Ilkogretim Online - Elementary Education Online, Year; Vol 20 (Issue 4): pp. 512-528
http://ilkogretim-online.org
doi: 10.17051/ilkonline.2021.04.56

Post-traumatic stress disorder (ptsd) and its relationship to depressive symptoms one month after covid-19 infection in a sample of indonesian society quarantined at home

Dwi Yan Nugraha*, *Department of Psychology, Universitas Negeri Makassar, Indonesia, dwi_nugraha97@yahoo.com*

Helmi Wibowo, *Department of Motor Vehicle Testing, Politeknik Keselamatan Transportasi Jalan, Indonesia, helmi.wibowo@pktj.ac.id*

Fadli, *Department of Nurses Profession, Stikes Muhammadiyah Sidrap, Indonesia, fadlietri@gmail.com*

Reza Yoga Anindita, *Department of Road Transportation Safety Management, Politeknik Keselamatan Transportasi Jalan, Indonesia, reza@pktj.ac.id*

Abstract- When COVID-19 appeared in Indonesia in early March, most residents were quarantined at home in an attempt by the government to prevent the spread of the virus. This study explores PTSD and depression in a sample of Indonesian people quarantined at home and to identify risk factors for psychological stress. Respondents involved in this study were 1,757 people who were investigated through the online questionnaire method using the scale of PTSD Check List-Civilian Version (PCL-C), Patient Health Questionnaire-9 (PHQ-9). Data on sleep duration, exposure, quarantine duration at home, and socio-demographics were also collected. The prevalence of PTSD and depression was obtained by 65.6% and 56.3%. Subjectively, individuals who feel very afraid of being infected and have been exposed to messages from stressful media are significant risk factors for psychological problems, followed by short sleep duration, and the longest quarantine duration at home. Sleep duration and quarantine duration are mediators between exposure to psychopathology. The results of this study indicate that the psychological impact caused by COVID-19 can be a serious problem. Therefore, psychological interventions in reducing fear and increasing sleep duration need to be applied for people in Indonesia who are quarantined at home, and for those who have been exposed to messages from media that are stressful and have extreme fears that must be prioritized.

Keywords: Exposure, psychopathology, sleep duration, home quarantine duration, covid-19

I. INTRODUCTION

About seventeen years after the outbreak of the SARS (acute respiratory syndrome) outbreak in Guangdong province in 2003, another more deadly virus emerged in early 2020 in Wuhan, China, known as coronavirus 2019 (COVID-19). This outbreak spread rapidly to all provinces in China and spread within a few days for various reasons to several countries including Indonesia. The COVID-19 outbreak in Indonesia began on March 2, 2020, when an individual had symptoms then diagnosed (Brahma, 2020). The diagnosis results indicate a positive status, making it the first case in Indonesia (Almuttaqi, 2020). The result has caused many reactions from the general public, including evaluating the readiness of the government in dealing with this problem. Starting with this first case, the community forced the government to form groups to prevent the spread of the COVID-19 outbreak. From early March to April, the number of confirmed cases increased to 5,923, and the number of deaths increased to 520. This situation has caused psychological disorders including anxiety. In dealing with this outbreak, the World Health Organization (WHO) announced that COVID-19 was a pandemic and issued several protocols to support mental and social welfare during the outbreak (Brahma, 2020; WHO, 2020).

The Government of Indonesia has made various efforts to expedite the handling of confirmed COVID-19 cases by forming a task force team to respond to the outbreak declared through Presidential Decree No. R1. 7 of 2020, then issued a revision of the previous decision, contained in No. 9 of 2020. The COVID-19 outbreak handling team took various actions to prevent the spread of the virus which can be accessed on the website www.covid19.go.id. Seeing the number of COVID-19 cases that are always increasing, efforts continue to be made by the Indonesian government such as social distance, requiring people to stay at home and limit direct community contact with other people around them. This policy is intended to slow the spread of the plague.

The COVID-19 virus has become a continuing crisis for every community. The spread of the COVID-19 virus has an impact on the mental health of Indonesian people and can lead to conditions such as post-traumatic stress disorder (PTSD) and depression (Schwartz et al., 2019; Plexousakis et al., 2019; Kopala-Sibley et al., 2016). However, the continuing impact of the spread of the virus on the psychological aspects of individuals is poorly understood (Leppin & Aro, 2009). Then, little information is related to the prevalence and risk factors for mental health problems when faced with stressors (COVID-19 outbreaks). Similar research shows that during the SARS virus pandemic in 2003, there were groups of individuals ranging from the general public to health workers showing different psychological problems such as PTSD and depression (Chen et al., 2006), fear and anxiety (Mihashi et al., 2009; Loh et al., 2005). Other findings also indicate that the SARS virus can cause psychological effects on student samples such as stress (Main et al., 2011), PTSD, and Depression (Tang et al., 2020). However, until now there has been no research on the psychological effects of the COVID-19 virus in the general population. It is also hoped that the need for psychological intervention will greatly assist in increasing and encouraging prompt and urgent research on the psychological impact caused by the virus (Duan & Zhu, 2020). Lack of data available from previous studies, resulting in very limited information obtained, so more research is needed to understand the psychological impact of the spread of the COVID-19 virus.

The psychological impact of the recent spread of COVID-19 is public health problems. In contrast to stressors in everyday life (Liu et al., 2020; Zhang et al., 2020; Qian et al., 2020; Duan & Zhu, 2020), because infections from the COVID-19 virus can spread rapidly and cause fatal risk for sufferers, then this becomes an uncontrollable stressor. Therefore, given the current global concern over the COVID-19 outbreak, research on the prevalence and risk factors for mental health problems can help psychologists to prevent and manage the psychological effects arising from the COVID-19 pandemic in the general population.

During the spread of the SARS outbreak in 2003, it was found that many people suffered from sleep deprivation and experienced short sleep duration due to anxiety and depression symptoms experienced (Johal, 2009; Chen et al., 2006). Based on this, researchers assume that higher exposure will cause sleep deprivation, thereby increasing the risk of mental illness. Therefore, it is necessary to understand the possible relationship between the COVID-19 pandemic, the duration of sleep, and the underlying mental illness in the general population. Many people chose to be alone in their homes when the COVID-19 outbreak was declared by the Indonesian government. However, based on research conducted by Reynolds et al. (2008) relating to the SARS pandemic, it was found that the longer the community was isolated, the higher the possibility of psychological pressure they experienced. Therefore, it is necessary to explore the influence between the time spent in home quarantine and mental illness to understand the effects of the COVID-19 outbreak on the psychological individual. Such research will increase knowledge about the psychological adjustment mechanisms needed to ensure public welfare. This study has five main objectives: 1) to see the level of COVID-19 pandemic exposure in predicting PTSD and depression, 2) to see longer quarantine times at home in predicting PTSD and depression, 3) to see shorter sleep duration times in predicting PTSD and depression, 4) to see the effect of sleep duration in mediating the effect between the amount of exposure and psychopathology, and 5) to see the quarantine effect at home in mediating the effect between the amount of exposure and psychopathology.

II. METHOD

Design and Respondents

This study uses a cross-sectional survey design consisting of a series of web-based self-report surveys for people in Indonesia. The sampling technique used was simple random sampling, which focused on the general public who had been infected with COVID-19 and had been quarantined at home for one month. The number of respondents who participated in this study was 1,757 Indonesians.

Procedure

The survey can be accessed on the website that was made by researchers and carried out from March 20 to April 27. Before the respondent worked on the survey, detailed information related to this study was explained to all respondents, who then gave their approval by signing the first page of the survey. All surveys are anonymous, but because this data will be used again in the future, all respondents are asked to provide their telephone numbers. For more details, the research procedure can be seen in Figure 1.

