only one-fifth of professionals experienced psychological disturbances, but half of the people had severe impairment in cognitive functioning. The low rate of psychological distress may reflect the resilience of Bangladeshi people due to our collectivistic society. In contrast, the relatively high prevalence of subjective cognitive impairment would imply that prolonged quarantine/self-isolation was at least partially responsible for a perception of reduced cognitive efficiency. The findings, however, highlight the importance of developing intervention programs to improve the psychological well-being and cognitive functioning of professionals during pandemics.

Keywords: pandemic, COVID-19, psychological disturbances, cognitive functioning, professionals

The coronavirus disease 2019 (COVID-19) was first detected in China in December 2019. Since then, more than 762,201,169 people have been infected, and over 6,893,190 people have died worldwide (World health organization-WHO, 2023). COVID-19 has put the global public health system in danger for three decades.

There is increasing evidence that many people who have recovered from the acute, life-threatening effects of COVID-19, still experience broad psychological and cognitive deficits, known as "COVID-19 brain fog". Research across countries (such as the USA, Itlay, and China) showed a relatively high frequency of cognitive and psychological impairment as a long-term consequence of COVID-19 (Becker et al., 2021; Poletti et al., 2021). For example, more than half of the COVID-19 recovered people in China had severe or moderate psychological problems such as depression, anxiety, or life stress (e.g., Liu et al., 2020; Wang et al., 2020). In a cross-cultural study, Rogers et al. (2020) found that recovered people had at least some degree of confusion (27.9%), depressive mood (32.6%), anxiety (35.7%), impaired memory (34.1%), or insomnia (41.9%) problems. In Bangladesh, Das et al. (2021) showed that during COVID-19, a significant proportion of general people suffered from various mental health problems (e.g., 71% from loneliness, 38% from depression, 64% from anxiety, and 73% from sleep disturbance). Even among adult people, 33.7%, 57.9%, and 59.7% of people reported anxiety, depressive, and stress symptoms, respectively (Banna et al., 2020). The COVID-19 positive patients are typically kept in solitary confinement or

assigned to a hospital bed in isolation, which results in a high prevalence of psychological and cognitive disturbances (Wang et al., 2020). These symptoms may significantly impact the quality of life. The neuro-anatomical studies also corroborated that COVID-19 can inflame the brain and alter the brain cells' activity, which results in COVID-19 brain fog (Fernández-Castañeda et al., 2022).

To date, most of the research on COVID-19 has been carried out in Bangladesh immediately following the lockdown (stay-at-home order) (e.g., period April 1 to 30, 2020 in Abir et al., 2021; April 29 to May 7, 2020 in Banna et al., 2020; July 15 to September 20, 2020 in Repon et al., 2021) with diverse people to see the impact of the COVID-19 pandemic on psychological disturbances (such as general people: Das et al., 2021; healthcare workers: Repon et al., 2021; adult population: Banna et al., 2020; adolescence: Himi et al., 2022). There is limited information on the long-term effects of COVID-19 recovered professionals (i.e., university faculties, bankers, and defense officers). Many professionals in Bangladesh have already recovered from COVID-19, and almost all may have faced numerous challenges during treatment and even after recovery, but such research has yet to be conducted in Bangladesh. Therefore, we addressed the following research questions in the present study:

1. Do the COVID-19 recovered professionals have psychological problems (such as somatic symptoms, anxiety and insomnia, social dysfunction, and severe depression)?

2. Do the recovered professionals experience cognitive impairment?

3. Are demographics and COVID-19 experiences related to psychological disturbances and cognitive functioning of recovered professionals?

Method

Participants

A total of 118 COVID-19 recovered professionals (i.e., university faculties, bankers, and defense officers) were selected from different organizations in Dhaka. They all met the inclusion criteria: (a) testing negative for COVID-19 at least twice; (b) having access to a computer with an internet connection; (c) having no previous or current mental, neurological, or physical illnesses. The percentages of the demographic variables of participants are presented in Table 1.

The present study was run following the Helsinki Declaration ethical code. Participants faced no potential risks in terms of physical, psychological, social, or legal. They were asked to provide their consent to participate with necessary debriefing (i.e., nature and objectives of the study, right to refusal or withdrawal from participation) in Google form before starting the main data collection form. Confidentiality of data was assured. There was no financial benefit for participation in the study. The data collection started in September 2021 and ended in November 2021.

