International Journal of Public Health Science (IJPHS)
Vol. 11, No. 1, March 2022, pp. 8~19
ISSN: 2252-8806, DOI: 10.11591/ijphs.v11i1.21018

Perception of information about COVID-19 and protective behaviours in relation to feelings of anxiety and happiness

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Article Info

Article history:

Received 11 May, 2021
Revised Oct 30, 2021
Accepted Nov 10, 2021

Keywords:

Anxiety
COVID-19
Happiness
Health behaviour
Information provision
Mental health

ABSTRACT

This study aimed to assess the perception of the coronavirus disease 2019 (COVID-19) information provision and the health protective behavior as potential factors of feelings of anxiety and happiness among the general population in Indonesia during the outbreak. We conducted an online survey using snowball sampling techniques. The online survey collected information about demographic data, information provision of COVID-19, health prevention behaviors, and feelings of anxiety and happiness. This study involved 3,686 participants in Indonesia in the period from 2nd of April to 4th of April 2020. We found that the most frequent source of information reported was social media. The majority of participants were satisfied with the amount of information provided (98%), however 54% of the participants reported that no information or very little information about the screening/test and the treatment of COVID-19 was provided. The most frequent protective behaviour was implemented cough attitude, avoided handshake, and applied physical distancing. High exposure of Information about COVID-19 and doing preventive measures were associated with greater anxiety. Nonetheless, some preventive measures appeared to be positively associated with feelings of happiness. Our results give an indications about the information provision, application of preventive measure and the factors associated with feelings of anxiety and happiness.

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1. INTRODUCTION

In December 2019, an outbreak of a novel coronavirus disease 2019 (COVID-19) was confirmed in Wuhan, China [1]. Considering the characteristic of the new coronavirus type (SARS-CoV-2) and the high potential for infection, the World Health Organization (WHO) affirmed the outbreak as a public health emergency on January 30, 2020 which became an international concern. WHO on March 11, 2020 declared COVID-19 as a pandemic. The first case of coronavirus disease in Indonesia was identified on 2nd of March 2020. According to the WHO data, on November 2021, there were 251,266,207 confirmed cases and 5,070,244 deaths reported in the world and in Indonesia there were 4,249,758 confirmed cases and 143,608 deaths related to COVID-19 [2].

Like many other countries, the Indonesian government has also taken many measures for the prevention and control of the pandemic. But, unlike other countries, enforceable measures in Indonesia are much less restrictive than the 'lockdowns' achieved in some European countries, New Zealand and areas in

the United States. For example, New Zealand government implemented a strict lockdown which part of a 'go early, go hard' COVID-19 elimination strategy. On of March 3, 2020 the day after the first case was confirmed, the Indonesian government enforced a large-scale social restriction for two weeks or longer if needed. Social restriction restrained most non-essential activity outside the home, with all schools and non-essential businesses being closed. Workers were ordered to work from home and students continued their study at home. The government endorsed a health protocol for public to follow. Indonesian public health measures resembled Japan's 'mildly enforceable lockdown' where residents were instructed to avoid going out their homes for non-essential reasons and limit the use of stores and facilities [3].

Based on previous pandemic, it is important to understand how facts and correct information about the health threat is disseminated and how the public processes and responds to this information [4], [5]. Proper and factual information have a critical role in controlling the spread of illness and managing uncertainty during an outbreak. Both formal and informal sources of information present a critical role in increasing situational awareness during public health emergencies. Although there were significant volume of news provided by public health officials, journalists and other sources, this huge amount of daily information does not just consist of correct information but also of fake news and misinformation. This is also applicable in Indonesia where recent study stated that there was an increase in public misinformation around basic coronavirus facts and there were a group of people who still did not understand misinformation regarding COVID-19 [6].

Consequently, to limit virus transmission, WHO continued to provide a guideline and recommend performing several protective behaviors against COVID-19, namely hand hygiene, using facial protection (e.g. mask), frequently cleaning and disinfecting surfaces, maintaining physical distances, avoiding crowded places, and restricting contact with people with fever or respiratory symptoms. The authorities in Indonesia with Ministry of Health have issued a health protocol for public to follow based on WHO guideline. At the individual level, they recommend frequent hand-washing, using facial protection (e.g., surgical mask and face shield) and the use of disinfectant (e.g., alcohol-based) are also endorsed [7]. Therefore, it is important to advocate to the public to prioritize implementing protective behaviors and understanding how the public respond about these measures