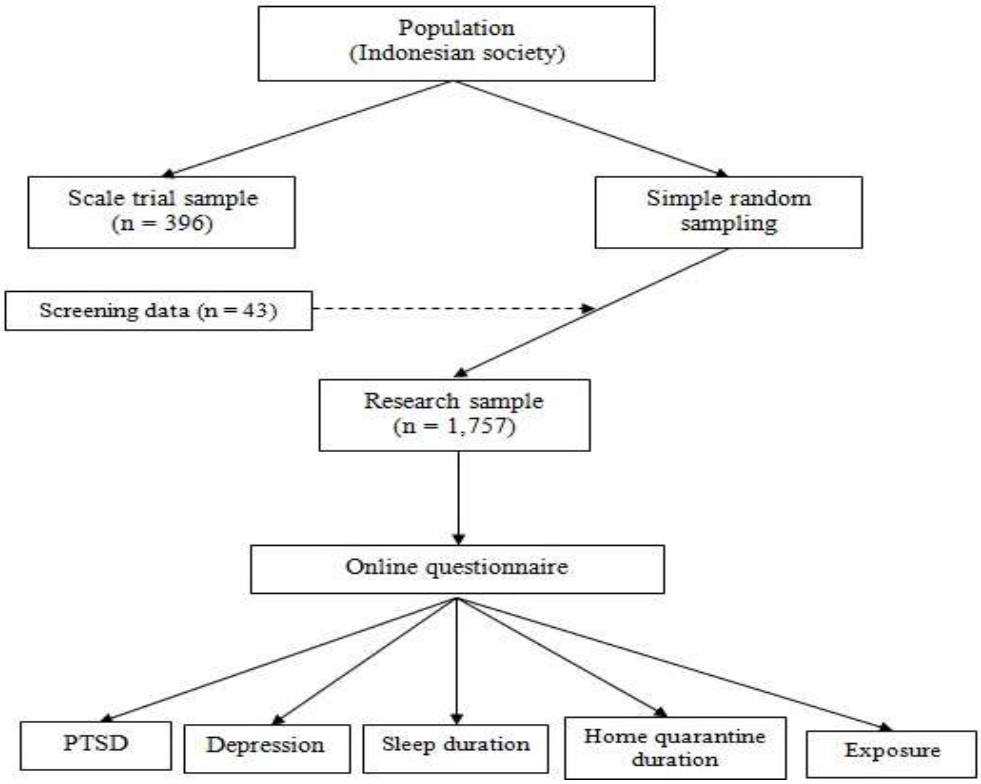

FIGURE 1. Research procedure

Measurement

Data related to the demographic characteristics of respondents such as gender, age, education level, and marital status were also collected from each respondent. PTSD, Depression, duration of sleep, quarantine duration at home, and exposure will be measured and become the main data in this study. The following description of the measuring instrument to be used.

Post-Traumatic Stress Disorder (PTSD)

The scale used to measure PTSD experienced by the community in the four weeks prior to COVID-19 exposure is PTSD Check List-Civilian Version (PCL-C) consisting of 17 question items (Weathers et al., 1999), using a 5-scale model Likert points ranging from 1 (not at all) to 5 (extremely) with a total score ranging from 17 to 85. A high score indicates a level of PTSD at a higher level, with a score of 38 or higher considered to have experienced PTSD (Harrington & Newman, 2007; Dobie et al., 2002). This scale has shown good internal reliability in Chinese samples with a Cronbach α value of .915 (Jin et al., 2014). In this study, the authors measured psychometric properties again with reference to the Indonesian sample (Table 1). The results obtained indicate that the validity value moves from .511 to .982 and Cronbach's reliability is .981, so it can be said that this scale meets good psychometric property rules.

Table 1. Validity and reliability of the PCL-C scale

Item	M	SD	*r*
Validity			
1. Repeated, disturbing memories, thoughts, or images of a stressful experience from the past?	3.235	.755	.975**
2. Repeated, disturbing dreams of a stressful experience from the past?	3.253	.751	.973**
3. Suddenly acting or feeling as if a stressful experience were happening again (as if you were reliving it)?	3.245	.752	.977**
4. Feeling very upset when something reminded you of a stressful experience from the past?	3.237	.753	.976**

5. Having physical reactions (e.g., heart pounding, trouble breathing, or sweating) when something reminded you of a stressful experience from the past?	3.245	.748	.982**
6. Avoid thinking about or talking about a stressful experience from the past or avoid having feelings related to it?	3.245	.748	.982**
7. Avoid activities or situations because they remind you of a stressful experience from the past?	3.247	.766	.871**
8. Trouble remembering important parts of a stressful experience from the past?	3.414	.780	.527**
9. Loss of interest in things that you used to enjoy?	2.778	.790	.511**
10. Feeling distant or cut off from other people?	3.285	.890	.518**
11. Feeling emotionally numb or being unable to have loving feelings for those close to you?	3.250	.750	.975**
12. Feeling as if your future will somehow be cut short?	3.184	.775	.931**
13. Trouble falling or staying a sleep?	3.237	.769	.928**
14. Feeling irritable or having angry outbursts?	3.242	.748	.981**
15. Having difficulty concentrating?	3.240	.753	.977**
16. Being “super alert” or watchful on guard?	3.232	.751	.971**
17. Feeling jumpy or easily startled?	3.240	.757	.971**
Reliability			
Indonesian samples (α= .981)			
Cina samples (α = .915)			

Note. *r* = Pearson correlation coefficients; *p < .05; ** p < .01.

Depression

The scale used to measure depression experienced by the community four weeks before COVID-19 exposure is the Patient Health Questionnaire-9 (PHQ-9) consisting of 9 statement items (Kroenke et al., 2001), using a 4-point scale model Likert from 0 (not at all) to 3 (nearly every day), with a total score ranging from 0 to 27 and a recommended cut-off score of 10 (Manea et al., 2012). This scale has also been widely used with Chinese populations and has shown excellent psychometric properties with a Cronbach α value of .870 (Wang et al., 2014). However, the authors continued to measure psychometric properties again with reference to the Indonesian sample (Table 2). The results obtained indicate that the validity value moves from .773 to .937 and Cronbach's reliability is .958, so it can be said that this scale meets good psychometric property rules.

Table 2. Validity and reliability of the PHQ-9 scale

Item	M	SD	*r*
Validity			
1. Little interest or pleasure in doing things	2.111	0.745	.878**
2. Feeling down, depressed, or hopeless	2.194	0.668	.937**
3. Trouble falling or staying asleep, or sleeping too much	2.167	0.695	.890**
4. Feeling tired or having little energy	2.255	0.688	.783**
5. Poor appetite or overeating	2.215	0.676	.862**
6. Feeling bad about yourself or that you are a failure or have let yourself or your family down	2.098	0.731	.852**
7. Trouble concentrating on things, such as reading the newspaper or watching television	2.182	0.673	.871**
8. Moving or speaking so slowly that other people could have noticed? Or the opposite being so fidgety or restless that you have been moving around a lot more than usual	2.136	0.737	.874**
9. Thoughts that you would be better off dead or of hurting yourself in some way	2.081	0.707	.847**
Reliability			
Indonesia samples (α= .958)			
Cina samples (α = .870)			

Note. *r* = Pearson correlation coefficients; *p < .05; ** p < .01.

Sleep Duration

Sleep duration is measured based on the question adapted from (Tang et al., 2020) which is "How much sleep do you have every night for the past four weeks?" The respondents were grouped according to the categorization of Swinkels et al. (2013) of the average reported duration of sleep, with categories under 6 hours/night, 6 to under 7 hours/night, 7 to under 8 hours/night, 8 to under 9 hours/night, 9 to under 10 hours/night, and ≥ 10 hours/night. According to Sun et al. (2018), the shortest sleep duration is < 6 hours/night.