Table 1
Personal Characteristics of the Participants

Variables	Category	Participants (*N* = 118)	
		N	*%*
Gender	Male	80	67.8
	Female	38	32.2
Age	18-35 years	74	62.7
	36-55 years	44	37.3
Marital Status	Unmarried	46	39.0
	Married	72	61.0
Education	S.S.C to H.S.C.	20	16.9
	Undergraduate to graduation	78	66.2
	Higher than graduation	20	16.9
Monthly Income	20,000 to 40,000tk	67	56.8
	40,001 to 60,000tk	25	21.2
	More than 60,000tk	26	22.0
Organization Type	Non-government	68	57.6
	Government	38	32.2
	International	12	10.2
Job Type	Part-time	12	10.2
	Full-time	106	89.8

Materials

Socio-demographic information

The online survey included participants' age, gender, educational qualification, marital status, job profile, and job pattern before and during the COVID-19 pandemic, COVID-19 infection and treatment-related information about participants and their family or close persons, and lifestyles after recovering from COVID-19.

Adapted Bangla version of General Health Questionnaire (GHQ-28; Banoo, 2001)

The General Health Questionnaire (GHQ-28), originally developed by Goldberg and Williams (1988) includes 28 items. It is used for assessing psychological disturbances in terms of a full-scale score as well as scores on four subscales each containing 7 items. The subscales are somatic symptoms, anxiety and insomnia, social dysfunction, and severe depression. For each subscale, scores between 0 and 6 are regarded as low, 7 to 13 as moderate, and 14 to 21 as severe. A score of less than 39 is regarded as not having a significant level of psychiatric instability, while a score of 39 or above is considered as having a considerable level of psychiatric instability. The maximum GHQ-28 score is 84.

Adapted Bangla version of Cognitive Failure Questionnaire (CFQ-25; Uddin, 2017)

The CFQ-25 (originally developed by Broadbent et al., 1982) is a self-report questionnaire consisting of 25 items that assesses cognitive deficits in perception ("Do you fail to see what you want in a supermarket (although it's there)?"), memory ("Do you find you forget appointments?"), and motor function. Each of the items asks about cognitive errors in

daily life and participants are instructed to indicate the frequency of his/her errors in the last six months. The response option is a 5-point scale, ranging from 0 (never) to 4 (very often). All items are worded in the same direction, i.e., no reverse scoring. The total scale ranges from 0 to 100 points, in which higher scores indicate poorer everyday memory or more subjective cognitive failure. To assess problems in cognitive functioning, a score of > 32 is used as a cut-off value (Boyce-van der Wal et al., 2015). However, no specific factor structure of the CFQ-25 was identified in the original study. For this reason, we used exploratory factor analysis to explore the factor structure in the Bangladeshi sample. A principal axis factoring with varimax rotation revealed a four-factor solution, explaining 44% of the variance (Table A1). Factor 1 includes items 16, 12, 3, 24, 4, 5, 18, 10, 19, and 14, which we labeled as 'memory'; Factor 2 includes items 25, 23, 13, 22, 17, 9, and 11, which we recognized as 'distractibility'; Factor 3 includes items 15, 1, 8, and 21, which we recognized as 'failure to trigger'; and Factor 4 comprises items 7, 20, 6, and 2, which we labeled as 'names'.

Procedure

Since face-to-face interviews were not possible due to COVID-19, data were collected through an online-based survey. Through social media, researchers contacted participants and shared the Google Form including personal information and the Bangla version's questionnaires. Before starting to fulfill the main form, an explanatory statement appeared in the beginning part of the Google Form including the research purpose, participant's role, potential risks, and probable benefits. Participants were also given the assurance that their information should be kept confidential and that they could withdraw themselves at any time during data collection. Finally, if they agreed to participate in the survey, they could go to the main data containing sheet and fill-up the form according to instructions. Participants completed this survey from their homes through mobile, tab, or computer.