Previous study about epidemics showed that during the fight against severe acute respiratory syndrome (SARS), middle east respiratory syndrome (MERS) and Ebola outbreaks, individuals faced various mental health problems such as stress, depression, anxiety, distress, anger and grief [8]–[11]. Together with the strong person-to-person transmission capability of the virus, recent studies showed that the outbreak of COVID-19 has been reported to cause mental health problems [12]–[15]. Anxiety is one of the psychological problems that can emerged during COVID-19 outbreak and can be seen as an events that can raise concerns [16]–[18]. Few studies confirmed that people experienced high levels of anxiety since the outbreak of COVID-19 [19]–[24]. Another study involved 7,236 participants in China found that 35.1% of participants reported anxiety symptoms, 20.1% reported depressive symptoms and 18.2% participants reported experienced poor sleep quality [25]. A previous study among 17,865 active users of a social media platform (Weibo) in China found that this epidemic has a strong impact on the psychological state: people showed higher negative emotions (e.g. anxiety, depression and indignation), higher sensitivity to social risks and lower positive emotions (e.g. happiness) and lower life satisfaction [26].

During COVID-19 epidemic, people experienced more negative emotions (e.g., anxiety and depression) and having less positive emotions, well-being and life satisfaction. Earlier researches also suggested that people's happiness level and well-being decreased from the onset of COVID-19 epidemic [27]–[31]. At the time of writing this paper (November 2020), many Indonesian people were living in some form of government-imposed social restriction. The authorities in Indonesia have maintained constant communication with the public about the status of COVID-19 outbreak. Considering the abrupt nature of the outbreak and the contagious power of the novel coronavirus (COVID-19), it is necessary for people to follow the protective behaviour and health protocol. Under these circumstances, people may show negative psychological reactions and affect their happiness and well-being. To the best of our knowledge, a research that systematically explores the role of perception of information about COVID-19 and protective behaviour in feelings of anxiety and happiness among Indonesian general population has never been conducted yet. Such data can be used for future psychological support and information provision by the government in a way that takes the emotions of the community into account. The present study aimed to assess the perception of the information provided about COVID-19 and the health protective behaviour, and to explore these as potential factors of feelings of anxiety and happiness among the general population in Indonesia during the period of a large scale social restriction in Indonesia due to COVID-19 outbreak.

2. RESEARCH METHOD

2.1. Participants

We conducted an anonymous on-line cross-sectional survey from April 2-4, 2020 during a large-scale social restriction, namely around one month after the COVID-19 outbreak in Indonesia. Eligible participants had to be Indonesia residents older than 18 years old and willing to participate in this study.

2.2. Procedures

This study was reviewed and approved by the Directorate of Research and Community Services of Universitas Padjadjaran, Indonesia. First, we constructed instruments to obtain information on demographic background (age, gender, region of residence, educational level and employment status), information provision of COVID-19, health protective behaviours, anxiety and happiness. Participants were recruited on the internet through a snowball sampling technique by spreading a survey link and they completed an online survey using the Google Form platform. All participants were voluntarily responded to the anonymous survey and provide their consent online on the first page of the survey. The survey procedure was clearly explained, and participants could interrupt or terminate participation at any time without explanation. Then, the participants would then be directed to complete an anonymous self-administered questionnaire.

To reach as many participants as possible all over the country, we relied on professional and personal networks of the researchers by reaching out to faculty members in university, students and Indonesian psychology profession association networks to broadcast and share the survey. The targeted participants were also encouraged to distribute the survey link to their personal contacts such as family members, friends or online chat groups. Two main platforms used in disseminating this survey were social media (e.g. Facebook, Twitter, Instagram) and WhatsApp. A standardised general description about the survey was given in the WhatsApp message or social media postings before the link was provided to the questionnaire. A total of 3,686 participants from 33 provinces in Indonesia took part in the survey.

2.3. Survey instruments

We developed a questionnaire that asked about the following areas: demographic data, information provision about COVID-19, health protective behaviours, and feeling of anxiety and happiness. The selection of measures was guided by our research questions and based on the measures used in fast-report articles on the COVID-19 outbreak that were accessible at the time of planning the study.