Home Quarantine Duration

The duration of quarantine at home is determined based on the question adapted from (Tang et al., 2020) which is "How much time have you spent on quarantine from outside since the COVID-19 outbreak?" Respondents were grouped according to five categories: None, under 1 week, 1 to 2 weeks, 2 to 4 weeks, and above 4 weeks.

Exposure

Respondents' exposure to COVID-19 was measured using a scale adapted from a modified version of the disaster exposure scale based on the DSM-IV criteria for PTSD (Tang et al., 2020). This scale has nine statement items with answer choices yes coded 1 and not coded 0. The statement items on this scale are: 1) there are infected individuals in their environment, 2) know the individuals who died due to infection with COVID-19, 3) live in a red zone area, 4) there are infected friends, 5) there are infected neighbors, 6) there are infected relatives, 7) are exposed to exposure to stressful media messages, 8) there are infected family members, and 9) arises a subjective fear of being contaminated with the COVID-19 virus.

Statistical Analysis

The method of data analysis in this study uses one way ANOVA test and sample independent t-test which aims to reveal the differences between the observed variables. Then, data analysis with multiple linear regression methods was also applied in this study with the aim of identifying the predictor variables for PTSD (PCL-C score) and Depression (PHQ-9 score), with the threshold value used ie $p < .05$ for the level error of 5%, and $p < .01$ for an error rate of 1%. Another data analysis method used in this research is bootstrap analysis through PROCESS with the help of the SPSS computer program ver. 22.0 and Rstudio ver. 1.2.1335 is used to make a path diagram for each observed variable. In addition to making corrections to variable biases, this method is also used to see the direct and indirect effects of the severity of exposure to PTSD and depression variables mediated by sleep duration and quarantine at home.

III. RESULT

Characteristics of Respondents

Table 3. Demographic characteristics of respondents (n = 1,757)

Variabels	N	%	M	SD	Variables	N	%	M	SD
Gender					Sleep duration (Hours/Night)				
Male	898	51.1	1.48	.50	< 6 H/N	1182	67.3		
Female	859	48.9			6 to < 7 H/N	115	6.5		
Age (Years Old)					7 to < 8 H/N	109	6.2	1.97	1.61
19 to 24 Y.O	271	15.4			8 to < 9 H/N	128	7.3		
25 to 30 Y.O	224	12.7			9 to < 10 H/N	112	6.4		
31 to 36 Y.O	174	9.9			10 > H/N	111	6.3		
37 to 42 Y.O	178	10.1	4.08	1.91	Quarantine duration				
43 to 48 Y.O	237	13.5			None	119	6.8	4.15	1.29
≥ 49 Y.O	673	38.3			< 1 week	129	7.3		

Educational attainment					1 to 2 weeks	250	14.2	
None	885	50.4			2 to 4 weeks	125	7.1	
Upper secondary school	463	26.4	1.72	.81	> 4 weeks	1134	64.5	
University	409	23.3			Type of exposure			
Marital status					5. There are infected neighbors			
Single	362	20.6			No	1754	99.8	.00 .04
Married	500	28.5			Yes	3	.2	
Widower	324	18.4	2.72	1.28	6. There are infected relatives			
Widow	396	22.5			No	1755	99.9	.00 .03
Divorced	175	10.0			Yes	2	.1	
Type of exposure								
1. There are infected individuals in their environment					7. Are exposed to exposure to stressful media messages			
No	1752	99.7	.00	.05	No	1747	99.4	.00 .07
Yes	5	.3			Yes	10	.6	
2. Know the individuals who died due to infection with COVID-19					8. There are infected family members			
No	1749	99.5	.00	.06	No	1755	99.9	.00 .03
Yes	8	.5			Yes	2	.1	
3. Live in a red zone area					9. Arises a subjective fear of being contaminated with the COVID-19 virus			
No	1751	99.7	.00	.05	No	1746	99.4	.00 .07
Yes	6	.3			Yes	11	.6	
4. There are infected friends								
No	1753	99.8	.00	.04				
Yes	4	.2						
Prevalence								
PTSD					Depression			
High	21	65.6			High	18	56.3	
Average	11	34.4	30.4	4.5	Average	12	37.5	16.6 2.9
Low	0	.0			Low	2	6.3	

Respondents who completed the survey were in 1800. However, at the data screening stage, there were 43 respondents who were not used for reasons because the answers did not make sense, like all choices of answers given on each item scale to be one or zero. Thus, researchers only involved 1,757 respondents to be used in the analysis, which consisted of 898 men and 859 women with an age range of 49 years and above (M = 4.08; SD = 1.91). The majority of respondents were married (28.5%), and most had no education (50.4%). The demographic characteristics of the study respondents are presented in Table 3.

Exposure to COVID-19 Virus

The results obtained in this study are related to respondents' exposure to the COVID-19 virus, namely: .3% reported that there were infected individuals in their environment, .3% reported that they lived in the most severe areas (red zone), and .6 % reported that the community felt very scared. Some respondents know individuals infected with the COVID-19 virus with the following prevalence: 2 / 1,757

respondents reported that family members were infected with the COVID-19 virus, 2 / 1,757 respondents reported that their relatives were infected with the virus, 4 / 1,757 respondents reported that their friends infected, 3 / 1,757 respondents reported that their neighbor was infected, and 8 / 1,757 respondents knew someone who died from COVID-19 infection. However, the majority of respondents reported that they had been exposed to stressful social media information (Table 3).

Psychopathological Prevalence (PTSD and Depression), Sleep Duration, and Duration of Quarantine at Home

The prevalence of possible PTSD and depression was determined to be 65.6% and 56.3% (Table 3). The duration of sleep of the respondent per night since the spread of COVID-19 cases, namely: < 6 hours (n = 1182;% = 67.3), 6 to 7 hours (n = 115;% = 6.5) 7 to 8 hours (n = 109;% = 6.2), 8 to 9 hours (n = 128;% = 7.3), 9 to 10 hours (n = 112;% = 6.4) and > 10 hours (n = 111;% = 6.3).

The majority of respondents (*M* = 4.15; *SD* = 1.29) chose to remain at home during the COVID-19 pandemic, with quarantine duration at home, namely: none (n = 119;% = 6.8), < 1 week (n = 129) ;% = 7.3), 1 to 2 weeks (n = 250;% = 14.2), 2 to 4 weeks (n = 125;% = 7.1) and > 4 weeks (n = 1134;% = 64.5).

Comparative Analysis of PTSD (PCL-C) and Depression (PHQ-9) Grouped by Demographic Characteristics of Respondents, Duration of Sleep, and Duration of Quarantine at Home

Statistical calculations using the one way ANOVA method and independent-sample t-tests were performed to assess differences in PTSD and depressive symptoms experienced by respondents grouped by gender, age, education level, marital status, type of exposure, duration of sleep, and duration of the home quarantine. The results of differences in PTSD obtained in this study indicate that individuals with an age range of 31 to 36 years, with short sleep duration (< 6 hours/night), and with the longest quarantine duration (> 4 weeks) are more likely to experience PTSD.

The average PTSD score obtained by respondents experienced a higher score increase if there were infected individuals in their environment, acquainted with individuals who died due to COVID-19 infection, living in the red zone area, there were infected friends, exposed to exposure from the media which is stressful, and arises from subjective fear of being contaminated with the COVID-19 virus (Table 4).