Data Analysis

We analyzed the frequency and descriptive statistics of the pandemic-specific items. To determine whether demographic variables and the reported COVID-19 experience-related information can affect the psychological disturbances and cognitive functioning of the professionals, a series of independent-sample *t*-tests and *F*-tests were conducted. Cohen's d-effect size measurements (expressed as mean differences) were reported for significant results. Although effect sizes were estimated using the open-source statistical program R (R Development Core Team, 2015) with the "pwr" package (Champely et al., 2020), all analyses were carried out using SPSS version 26. SPSS Amos 24 was used for the latent variable analysis. A Chi-square test ($\chi 2$), the standardized root mean square residual (SRMR), the root mean squared error of approximation (RMSEA), and the comparative fit index (CFI) were used to evaluate the global goodness-of-fit for the confirmatory factor analysis. As an indication of adequate model fit, values of SRMR $\leq$ .08, RMSEA $\leq$ .06, and CFI > .95 were considered (Hu & Bentler, 1999).

Results

Descriptive statistics and reliability estimate of all measures are displayed in Table 2. All measures were roughly normally distributed (skewness < 3 and kurtosis < 10; Kline, 2005). Further, the Shapiro-Wilk and Kolmogorov-Smirnov's test showed no significant *p*-value, deeming approximately normally distributed data. The reliability estimates of the measures were acceptable.

Table 2
Mean, Standard Deviation, and Reliability (Cronbach's Alpha) of the Measures

Measures	*Mean*	*SD*	Skewness	Kurtosis	Reliability
GHQ-28	28.58	12.13	0.38	-0.34	.91
Somatic symptoms	7.63	3.70	0.21	-0.26	.78
Anxiety and insomnia	6.93	4.70	0.20	-0.83	.86
Social dysfunction	9.54	3.00	0.41	0.29	.77
Severe Depression	4.48	3.49	0.64	0.01	.75
CFQ-25	36.48	21.47	0.44	-0.55	.96
Memory	12.45	9.16	0.65	-0.56	.92
Distractibility	11.03	6.72	0.37	-0.59	.90
Failure to trigger	6.87	3.66	0.19	-0.86	.81
Names	6.13	4.17	0.40	-0.84	.86

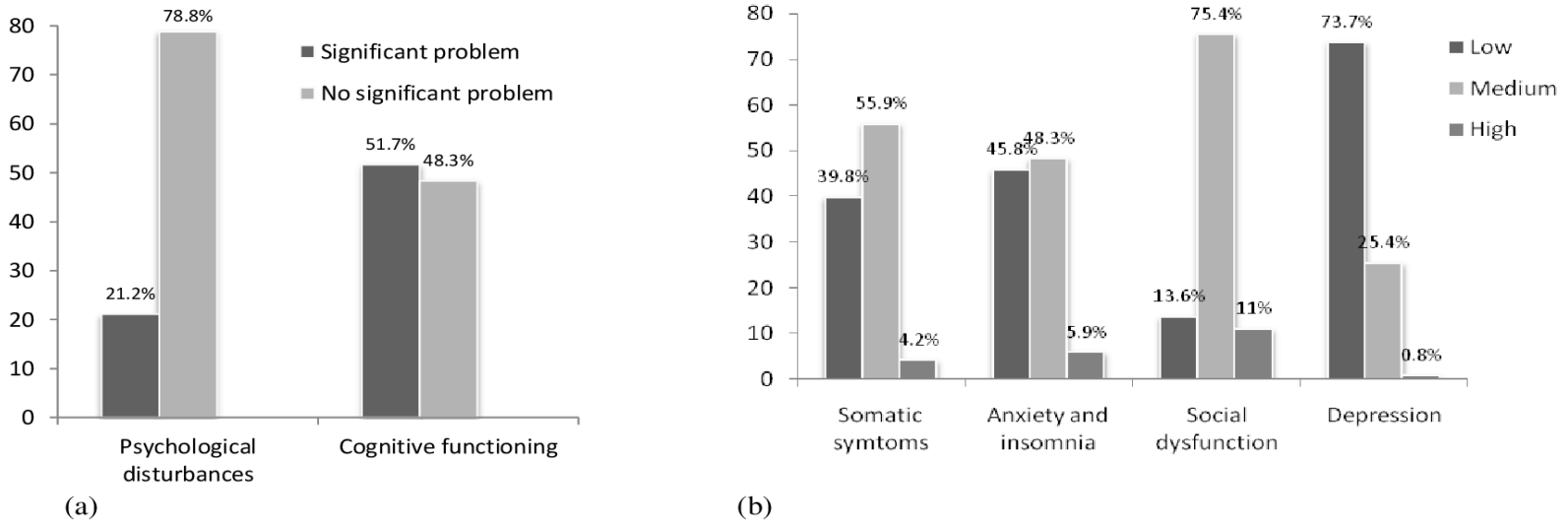
Note. Reliability is estimated using Cronbach alpha.