Sociodemographic data were collected on gender, age, residential location, education, and employment status. Information provision about COVID-19 was measured using a set of questions on several aspects, namely: i) Source of information (i.e. radio, television, website, official/government hotlines, and social media: Facebook, WhatsApp, Instagram); ii) Daily frequency of information searching (i.e. <3 times, 4-5 times, 6-10 times, and >10 times a day); iii) The amount of information provided; iv) Information about how the virus is transmitted; v) Information about protective behaviour to prevent the spread of the virus; vi) Information about screening/test for COVID-19; vii) Information about treatment of COVID-19; viii) Information about the impact of COVID-19; and ix) Information about referral hospitals or centres provided by Indonesian government. Participants were answered the questions on aspects 3 to 9 by a 4-point response scale (1=none, 2=very little, 3=some and 4=a lot).

Health protective behaviours were measured by questions on the following protective behaviours, namely: staying at home, washing hands, wearing a mask, sun bathing, consuming multivitamin, physical distancing, avoiding handshakes, avoid touching the face, implementing cough and sneezing etiquettes, and regular exercise at home. Participants were asked to answer in a 5-point response scale (range 1-5, 1=never; 5=always).

Anxiety and happiness were measured using two questions to describe their emotional condition within the last seven days. In order to measure feeling of anxiety, we included a question, "Are you feeling anxious?" (1=not at all to 5=very anxious). As for measuring happiness, we added a question"Are you feeling happy?" (1=not at all to 5=very happy). We adjusted the answer choices to a 5-point scale for both questions.

2.4. Data analysis

Data analyses were carried out using the IBM SPSS Statistics version 22. We used descriptive statistics to describe the demographic characteristic of the participants and the scores obtained from the questionnaires. Associations between demographic characteristics, information provision about COVID-19, health protective behaviors, and feelings of anxiety and happiness were explored by t-test. Multiple regression analyses were performed to investigate the association between information provision about COVID-19 and health protective behaviors with feelings of anxiety and happiness. We did not apply a separate analysis on different levels of demographic or include those as interaction term. Further, Cohen's *d* effect size was calculated for all comparisons, with d=between 0.02 and 0.05, d=between 0.05 and

0.08 and $d \geq 0.08$ demonstrating a small, moderate, and large effect, respectively. All tests were two-tailed, with a significance level of $p<0.05$.

3. RESULTS AND DISCUSSION

3.1. Demographic background

Data were obtained from 3,686 respondents from 33 Provinces in Indonesia. As shown in Table 1, the mean age of the participants was 37.1 years (SD=1.00). Most of participants were women and lived in West Java. Sixty-three percent of the participants (63%) worked as private employee or government officer. The majority of participants (79.4%) had a university education background.

Table 1. Demographic background of the respondents

Variable	n (%)
Age (M±SD)	37.13 ± 11.00
Gender	
Male	1,346 (36.5%)
Female	2,340 (63.5%)
Residential location (province)	
West Java	1,947 (52.8%)
DKI Jakarta	531(14.4%)
Banten	347 (9.4%)
East Java	128 (3.5%)
Central Java	126 (3.4%)
Other regions	607 (16.5%)
Employment status	
Private Employees	1,295 (35.1%)
Government officers	1,031(27.9%)
House wife	499 (13.5%)
Self Employed	371 (10.1%)
Students	334 (9.1%)
Laborers	34 (0.9%)
Unemployed	122 (3.3%)
Highest education level	
Elementary and/or Secondary school	431 (11.7%)
College/Diploma	330 (9.0%)
University	2,925 (79.4%)

3.2. Perception of information about COVID-19

Considering participant's information sources about COVID-19, main news sources were social media, television, and websites in that order more than hotlines and radio. As presented in Figure 1, the majority of participants (91%) reported that they received a lot of information about the outbreak through social media, such as Facebook, WhatsApp, and Instagram. In regard to the frequency of daily information searches, we found that 44.9% of the participants search information related to COVID-19 less than three times a day, 37% of the participants seek information for four to five times a day, 9.9% of the participants search for the information roughly 6-10 times a day, and 8.2% of participants seek information about the outbreak more than ten times a day.

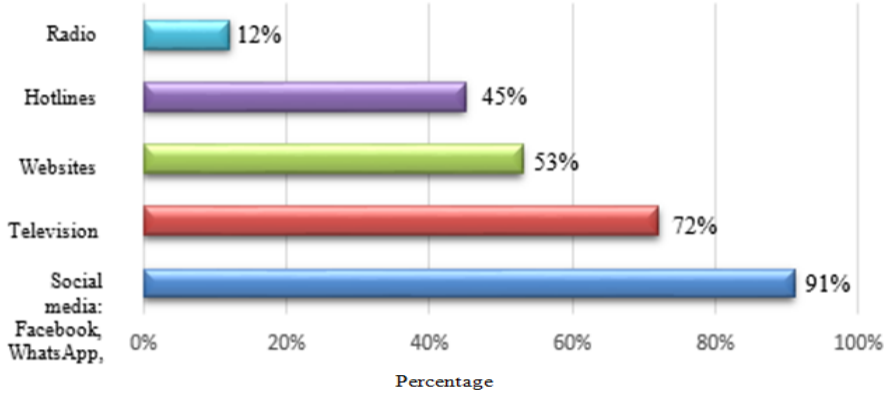

Figure 1. The percentages of frequency and type of source information about COVID-19