Table 4. Comparative analysis of PTSD (PCL-C)

Measure	PCL-C (M ± SD)	F/t	Measure	PCL-C (M ± SD)	F/t
Gender			Sleep duration (Hours/Night)		
Male	30.36 ± 4.44	.135	< 6 H/N	30.58 ± 3.94	
Female	30.34 ± 4.46		6 to < 7 H/N	29.84 ± 5.72	
Age (Years Old)			7 to < 8 H/N	30.22 ± 5.37	2.77*
19 to 24 Y.O	29.63 ± 3.01		8 to < 9 H/N	29.67 ± 5.24	
25 to 30 Y.O	32.68 ± 3.97		9 to < 10 H/N	30.44 ± 5.75	
31 to 36 Y.O	33.01 ± 3.85	37.88**	10 > H/N	29.30 ± 4.43	
37 to 42 Y.O	29.15 ± 2.93		Quarantine duration		
43 to 48 Y.O	28.96 ± 3.07		None	29.98 ± 5.22	
≥ 49 Y.O	29.98 ± 5.33		< 1 week	30.63 ± 5.38	
Educational attainment			1 to 2 weeks	29.66 ± 4.96	5.53**
None	30.24 ± 4.32		2 to 4 weeks	29.12 ± 4.77	
Upper secondary school	30.47 ± 4.44	.52	> 4 weeks	30.65 ± 4.03	
University	30.45 ± 4.73		Type of exposure		
Marital status			5. There are infected neighbors		

Single	30.54 ± 4.48		No	30.34 ± 4.45	-1.67
Married	29.92 ± 4.34		Yes	34.66 ± .57	
Widower	30.30 ± 4.45	2.21	6. There are infected relatives		
Widow	30.76 ± 4.49		No	30.34 ± 4.45	-1.63
Divorced	30.36 ± 4.54		Yes	35.50 ± .70	
Type of exposure					
1. There are infected individuals in their environment			7. Are exposed to exposure to stressful media messages		
No	30.34 ± 4.45	-2.23*	No	30.32 ± 4.44	-3.24**
Yes	34.80 ± 1.48		Yes	34.90 ± 1.96	
2. Know the individuals who died due to infection with COVID-19			8. There are infected family members		
No	30.33 ± 4.45	-2.80**	No	30.35 ± 4.45	-1.31
Yes	34.75 ± 1.16		Yes	34.50 ± .70	
3. Live in a red zone area			9. Arises a subjective fear of being contaminated with the COVID-19 virus		
No	30.33 ± 4.44	-2.93**	No	30.32 ± 4.44	-4.16**
Yes	35.66 ± 2.16		Yes	35.90 ± 1.92	
4. There are infected friends					
No	30.34 ± 4.45	-2.09*			
Yes	35.00 ± .81				

Note. Total scores one month after the COVID-19 outbreak were grouped based on respondent demographic data, isolation time, and sleep duration (n = 1,757); *$p < .05$; ** $p < .01$.

Differences in depressive symptoms from respondents reported that individuals with an age range of 31 to 36 years, with short sleep duration, and long isolation were more likely to experience depressive symptoms. The average score of depressive symptoms in each respondent has a higher score increase if there are infected individuals in their environment, acquainted with individuals who died due to COVID-19 infection, there are friends who are infected, there are infected neighbors, there are infected relatives, exposed to pressure from media, and fear arises from being infected with the virus (Table 5).

Table 5. Comparative analysis of Depression (PHQ-9)

Measure	PHQ-9 (M ± SD)	F/t	Measure	PHQ-9 (M ± SD)	F/t
Gender			Sleep duration (Hours/Night)		
Male	16.58 ± 2.93	-.31	< 6 H/N	16.78 ± 2.55	
Female	16.63 ± 2.85		6 to < 7 H/N	16.13 ± 3.69	
Age (Years Old)			7 to < 8 H/N	16.67 ± 3.47	3.88**
19 to 24 Y.O	16.17 ± 2.18		8 to < 9 H/N	16.07 ± 3.36	
25 to 30 Y.O	17.60 ± 2.51		9 to < 10 H/N	16.60 ± 3.78	
31 to 36 Y.O	18.14 ± 2.59	21.05**	10 > H/N	15.84 ± 3.03	
37 to 42 Y.O	16.41 ± 2.14		Quarantine duration		
43 to 48 Y.O	16.00 ± 2.21		None	16.24 ± 3.15	
≥ 49 Y.O	16.32 ± 3.46		< 1 week	17.07 ± 3.64	
Educational attainment			1 to 2 weeks	16.07 ± 3.23	7.41**
None	16.55 ± 2.84		2 to 4 weeks	15.77 ± 3.21	
Upper secondary school	16.63 ± 2.84	.43	> 4 weeks	16.80 ± 2.61	

University	16.71 ± 3.06		Type of exposure		
Marital status			5. There are infected neighbors		
Single	16.70 ± 2.88		No	16.60 ± 2.88	-3.23**
Married	16.39 ± 2.87		Yes	22.00 ± 4.58	
Widower	16.58 ± 2.92	1.49	6. There are infected relatives		
Widow	16.84 ± 2.91		No	16.60 ± 2.89	-3.12**
Divorced	16.53 ± 2.89		Yes	23.00 ± 4.24	
Type of exposure					
1. There are infected individuals in their environment			7. Are exposed to exposure to stressful media messages		
No	16.59 ± 2.88	-2.93**	No	16.59 ± 2.88	-3.39**
Yes	20.40 ± 5.27		Yes	19.70 ± 4.21	
2. Know the individuals who died due to infection with COVID-19			8. There are infected family members		
No	16.59 ± 2.88	-4.06**	No	16.60 ± 2.89	-1.65
Yes	20.75 ± 3.99		Yes	20.00 ± 4.24	
3. Live in a red zone area			9. Arises a subjective fear of being contaminated with the COVID-19 virus		
No	16.60 ± 2.89	-1.45	No	16.58 ± 2.87	-5.28**
Yes	18.33 ± 3.14		Yes	21.18 ± 3.09	
4. There are infected friends					
No	16.59 ± 2.88	-3.38**			
Yes	21.50 ± 3.87				

Note. Total scores one month after the COVID-19 outbreak were grouped based on respondent demographic data, isolation time, and sleep duration (n = 1,757); *$p < .05$; ** $p < .01$.

The Ability of the Variable Exposure, Sleep Duration, and Duration of Quarantine at home to predict PTSD and Depression

The regression model shows that the type of exposure in the first item ie infected individuals in their environment is a significant predictor for PTSD, followed by other types of exposure, namely: acquainted with individuals who died due to COVID-19 infection, living in red zone areas, having friends infected, exposed to exposure to stressful media messages, the emergence of extreme fears, short sleep duration, the longest duration of isolation, and of respondents with an age range of 31 to 36 years. In contrast, gender, educational attainment, marital status, and infected family members were unable to predict PTSD (Table 6).

Table 6. Analysis of PTSD multiple linear regression and depression

Model	PTSD			Depression		
	Unstandardized Coefficients		Standardized Coefficients	Unstandardized Coefficients		Standardized Coefficients
	B	Std. Error	Beta	B	Std. Error	Beta
Gender	-.02	.21	-.00	.04	.13	.00
Age	-.27**	.05	-.11	-.13**	.03	-.09
Educational attainment	.11	.13	.02	.07	.08	.02
Marital status	.08	.08	.02	.03	.05	.01

Sleep duration	-.19**	.06	-.07	-.14**	.04	-.08
Quarantine duration	.19*	.08	.05	.12*	.05	.05
Type of exposure						
1. There are infected individuals in their environment	4.45*	1.99	.05	3.80**	1.29	.07
2. Know the individuals who died due to infection with COVID-19	4.41**	1.57	.06	4.15**	1.02	.09
3. Live in a red zone area	5.32**	1.81	.07	1.72	1.18	.03
4. There are infected friends	4.65*	2.22	.05	4.90**	1.44	.08
5. There are infected neighbors	4.31	2.57	.04	5.39**	1.67	.07
6. There are infected relatives	5.15	3.14	.03	6.39**	2.04	.07
7. Are exposed to exposure to stressful media messages	4.57**	1.40	.07	3.10**	.91	.08
8. There are infected family members	4.14	3.14	.03	3.39	2.05	.03
9. Arises a subjective fear of being contaminated with the COVID-19 virus	5.58**	1.34	.09	4.60**	.87	.12
R	.16			.18		
R^2	.02			.03		
AR^2	.02			.02		

Note. *p < .05; ** p < .01; R^2 = R-Squared; AR^2 = Adjusted R-Squared; Unstandardized coefficients are reported.