Effects of COVID-19 on Recovered Professionals

We assessed psychological disturbances and cognitive functioning of the COVID-19 recovered professionals. Using the cutoff values, ~21% of individuals had significant psychological disturbances, and ~52% of them had significant problems in cognitive functioning (Figure 1a). Results further revealed that COVID-19 recovered professionals mostly had medium levels of somatic symptoms (55.9%), anxiety and insomnia (48.3%), but higher levels of social dysfunction (75.4%), and depression (73.7%; Figure 1b).

Pandemic-specific Measurement

The COVID-19 experience-related information (such as job patterns in the pandemic, work pressure during the pandemic, infected family members/ closest, death of family members/closest, and fear of COVID-19) was also collected through interviewing the professionals (Table 3). Results showed that most of the professionals worked from both home and the office during COVID-19, but experienced high work pressure. After recovery from COVID, they experienced that compared to earlier, they needed more time to complete the same amount of work density. Results further showed that many of them were afraid of COVID-19, and therefore avoided seeing COVID-19 related news. They also reported that as much as their relatives were affected, the death rate was not that high.



Note. (a) Using the suggested cut-off for significant problems in psychological disturbances (GHQ-28) and cognitive functioning (CFQ-25) defined as scores > 39 and > 32, respectively. (b) Using suggested severity scores ranging 0 to 6 defined as low, 7 to 13 as moderate, and 14 to 21 in the psychological disturbances (GHQ-28).

Figure 1

Presence of Psychological Disturbance and Cognitive Failure Outcome among COVID-19 Recovered Professionals (in Percentage)

Table 3

COVID-19 Experience-related Variables of Participants

Characteristics	Participants (*N* = 118)			
	n	*%*	*M*	*SD*
Job pattern in pandemic				
Fully home-based work	25	21.2		
Both home and office-based work	49	41.5		
Fully office-based work	44	37.3		
Work pressure in pandemic				
Less than before COVID-19	31	26.3		
Same as before COVID-19	35	29.6		
More than before COVID-19	52	44.1		
Infected family members				
Yes	70	59.3		
No	48	40.7		
Death of family members				
Yes	14	11.9		
No	104	88.1		
Infected others closest				
Yes	96	81.4		
No	22	18.6		
Death of others closest				
Yes	51	43.2		
No	67	56.8		
Fear in COVID-19				
No fear	29	24.6		
Medium fear	66	55.9		
High fear	23	19.5		
Spending time on COVID-19 news				
Not at all	63	53.4		
Less than half an hour	40	33.9		
More than half an hour	15	12.7		
Working times after recovered				
less time needed	04	03.4		
same time needed	52	44.1		
more time needed	62	52.5		
Duration from COVID-19 positive to assessment (month)			06.33	5.85
Recovered duration (day)			18.82	8.69
Attentiveness before COVID-19 positive (hour)			07.46	2.82
Attentiveness after COVID-19 positive (hour)			06.23	3.00

Note. M = mean; *SD* = standard deviation.

Factors Affecting Psychological Disturbances and Cognitive Functioning

In addition, it was examined whether demographic variables and the reported COVID-19 experience-related information can affect the psychological disturbances and cognitive functioning of the professionals. The findings are presented Table 4 and 5. Table 4 indicates that there was a significant difference in cognitive functioning due to the variation of professionals' age groups, in which high cognitive performance deficiency was observed in the age group of 36−55 years ($\bar{X}$ = 30.95). Besides, both psychological disturbances and cognitive functioning were significantly varied due to the variation of the marital status of COVID-19 recovered professionals. The unmarried professionals experienced more psychological distress ($\bar{X}$ = 31.47) and cognitive impairment ($\bar{X}$ = 47.09) than the married professionals ($\bar{X}$ = 26.75; $\bar{X}$ = 29.69, respectively). However, no significant difference between individuals having and not having infected/dead family members/closest in psychological disturbances and cognitive functioning were found.