Related to the aspect of information provision about COVID-19, we found that a considerable number of participants stated that they were satisfied with the amount of information provided (98%) and they reported that there were adequate information about how the virus is transmitted (97%) and information about protective behavior to prevent the spread of the virus (96%) as shown in Figure 2. On the other hand, 54% of the participants said that there was no information available for them or they only receive a very limited information about screening test for COVID-19, and 49% of them also reported that they did not receive any information at all or only get a very little info about the treatment of COVID-19.

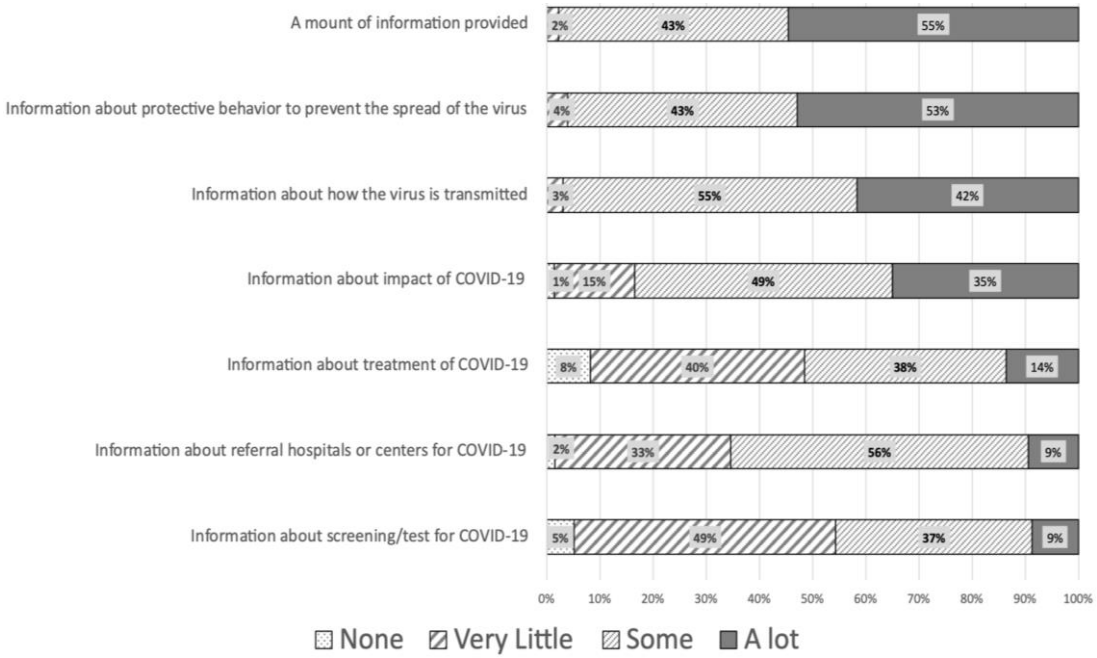

Figure 2. Perceived information about COVID-19

3.3. Protective behaviors

In regard to health protective behaviors, we found the following percentage of behaviors that were implemented 'often and always' by the participants, namely: 90% of participants folowed cough and sneezing etiquettes, 89% avoided handshakes, 84% adopting physical distancing, 82% stayed at home, 78% wore a mask, 64% consumed multivitamin, 57% did not touch the face, 51% did sun bathing, 45% washed hands, and 33% of participants did regular exercise at home.

3.4. Demographic variables related to anxiety and happiness score

Table 2 describes frequency, means and statistics for demographic background, anxiety and happiness. We found that 72% of participans reported having feeling of anxiety and 23% of them expressed being unhappy. There was a significant difference in level of anxiety among male and female participants ($t=-3.36$, $p<0.01$). Higher feeling of anxiety was found in female participants ($M=4.05$) compared to male participants ($M=3.94$). Participants with laborer employment status expressed a higher feeling of anxiety ($M=4.5$) and had a lower score on happiness ($M=2.53$) compared to those with another employment status. We found significant difference in level of happiness based on education level ($t=17.48$, $p<0.01$). Participants with elementary-high school background expressed significantly lower happiness score ($M=2.85$) than participants with college or university background ($M=3.15$).