Regression analysis on depressive variables showed that the type of exposure in the first item namely there were infected individuals in their environment was a significant predictor, followed by other types of exposure namely: acquainted with individuals who died due to being infected with COVID-19, there were infected friends, there were neighbors infected, there are infected relatives, exposed to exposure to stressful media messages, the emergence of feelings of fear of being infected with the COVID-19 outbreak, short duration of sleep, the longest duration of isolation, and of respondents with an age range of 31 to 36 years. In contrast, gender, educational attainment, marital status, living in the red zone, and infected family members were unable to predict depression (Table 6).

Test the Mediating effect with the Bootstrap Method

Analysis of the mediating effects by the biased correction bootstrap method reported that the amount of exposure had a direct effect on PTSD (z = 1.18; 95% CI = .60 to 1.76), and depression (z = .95; 95% CI = .57 to 1.33). The sleep duration variable was observed as a mediator between the amount of exposure to PTSD (z = -.09; 95% CI = -.17 to - .02), and depression (z = - .07; 95% CI = - .12 to - .02) presented in Table 7.

Table 7. Analysis of the mediating effects of sleep duration and quarantine duration at home

Path	Effect	SE	95% CI
Exposure (X) ➔ Sleep duration (M) ➔ PTSD (Y)			
X ➔M	.44**	.10	.23 to .65
M ➔Y	-.21**	.06	-.34 to -.09
Direct effect of X ➔Y	1.18**	.29	.60 to 1.76
The indirect effect of X ➔Y	-.09**	.03	-.17 to -.02
Total effect of X ➔Y	1.09**	.29	.51 to 1.66
Exposure (X) ➔ Sleep duration (M) ➔ Depression (Y)			
X ➔M	.44**	.10	.23 to .65
M ➔Y	-.16**	.04	-.25 to -.08
Direct effect of X ➔Y	.95**	.19	.57 to 1.33
The indirect effect of X ➔Y	-.07**	.02	-.12 to -.02
Total effect of X ➔Y	.88**	.19	.50 to 1.25
Exposure (X) ➔ Quarantine duration (M) ➔ PTSD (Y)			
X ➔M	-.33**	.08	-.50 to -.16
M ➔Y	.22*	.08	.06 to .38

Direct effect of X ➔Y	1.16**	.29	.58 to 1.74
The indirect effect of X ➔Y	-.07**	.03	-.16 to -.01
Total effect of X ➔Y	1.09**	.29	.51 to 1.66
Exposure (X) ➔ Quarantine duration (M) ➔ Depression (Y)			
X ➔M	-.33**	.08	-.50 to -.16
M ➔Y	.14*	.05	.04 to .25
Direct effect of X ➔Y	.93**	.19	.55 to 1.30
The indirect effect of X ➔Y	-.05**	.02	-.10 to -.01
Total effect of X ➔Y	.88**	.19	.50 to 1.25

Note Bootstrap SE and 95% CI were analyzed for indirect effects; *$p < .05$; **$p < .01$.

[a]Abbreviations: PTSD = Post Traumatic stress disorder; SE = standard error; CI = confidence interval.

Testing mediation effects by applying the biased correction bootstrap method reported that the amount of exposure had a direct effect on PTSD (z = 1.16; 95% CI = .58 to 1.74), and depression (z = .93; 95% CI = .55 to 1.30). The quarantine duration variable was analyzed as a mediator between the amount of exposure to PTSD (z = - .07; 95% CI = - .16 to - .01), and depression (z = - .05; 95% CI = - .10 to - .01) presented in Table 7. Two separate models were developed to assess the role of sleep duration and quarantine duration as mediating variables in predicting the effect of total exposure on PTSD and depression. The first model was shown to illustrate the fourth objective in this study which was to prove that sleep duration mediated the effect between the amount of exposure and PTSD or depression. The procedure for testing the mediator is shown in Figure 2.

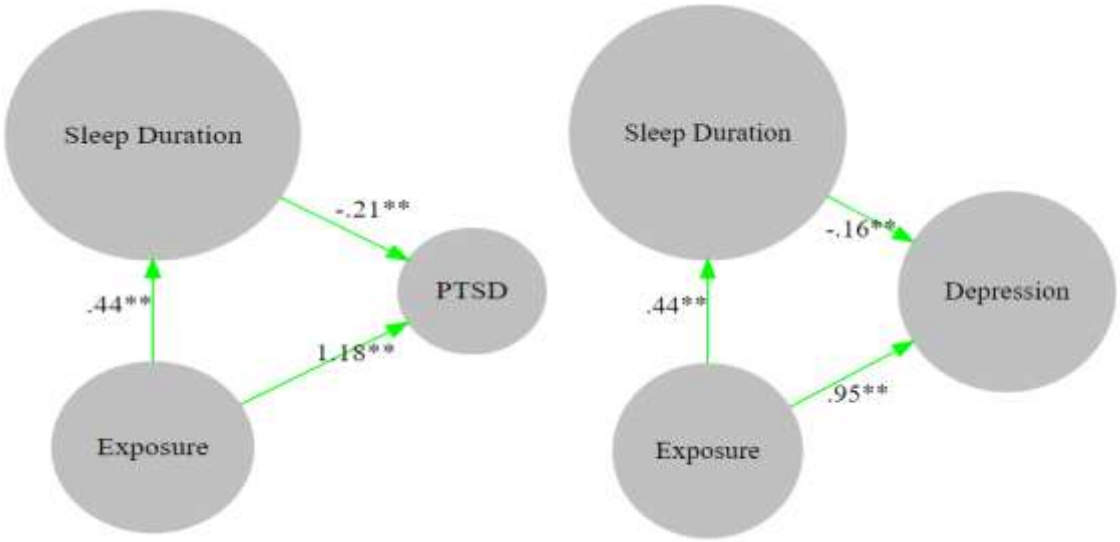

FIGURE 2. Mediation analysis procedures used to examine the effects of sleep duration in mediating the effect between exposure and psychopathology (PTSD and depression). Note: Green lines indicate significant paths, with parameters *p < .05, **p < .01.

The bootstrap results in Table 7 report back that the amount of exposure has a significant indirect effect on PTSD (p = .00), depression (p = .00) by involving sleep duration variables as mediators, and the amount of exposure has a significant direct effect on PTSD (p = .00) and depression (p = .00). Based on the bootstrap results in Table 7, the researchers conclude that the bootstrap is consistent with the results in Figure 2. These results support the fourth research objective, which indicates that sleep duration fully mediates the effect of the amount of exposure to PTSD and depression. The second model is shown to visualize the fifth goal of our study, which is to prove that the duration of quarantine mediates the effect between the amount of exposure to PTSD and depression. The procedure for testing the mediator is presented in Figure 3.