The results reported in Table 5 indicated that there were significant differences in psychological disturbances due to the different job patterns during the pandemic, spending time seeing pandemic-related news, and working times after recovering from COVID-19. Moreover, there were also significant differences in cognitive functioning due to the variation in educational qualification and working times after recovering from COVID-19.

Table 4
Using *t*-test Showing Differences in the Major Variables across Psychological Disturbances and Cognitive Functioning

Variables	**Psychological Disturbances**							**Cognitive Functioning**						
					t	*df*	*d*					*t*	*df*	*d*
Gender	**Male**		**Female**					**Male**		**Female**				
	M	*SD*	*M*	*SD*				*M*	*SD*	*M*	*SD*			
	27.51	12.02	30.82	12.19	1.39	116	0.56	35.18	22.14	39.21	19.97	0.95	116	0.56
Age	**18-35 years**		**36-55 years**					**18-35 years**		**36-55 years**				
	M	*SD*	*M*	*SD*				*M*	*SD*	*M*	*SD*			
	28.95	12.06	27.95	12.36	.43	116	0.54	39.76	21.51	30.95	20.47	2.19*	116	0.54
Marital status	**Unmarried**		**Married**					**Unmarried**		**Married**				
	M	*SD*	*M*	*SD*				*M*	*SD*	*M*	*SD*			
	31.43	10.68	26.75	12.70	-2.08*	116	0.53	47.09	19.62	29.69	19.89	-4.66***	116	0.53
Job type	**Part time**		**Full time**					**Par time**		**Full time**				
	M	*SD*	*M*	*SD*				*M*	*SD*	*M*	*SD*			
	28.42	9.61	28.59	12.42	-.05	116	0.86	27.08	16.27	37.54	21.78	-1.61	116	0.86
Infected family members	**Yes**		**No**					**Yes**		**No**				
	M	*SD*	*M*	*SD*				*M*	*SD*	*M*	*SD*			
	29.24	11.67	27.60	12.82	.72	116	0.53	34.47	20.95	39.40	22.09	-1.23	116	0.53
Death family members	**Yes**		**No**					**Yes**		**No**				
	M	*SD*	*M*	*SD*				*M*	*SD*	*M*	*SD*			
	34.07	8.78	27.84	12.35	1.82	116	0.80	34.79	14.17	36.70	22.31	-.44	116	0.80
Infected others closest	**Yes**		**No**					**Yes**		**No**				
	M	*SD*	*M*	*SD*				*M*	*SD*	*M*	*SD*			
	29.28	12.21	25.50	11.53	1.32	116	0.67	36.08	21.81	38.18	20.32	-.41	116	0.67
Death others closest	**Yes**		**No**					**Yes**		**No**				
	M	*SD*	*M*	*SD*				*M*	*SD*	*M*	*SD*			
	28.02	10.78	29.00	13.12	-.43	116	0.53	36.29	20.74	36.61	22.16	-.08	116	0.53

Note. ***$p < .001$, *$p < .05$; *M= Mean, SD= Standard Deviation.*

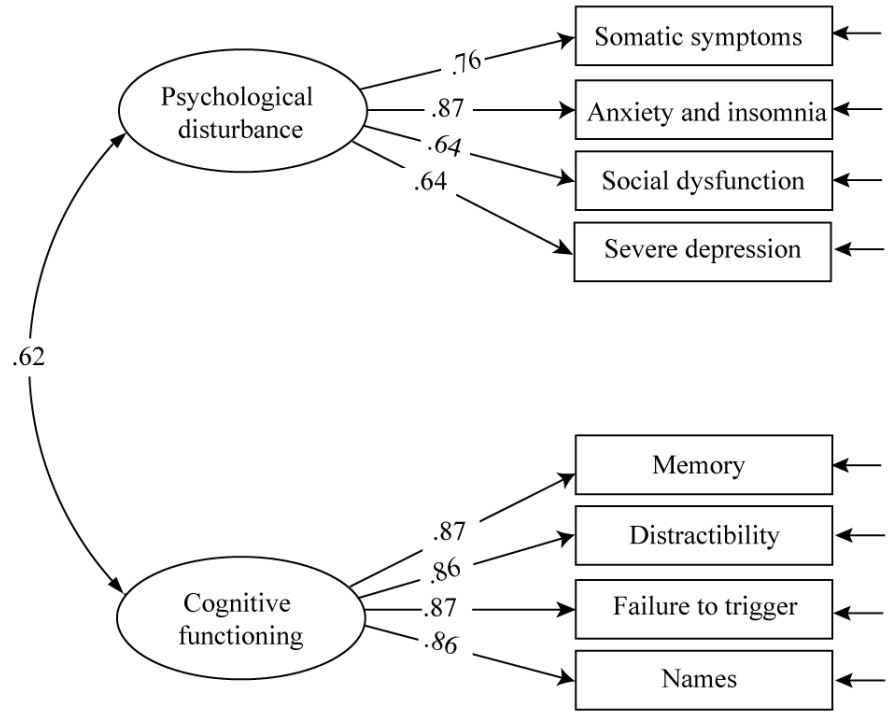
Table 5
Using *F*-test Showing Differences in the Major Variables across Psychological Disturbances and Cognitive Functioning