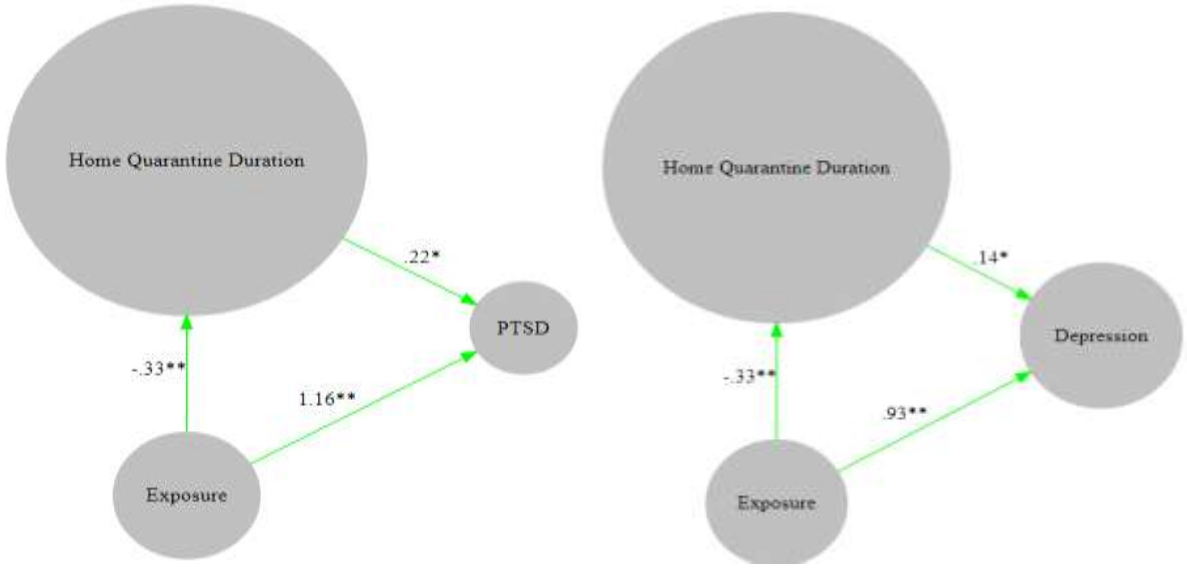

FIGURE 3. The mediation analysis procedure is used to examine the effects of quarantine duration at home in mediating the effect between the amount of exposure and psychopathology (PTSD and depression). Note: Green lines indicate significant paths, with parameters *p < .05, **p < .01.

The bootstrap results in Table 7 confirm that the amount of exposure has a significant indirect effect on PTSD (p = .00), depression (p = .00) by involving quarantine duration variables as mediators, and the amount of exposure has a significant direct effect on PTSD (p = .00), and depression (p = .00). Based on the bootstrap results in Table 7, the researchers concluded that the bootstrap is consistent with the results in Figure 3. These results support the fifth research objective, which indicates that the duration of quarantine fully mediates the effect between the amount of exposure to PTSD and depression.

IV. DISCUSSION

This study is the first to explore PTSD, depression, and psychological effects on society about one month after the COVID-19 outbreak in Indonesia, and evaluate the associated risk factors. After one month of the expansion of the COVID-19 virus, the prevalence of PTSD was found to be as high as 65.6% of large Indonesian respondents, and the possibility of depression was found to be 56.3%. People who felt very scared during the widespread outbreak of COVID-19, those who were unable to control the fears that arose in them, and people who had been exposed to messages from press-filled media were reported to have the highest risk of PTSD and depression. Shorter sleep duration has been confirmed to be significantly related to mental health effects, and it was reported that longer quarantine duration at home was also significantly associated with PTSD and depression.

Almost all Indonesians have been exposed to information on pressurized social media related to the coronavirus news. The public is faced with a lack of clarity of information in the initial period of the spread of the disease, giving rise to rumors of uncertainty for the community and a stressful psychological effect (Ma, 2008; Johal, 2009). As such, many communities believe that this outbreak is known to be highly contagious (Xu et al., 2020) and has many transmission routes that are currently unknown, which can cause disability and death for infected communities. The community also believes that if they are infected with an outbreak of the disease, they will not get maximum care and will transmit it to their families, so that families also become infected. People who cannot do much to change this situation will experience feelings of helplessness, worry, and fear (Zheng et al., 2005). Symptoms arising from this outbreak can explain the level of depression experienced by the community. Another explanation could be that when individuals are quarantined at home it will reduce interpersonal communication, so that feelings of loneliness in individuals become increased, consequently causing symptoms of depression (Weiss, 1973; Ge et al., 2017).

However, the prevalence of PTSD (65.6%) and depression (56.3%) experienced by Indonesians is much higher than the 2,485 people in China who were isolated during the COVID-19 pandemic (Tang et

al., 2020), with PTSD rates (2.7%) and depression (9.0%). Likewise with research conducted by Hawryluck et al. (2004) by involving 129 people in Canada who were isolated during the SARS virus pandemic had the possibility of PTSD (28.9%) and depression (31.2%), which were still under the Indonesian state. In the research of Hawryluck et al. (2004), the longer duration of quarantine at home was reported to be related to the increased prevalence of PTSD symptoms, which is consistent with the findings of our study. However, different from Tang et al. (2020), which did not show a link between quarantine duration and increasing PTSD for the community. This difference may be due to the fact that Indonesian people have different levels of interaction and direct contact with people who have been diagnosed, thereby increasing the fear of being contaminated with the virus through them. In addition, researchers suspect the influence of cultural factors that cause differences in the results of our study. The level of depression experienced by the people in this study was very different found in the population in China (n = 959) with a percentage of 8.8% despite using the same scale (Zhang et al., 2013). The prevalence of depression that was obtained, showed lower results (11.8%) than reported in previous studies involving populations in China based on BDI measurement tools (Yu et al., 2015). Therefore, the level of depression in Indonesian society during this outbreak was reported to be very high. Even though similar studies have been carried out in the past, it is difficult to directly compare the results in this study. However, because Indonesians are reported to have high levels of PTSD and depression, it is recommended that the Indonesian government provide more room for psychologists to identify and provide interventions for Indonesian people for the incidence of PTSD and depression caused by the COVID-19 pandemic. Considering this research was conducted in the early period in the development of the COVID 19 outbreak, the effects of longitudinal mental health changes cannot yet be identified. Therefore, further research is needed to add information and provide insights related to broader psychological effects due to the COVID-19 pandemic that occurred in the community.

Our results are related to the type of exposure that is ''feeling very scared'' has a great effect on PTSD and depression after the development of the coronavirus outbreak and is consistent with past research related to trauma variables in the community (Tang et al., 2020; Tang et al., 2018; Roussos et al., 2005; Livanou et al., 2005). Fear is an adaptive response carried out by individuals as a defensive behavior to protect themselves from danger, so it can be said that PTSD can arise when individuals are unable to properly regulate the fears they experience (Rau et al., 2005). In the study of Norrholm et al. (2011) reported that PTSD problems have been found as an inability of individuals to suppress fear even in safe conditions. Later, in our study, it was reported that fear was an important predictor for PTSD and depression. However, this finding differs from previous studies which reported that fear disorders can have an effect on PTSD but not for depression (Jovanovic et al., 2010). Another explanation to complement the results of this study is that in some personality types possessed by individuals susceptible to fear and nature can act as a mediator between the effects of fear on psychological pressure (Lara & Akiscal, 2006). Given the highly infectious nature of the COVID-19 outbreak and its long incubation period (> 14 days), many people fear that they will be contaminated with the epidemic without realizing it and will transmit the virus to family members and in their neighborhoods. Therefore, psychological intervention is urgently needed as an effort to reduce the fear of the 2019 COVID pandemic and instill emotional endurance in individuals infected with this virus, so that it can help in preventing the development of PTSD prevalence and depressive symptoms. Further research after being infected with the COVID-19 outbreak is needed to explore and reinforce the influence between fear and psychological distress.

It is important to note that short sleep duration (< 6 hours/night) is reported to have a strong influence on PTSD and depressive symptoms in our study. Consistent with the findings of Tang et al. (2020) which confirms that short sleep duration has an effect on PTSD and depression. Our findings are also consistent with past meta-analyses that report that sleep duration under 6 hours/night is associated with a higher risk of depression, and sleep duration above 9 hours/night has no significant association with the risk of depression (Sun et al., 2018). The significant relationship between duration of short sleep with PTSD in our findings is also in line with the results of previous studies related to earthquake victims (Fan et al., 2017). Based on the researchers' assumption that sleep duration is a mediator for mental health problems. Exposure to severe COVID-19 outbreaks can worsen sleep duration, which can later lead to PTSD and depression in the community. This finding is consistent with Johal's (2009) study related to SAR outbreaks, and Tang et al. (2020) about the coronavirus 2019. In this study, we also explore the effect of quarantine duration at home on psychopathology that has the potential to occur in individuals. Our findings report that the duration of quarantine at home has an effect on mental illness (PTSD and depression), and is consistent with the results of the study of Reynolds et al. (2008) about the SARS outbreak which reported that the longer individuals were quarantined, the possibility of the risk of

mental health problems in themselves increased. In addition, researchers also developed a new research model with the assumption that quarantine duration at home is also a mediating variable between the effect of COVID-19 exposure on psychopathology (PTSD and depression). As researchers have assumed and proven by our results that the amount of exposure to COVID-19 outbreaks can decrease if longer quarantine duration is applied at home, and then it will increase PTSD and depressive symptoms, which resulted in the quality of mental health for the community to be worse than before. The results of this study complement and add new information from previous studies related to the development of research models by looking at the effects caused by the amount of isolation time spent as a mediator between the amount of exposure to mental illness (PTSD and depression), and our findings can also be used as a basis for consideration for the Indonesian government in making future policies in breaking the 2019 coronavirus chain.

Although the results of this study are important, they have several limitations. First, because this research is only focused on the people of Indonesia, so the results cannot be applied to people in other countries. Second, there are still several other variables that are not revealed in this study, for example, copying and personality styles that can affect the results of the study. Third, random sampling techniques that are not rigorous and measurements by online systems can affect the reliability and representativeness of research results. However, despite the limitations that have been presented by us, this study makes a very important contribution related to understanding the effects of COVID-19 outbreaks on individual psychological. Therefore, to alleviate public concern due to the effects of the COVID-19 outbreak, the psychological intervention that will be provided must focus on emotional comfort through strengthening psychological counseling methods for people in Indonesia. In addition, the researcher suggests developing this research model by adding other variable parameters, such as personality and coping styles that might act as mediators.

V. CONCLUSION

The COVID-19 outbreak has spread to various countries in the world, including in Indonesia. The Indonesian government has taken many steps to prevent and cut the development of the coronavirus. The effect caused by this virus is the emergence of fear for individuals to be infected, thus affecting their mental health. There were 1,757 people involved in the study with the majority of men aged 49 years and over, who were married, and most had no education. The prevalence of PTSD and depression for Indonesian people is 65.6% and 56.3%. People who are afraid of being infected and who have been exposed to messages from the media are a risk factor for psychological problems. Likewise, the short duration of sleep, and the long duration of isolation also significantly affected the mental health of the community during the COVID-19 pandemic outbreak. In addition, sleep duration and quarantine duration are mediators between the amount of coronavirus exposure received by the public from psychopathology (PTSD and depression). Considering that this research made a very important contribution, we suggest that further researchers can formulate psychological interventions to improve the mental health of the community during the COVID-19 pandemic. In addition, we also recommend that the government strictly enforces and enforces the law when the rules set are violated. Therefore, all levels of society are advised to act wisely and cooperate with the government in protecting our lives and with other individuals in order to remain safe. Without good cooperation between the government and the people of the epidemic, COVID-19 cannot be controlled.

ACKNOWLEDGMENT

We would like to thank all the research respondents who took the time to participate in this research. The writer is also very grateful to Mr. Andi Anto Patak (Makassar, Indonesia, Email: andiantopatak@gmail.com) who has helped the writer with an English translation and polishing services.

CONTRIBUTORS

Dwi Yan Nugraha designed the research and wrote this manuscript, assisted by other co-authors. Researchers also collect and analyze research data.

AUTHORSHIP AND COPYRIGHT

Researchers reported that the manuscripts sent were original manuscripts and had never been published before. In addition, this manuscript is not being considered for publication elsewhere, and if

this manuscript is accepted, the author will not publish elsewhere in the form of a research concept and the same manuscript in any language, without the consent of the journal that was originally published.

ETHICAL APPROVAL

All procedures adhere to the latest ethical standards of the Indonesian Psychological Association (HIMPSI) Ethics Research Committee from the results of the XI Congress of HIMPSI, 2010 in Surakarta.

FUNDING

The author does not receive special grants from commercial institutions, donors in the public sector, and non-profits in the creation and implementation of this research.

DECLARATION OF COMPETING INTEREST

The researcher confirms that no personal relationship interests can affect the work reported in this manuscript.

REFERENCES

1. Almuttaqi, A.I. (2020). The Omnishambles of COVID-19 Response in Indonesia. [WWW Document]. habibiecenter.or.id. URL habibiecenter.or.id.
2. Brahma, B. (2020). Oncologists and COVID-19 in Indonesia: What can we learn and must do? *Indonesian Journal of Cancer*, *14*(1), 1-2.
3. Chen, R., Chou, K.R., Huang, Y.J., Wang, T.S., Liu, S.Y., & Ho, L.Y. (2006). Effects of a SARS prevention programme in Taiwan on nursing staff's anxiety, depression and sleep quality: a longitudinal survey. *International journal of nursing studies, 43*(2), 215-225.
4. Dobie, D.J., Kivlahan, D.R., Maynard, C., Bush, K.R., McFall, M., Epler, A.J., & Bradley, K.A. (2002). Screening for post-traumatic stress disorder in female Veteran's Affairs patients: validation of the PTSD checklist. *General hospital psychiatry, 24*(6), 367-374.
5. Duan, L., & Zhu, G. (2020). Psychological interventions for people affected by the COVID-19 epidemic. *The Lancet Psychiatry*, *7*(4), 300-302.
6. Fan, F., Zhou, Y., & Liu, X. (2017). Sleep disturbance predicts posttraumatic stress disorder and depressive symptoms: a cohort study of Chinese adolescents. *The Journal of clinical psychiatry, 78*(7), 882-888.
7. 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), 1-13.
8. Harrington, T., & Newman, E. (2007). The psychometric utility of two self-report measures of PTSD among women substance users. *Addictive behaviors, 32*(12), 2788-2798.
9. Hawryluck, L., Gold, W.L., Robinson, S., Pogorski, S., Galea, S., & Styra, R. (2004). SARS control and psychological effects of quarantine, Toronto, Canada. *Emerging infectious diseases*, *10*(7), 1206-1212.
10. Jovanovic, T., Norrholm, S.D., Blanding, N.Q., Davis, M., Duncan, E., Bradley, B., & Ressler, K.J. (2010). Impaired fear inhibition is a biomarker of PTSD but not depression. *Depression and anxiety, 27*(3), 244-251.
11. Jin, Y., Xu, J., Liu, H., & Liu, D. (2014). Posttraumatic stress disorder and posttraumatic growth among adult survivors of Wenchuan earthquake after 1 year: Prevalence and correlates. *Archives of Psychiatric Nursing, 28*(1), 67-73.
12. Johal, S.S. (2009). Psychosocial impacts of quarantine during disease outbreaks and interventions that may help to relieve strain. *The New Zealand Medical Journal*, *122*(1296), 53-58.
13. Kopala-Sibley, D.C., Danzig, A.P., Kotov, R., Bromet, E.J., Carlson, G.A., Olino, T.M., Bhatia, V., Black, S.R., & Klein, D.N. (2016). Negative emotionality and its facets moderate the effects of exposure to Hurricane Sandy on children's post-disaster depression and anxiety symptoms. *Journal of Abnormal Psychology*, *125*(4), 471-481.
14. Kroenke, K., Spitzer, R.L., & Williams, J.B. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of general internal medicine, 16*(9), 606-613.