Variables	Psychological Disturbances								Cognitive Functioning							
							F-ratio	*η2*							*F*-ratio	*η2*
Educational qualification	**S.S.C to H.S.C.**		**Undergraduate to graduation**		**Higher than graduation**				**S.S.C to H.S.C.**		**Under graduation to graduation**		**Higher than graduation**			
	M	*SD*	*M*	*SD*	*M*	*SD*			*M*	*SD*	*M*	*SD*	*M*	*SD*		
	30.45	12.34	28.26	12.28	27.95	11.71	0.29	.005	46.90	23.94	35.83	21.29	28.55	15.66	3.95*	.064
Monthly income	**20,000 to 40,000tk**		**40,001 to 60,000tk**		**More than 60,000tk**				**20,000 to 40,000tk**		**40,001 to 60,000tk**		**More than 60,000tk**			
	M	*SD*	*M*	*SD*	*M*	*SD*			*M*	*SD*	*M*	*SD*	*M*	*SD*		
	27.96	12.18	30.08	12.38	28.73	12.07	0.28	.005	34.70	21.78	43.08	24.31	34.69	16.78	1.52	.026
Organizational type	**Non-government**		**Government**		**International**				**Non-government**		**Government**		**International**			
	M	*SD*	*M*	*SD*	*M*	*SD*			*M*	*SD*	*M*	*SD*	*M*	*SD*		
	29.88	12.35	26.97	11.94	26.25	11.42	0.95	.016	39.96	23.01	30.00	19.14	37.25	14.96	2.71	.045
Job pattern in pandemic	**Fully home-based work**		**Both home and office -based work**		**Fully office-based work**				**Fully home-based work**		**Both home and office-based work**		**Fully office-based work**			
	M	*SD*	*M*	*SD*	*M*	*SD*			*M*	*SD*	*M*	*SD*	*M*	*SD*		
	34.60	9.57	27.51	11.644	26.34	13.05	4.25*	.069	43.12	21.86	32.20	19.55	37.45	22.65	2.26	.038
Work pressure in pandemic	**Less than before COVID-19**		**Same as before COVID-19**		**More than before COVID-19**				**Less than before COVID-19**		**Same as before COVID-19**		**More than before COVID-19**			
	M	*SD*	*M*	*SD*	*M*	*SD*			*M*	*SD*	*M*	*SD*	*M*	*SD*		
	26.52	13.35	29.63	11.53	29.10	11.84	0.62	.011	34.71	22.37	35.89	20.99	37.92	21.57	0.23	.004
Fear in COVID-19	**No fear**		**Medium fear**		**High fear**				**No fear**		**Medium fear**		**High fear**			
	M	*SD*	*M*	*SD*	*M*	*SD*			*M*	*SD*	*M*	*SD*	*M*	*SD*		
	26.90	14.69	29.33	11.10	28.52	11.75	0.40	.007	34.93	19.14	35.92	21.76	40.00	23.844	0.40	.007
Spending time on COVID-19 news	**Not at all**		**Less than half an hour**		**More than half an hour**				**Not at all**		**Less than half an hour**		**More than half an hour**			
	M	*SD*	*M*	*SD*	*M*	*SD*			*M*	*SD*	*M*	*SD*	*M*	*SD*		
	25.19	11.02	33.30	12.60	30.20	11.41	6.12**	.096	33.75	19.22	38.50	24.67	42.53	20.86	1.29	.022
Working times after recovery	**less time needed**		**same time needed**		**more time needed**				**less time needed**		**same time needed**		**more time needed**			
	M	*SD*	*M*	*SD*	*M*	*SD*			*M*	*SD*	*M*	*SD*	*M*	*SD*		
	33.00	11.17	21.62	9.42	34.13	11.30	20.43***	.262	33.00	15.34	29.73	20.01	42.35	21.51	5.31**	.085

Note. ***$p < .001$, **$p < .01$, *$p < .05$.