15. Lara, D.R., & Akiskal, H.S. (2006). Toward an integrative model of the spectrum of mood, behavioral and personality disorders based on fear and anger traits: II. Implications for neurobiology, genetics, and psychopharmacological treatment. *Journal of Affective Disorders*, *94*(1-3), 89-103.
16. Leppin, A., & Aro, A.R. (2009). Risk perceptions related to SARS and avian influenza: theoretical foundations of current empirical research. *International journal of behavioral medicine, 16*(1), 7-29.
17. Liu, S., Yang, L., Zhang, C., Xiang, Y.T., Liu, Z., Hu, S., & Zhang, B. (2020). Online mental health services in China during the COVID-19 outbreak. *The Lancet Psychiatry*, *7*(4), 17-18.
18. Livanou, M., Kasvikis, Y., Başoğlu, M., Mytskidou, P., Sotiropoulou, V., Spanea, E., & Voutsa, N. (2005). Earthquake-related psychological distress and associated factors 4 years after the Parnitha earthquake in Greece. European Psychiatry, 20(2), 137-144.
19. Loh, L.C., Ali, A.M., Ang, T.H., & Chelliah, A. (2005). Impact of a spreading epidemic on medical students. *The Malaysian Journal of Medical Sciences*: *MJMS*, *12*(2), 43-49.
20. Ma, R. (2008). Spread of SARS and war-related rumors through new media in China. *Communication Quarterly, 56*(4), 376-391.
21. Main, A., Zhou, Q., Ma, Y., Luecken, L.J., & Liu, X. (2011). Relations of SARS-related stressors and coping to Chinese college students' psychological adjustment during the 2003 Beijing SARS epidemic. *Journal of Counseling Psychology*, *58*(3), 410-423.
22. Manea, L., Gilbody, S., & McMillan, D. (2012). Optimal cut-off score for diagnosing depression with the Patient Health Questionnaire (PHQ-9): a meta-analysis. *Cmaj, 184*(3), E191-E196.
23. Mihashi, M., Otsubo, Y., Yinjuan, X., Nagatomi, K., Hoshiko, M., & Ishitake, T. (2009). Predictive factors of psychological disorder development during recovery following SARS outbreak. *Health Psychology*, *28*(1), 91.
24. Norrholm, S.D., Jovanovic, T., Olin, I. W., Sands, L.A., Bradley, B., & Ressler, K.J. (2011). Fear extinction in traumatized civilians with posttraumatic stress disorder: relation to symptom severity. *Biological psychiatry, 69*(6), 556-563.
25. Plexousakis, S.S., Kourkoutas, E., Giovazolias, T., Chatira, K., & Nikolopoulos, D. (2019). School bullying and post-traumatic stress disorder symptoms: the role of parental bonding. *Frontiers in public health*, *7*(75), 1-15.
26. Qian, M., Wu, Q., Wu, P., Hou, Z., Liang, Y., Cowling, B. J., & Yu, H. (2020). Psychological responses, behavioral changes, and public perceptions during the early phase of the COVID-19 outbreak in China: a population-based cross-sectional survey. *medRxiv*. 1-25.
27. Rau, V., DeCola, J.P., & Fanselow, M.S. (2005). Stress-induced enhancement of fear learning: an animal model of posttraumatic stress disorder. *Neuroscience & biobehavioral reviews, 29*(8), 1207-1223.
28. Reynolds, D.L., Garay, J.R., Deamond, S.L., Moran, M.K., Gold, W., & Styra, R. (2008). Understanding, compliance and psychological impact of the SARS quarantine experience. *Epidemiology & Infection, 136*(7), 997-1007.
29. Roussos, A., Goenjian, A.K., Steinberg, A.M., Sotiropoulou, C., Kakaki, M., Kabakos, C., & Manouras, V. (2005). Posttraumatic stress and depressive reactions among children and adolescents after the 1999 earthquake in Ano Liosia, Greece. *American Journal of Psychiatry, 162*(3), 530-537.
30. Schwartz, R.M., Rasul, R., Gargano, L.M., Lieberman-Cribbin, W., Brackbill, R.M., & Taioli, E. (2019). Examining associations between Hurricane Sandy exposure and posttraumatic stress disorder by community of residence. *Journal of traumatic stress, 32*(5), 677-687.
31. Sun, Y., Shi, L., Bao, Y., Sun, Y., Shi, J., & Lu, L. (2018). The bidirectional relationship between sleep duration and depression in community-dwelling middle-aged and elderly individuals: Evidence from a longitudinal study. *Sleep Medicine*, *52*, 221-229.
32. Swinkels, C.M., Ulmer, C.S., Beckham, J.C., Buse, N., VA Mid-Atlantic MIRECC Registry Workgroup, & Calhoun, P.S. (2013). The association of sleep duration, mental health, and health risk behaviors among US Afghanistan/Iraq era veterans. *Sleep,* 36(7), 1019-1025.
33. Tang, W., Hu, T., Hu, B., Jin, C., Wang, G., Xie, C., Chen, S., & Xu, J. (2020). Prevalence and correlates of PTSD and depressive symptoms one month after the outbreak of the COVID-19 epidemic in a sample of home-quarantined Chinese university students. *Journal of affective disorders*, *274*, 1-7.
34. Tang, W., Zhao, J., Lu, Y., Zha, Y., Liu, H., Sun, Y., Zhang, J., Yang, Y., & Xu, J. (2018). Suicidality, posttraumatic stress, and depressive reactions after earthquake and maltreatment: A cross-sectional survey of a random sample of 6132 Chinese children and adolescents. *Journal of affective disorders*, *232*, 363-369.

35. Wang, W., Bian, Q., Zhao, Y., Li, X., Wang, W., Du, J., & Zhao, M. (2014). Reliability and validity of the Chinese version of the Patient Health Questionnaire (PHQ-9) in the general population. *General hospital psychiatry, 36*(5), 539-544.
36. Weathers, F.W., Ruscio, A.M., & Keane, T.M. (1999). Psychometric properties of nine scoring rules for the Clinician-Administered Posttraumatic Stress Disorder Scale. *Psychological assessment*, *11*(2), 124-133.
37. Weiss, R.S. (1973). *Loneliness: The experience of emotional and social isolation.* Cambridge, MA: MIT Press.
38. WHO. (2020). *Mental Health and Psychosocial Considerations during the COVID-19 Outbreak,* 18 March 2020. World Health Organization.
39. Xu, Z., Shi, L., Wang, Y., Zhang, J., Huang, L., Zhang, C., Liu, S., Zhao, P., Liu, H., Zhu, L., Tai, Y., Bai, C., Gao, T., Song, J., Xia, P., Dong, J., Zhao, J., & Wang, F.S. (2020). Pathological findings of COVID-19 associated with acute respiratory distress syndrome. *The Lancet Respiratory Medicine*, *8*(4), 420-422.
40. Yu, Y., Yang, X., Yang, Y., Chen, L., Qiu, X., Qiao, Z., Zhou, J., Pan, H., Ban, B., Zhu, X., He, J., Ding, Y. & Bai, B. (2015). The role of family environment in depressive symptoms among university students: A large sample survey in China. *PLoS ONE*, *10*(12), 1-13.
41. Zhang, J., Wu, W., Zhao, X., & Zhang, W. (2020). Recommended psychological crisis intervention response to the 2019 novel coronavirus pneumonia outbreak in China: A model of West China Hospital. *Precision Clinical Medicine*, *3*(1), 3-8.
42. Zhang, Y.L., Liang, W., Chen, Z.M., Zhang, H. M., Zhang, J.H., Weng, X.Q., Yang, S.C., Zhang, L., Shen, L.J., & Zhang, Y.L. (2013). Validity and reliability of Patient Health Questionnaire-9 and Patient Health Questionnaire-2 to screen for depression among college students in China. *Asia-Pacific Psychiatry*, *5*(4), 268-275.
43. Zheng, G., Jimba, M., & Wakai, S. (2005). Exploratory study on psychosocial impact of the severe acute respiratory syndrome (SARS) outbreak on Chinese students living in Japan. *Asia Pacific Journal of Public Health, 17*(2), 124-129.