Relations between Psychological Disturbances and Cognitive Functioning

We further tested the correlated two-factor model (Figure 2) for psychological disturbances and cognitive functioning to see how these two constructs were related. The two-factor model revealed an adequate model fit, χ^2 (19) = 57.210, $p < .001$; CFI = .934; RMSEA = .131; SRMR = .057. Factor loadings of all the indicators onto their respective latent variables were moderate to high (psychological disturbance: $\lambda = .64$ to $\lambda = .87$, cognitive functioning: $\lambda = .86$ to $\lambda = .87$) and significantly different from zero ($p < .01$). Correlation between the latent variables was .62 ($p = .007$), indicating they shared ~38% of the variance.



Note. The factor loadings are standaridized estimates ($p < .05$).

Figure 2
Correlated Factor Model of Psychological Disturbance and Cognitive Functioning

Discussion

This perception-based study attempted to depict the psychological disturbances as well as cognitive functioning among the recovered COVID-19 professionals in Bangladesh. Since the outbreak of the pandemic, the prevalence of mental illness and cognitive functioning–particularly those associated with the coronavirus–has increased all around the world (Mukaetova-Ladinska & Kronenberg, 2021; Salari et al., 2020).

Nevertheless, the average degree of psychological disturbances and cognitive functioning related to COVID-19 in this present sample was below the cut-off values. With ~21% having clinically significant dysfunctional psychological stress and ~52% reporting a cognitive decline, the majority of the professionals expressed medium to little psychological disturbance (Figure 1a). Particularly, most of them had medium levels of somatic symptoms, anxiety and insomnia, and social dysfunction (Figure 1b), which contradicts other previous studies (e.g.,

Tian et al., 2020). These inconsistent results may be explained by the fact that Bangladeshis may not frequently express their mental distress because of their collectivist culture (Haar & Brougham, 2013). On the other hand, the relatively high prevalence of subjective cognitive impairment would imply that prolonged quarantine/self-isolation was at least partially responsible for a perception of reduced cognitive efficiency. A large proportion of the COVID-19 recovered professionals were afraid of the pandemic and avoided seeing COVID-19 related news. In addition, they required more working time after recovery to complete the same amount of work that they did before being infected with COVID-19. Consistent with earlier works, one-third of COVID-19 healed patients exhibit cognitive deficits, namely in attention, working memory, and processing speed (e.g., Rogers et al., 2020; Zhou et al., 2020).

Further, the inferential statistics provided some insights into the psychological disturbances and cognitive failure associated with pandemic-specific measurements. The marital status of COVID-19 recovered professionals, job patterns during the pandemic, and spending time watching pandemic-related news influenced their psychological well-being. Professionals who were married had significantly fewer psychological problems and cognitive dysfunction than those who were single. This situation emerges as a result of their life partner's strong and ardent support, as compared to unmarried or single people. Even after a traumatic incident, a sense of stability and the ability to share emotions with a close one develops (Khatun et al., 2021). Moreover, married people have a lower risk of death than unmarried persons (Lillard & Waite, 1995) because of having healthy mental conditions (Shapiro & Keyes, 2008).

Results also revealed that professionals who spent less than half an hour per day viewing pandemic-related news had more psychological problems than those who spent more than half an hour or even did not spend any time at all. This could be because people are scared when they see COVID-19 related news in a short period due to a lack of information about COVID-19's protective measures. However, those who became accustomed to hearing more news about the pandemic felt less fearful. Further, the post-COVID-19 professionals who worked entirely from home had more psychological issues than those who worked entirely in the office. Again, professionals who had a higher workload after recovery had more psychological issues and cognitive impairments than those who had a lower workload. Because extra-role performance leads to high burnout (Luceo-Moreno et al., 2020), which can worsen over time if the pandemic and associated economic crisis persist (Rodrguez-López et al., 2021; Rubio et al., 2001).

With respect to cognitive functioning, more frequent cognitive deficits were associated with age and lower educational level. The senior COVID-19 affected people's cognitive ability declines after recovery, which is also consistent with previous studies (Devita et al., 2020; Wu & McGoogan, 2020). Moreover, a high level of education is a proxy for cognitive reserve (Santangelo et al., 2021), therefore COVID-19 can not hamper an individual’s cognitive functioning. However, Pistarini et al. (2021) found no significant difference in the cognitive functioning of COVID-19-affected adults with different levels of education.

In addition, past findings explored those psychological disturbances were correlated with cognitive failure. The consequence of COVID-19 negatively affects psychological well-being (Taquet et al., 2021; Vindegaard & Benros, 2020), and prolonged distress can lead to perceived deficits in memory and concentration

(Qureshi et al., 2011). For this reason, the two-factor model (Figure 2) revealed that psychological distress and cognitive impairment were related, which is similar to other studies (Li et al., 2015; Yang & Hendrix, 2018). However, we cannot rule out the possibility that participants' cognitive functioning was impaired before being affected by COVID-19.

The study had some limitations which needed to be addressed. First, it is a cross-sectional study based on current psychological disturbances and cognitive impairment; we have no data regarding participants' mental well-being and cognitive functioning before the outbreak of COVID-19. Second, it was hard to collect data from COVID-19-recovered professionals with face-to-face interaction due to the pandemic situation and unwillingness to give the information.

To this end, while the current study found a relatively low prevalence rate of psychological disturbances and cognitive impairment in COVID-19 recovered professionals, their job pattern and amount of time spent viewing pandemic-related news were risk factors for psychological disturbances, and age and educational qualification was associated with cognitive deficits. Thus, this study suggests that psychosocial interventions, particularly for the problematic group, should be developed to alleviate psychological symptoms as well as the long-term cognitive effects of COVID-19. Professionals generally play important roles in many critical positions around the country, so their difficulties must be considered before taking any unpleasant actions against them.

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Appendix A

Table A1

Factor Loadings for the Exploratory Factor Analysis of the Cognitive Failure Questionnaire Items

Items	Factor			
	1	2	3	4
Item 16: Do you find you forget appointments?	.734			
Item 12: Do you find you forget which way to turn on a road you know well but rarely use?	.674	.400		
Item 3: Do you fail to notice signposts on the road?	.643	.310		.333
Item 24: Do you drop things?	.630	.354		
Item 4: Do you find you confuse right and left when giving directions?	.612		.389	
Item 5: Do you bump into people?	.611	.324		
Item 18: Do you find you accidentally throw away the thing you want and keep what you meant to throw away -- as in the example of throwing away the matchbox and putting the used match in your pocket?	.557			
Item 10: Do you lose your temper and regret it?	.514		.503	
Item 19: Do you daydream when you ought to be listening to something?	.489	.463		
Item 14: Do you find yourself suddenly wondering whether you've used a word correctly?	.424	.324	.400	
Item 25: Do you find you can't think of anything to say?		.729	.351	
Item 23: Do you find you forget what you came to the shops to buy?		.701		
Item 13: Do you fail to see what you want in a supermarket (although it's there)?	.430	.682		
Item 22: Do you find you can't quite remember something although it's "on the tip of your tongue"?		.677	.395	
Item 17: Do you forget where you put something like a newspaper or a book?	.315	.579	.328	
Item 9: Do you fail to hear people speaking to you when you are doing something else?		.533		.360
Item 11: Do you leave important letters unanswered for days?	.403	.519		
Item 15: Do you have trouble making up your mind?		.480	.609	
Item 1: Do you read something and find you haven't been thinking about it and must read it again?			.546	.439
Item 8: Do you say something and realize afterward that it might be taken as insulting?	.502		.534	
Item 21: Do you start doing one thing at home and get distracted into doing something else (unintentionally)?	.379	.420	.466	
Item 7: Do you fail to listen to people's names when you are meeting them?		.537		.668
Item 20: Do you find you forget people's names?		.353		.621
Item 6: Do you find you forget whether you've turned off a light or a fire or locked the door?		.407	.356	.504
Item 2: Do you find you forget why you went from one part of the house to the other?	.416		.405	.491

Note. Values < .30 were excluded; Extraction method: Principal Axis Factoring; Rotation method: Varimax with Kaiser Normalization.