3.5. Perception of information about COVID-19 and protective behaviors related to feelings of anxiety and happiness

Results from the multiple linear regression analyses as presented in Table 3 show that the higher frequency of daily information search about COVID-19 (β=0.16, p-value=0.01), higher amount of information about COVID-19 provided (β=0.06, p-value=0.01), and higher amount of information about how the virus is transmitted (β=0.06, p-value=0.01) significantly predicted a higher feeling of anxiety. On the

other hand, further information about screening test for COVID-19 (β=-0.05, p-value=0.05) and information about treatment of COVID-19 (β=-0.05, p-value=0.05) significantly predicted a lower feeling of anxiety.

In regard of happiness, we found that higher frequency of daily information search about COVID-19 (β=-0.08, p-value=0.01), higher amount of information about COVID-19 provided (β=-0.04, p-value=0.05), and higher information about impact of COVID-19 (β=-0.05, p-value= 0.05) significantly predicted lower happiness. However, higher provision on information about protective behavior to prevent the spread of the virus (β=0.06, p-value=0.01), information about treatment of COVID-19 (β=0.12, p-value=0.01) and information about referral hospitals or centers for COVID-19 (β=0.07, p-value=0.01) were significantly predicted higher happiness.

Table 2. Frequency, means and statistics for demographic background, anxiety and happiness

Variable	f (%)	Anxiety		Happiness	
		M (SD)	t/F	M (SD)	t/F
Gender					
Male	1,346 (36.5%)	3.94 (1.04)	-3.36**	3.13 (1.02)	0.93
Female	2,340 (63.5%)	4.05 (0.92)		3.10 (0.96)	
Employment status					
Laborers	34 (0.9%)	4.5 (0.96)	7.84**	2.53 (1.02)	11.79**
House wife	499 (13.5%)	4.17 (0.9)		3.14 (0.97)	
Students	334 (9.1%)	3.93 (1)		2.85 (0.97)	
Private employees	1,295 (35.1%)	4.03 (0.94)		3.06 (0.98)	
Government officers	1,031 (27.9%)	3.79 (1.03)		3.50 (0.93)	
Self employed	371 (10.1%)	3.82 (1.08)		3.19 (1.01)	
Unemployed	122 (3.3%)	3.93 (1.08)		3.18 (0.98)	
Education level					
Elementary-High school	431 (11.7%)	4.1 (1.01)	2.5	2.85 (1.07)	17.48**
College/Diploma	330 (9.0%)	4.03 (1.13)		3.15 (1.11)	
University	2,925 (79.4%)	3.99 (0.94)		3.15 (0.95)	

*p<0.05; **p<0.01

Table 3. Regression analyses of information provision associated with feeling anxiety and happiness

Indicators	M(SD)	Feeling anxiety		Happiness	
		R squared	Beta	R squared	Beta
Frequency of daily information searching about COVID-19	1.81	0.041	0.16**	0.017	-0.08**
Amount of information about COVID-19 provided	3.39		0.06**		-0.04*
Information about how the virus is transmitted	3.52		0.06**		-0.04
Information about protective behavior to prevent the spread of the virus	3.49		-0.03		0.06**
Information about screening/test for COVID-19	2.49		-0.05*		0.02
Information about treatment of COVID-19,	2.57		-0.05*		0.12**
Information about impact of COVID-19,	3.17		0.00		-0.05*
Information about referral hospitals or centers for COVID-19	2.73		-0.02		0.07**

*p<0.05; **p<0.01

Multiple linear regression analyses were also used to evaluate association between health protective behaviors and feeling of anxiety and happiness among participants. As presented in Table 4, we found that staying at home (β= 0.04, p-value=0.05), washing hands (β=0.09, p-value=0.01), wearing a mask (β=0.12, p-value=0.01), sun bathing (β=0.05, p-value=0.05), avoiding handshakes (β=0.07, p-value=0.01) were significantly associated with higher feeling of anxiety. On the other hand, doing regular exercise at home (β=-0.10, p-value=0.05) was associated with lower feeling of anxiety. Regarding to happiness, we found that regular exercise at home (β=0.04, p-value=0.05), physical distancing (β=0.09, p-value=0.01) and implementing cough and sneezing etiquettes (β=0.09, p-value=0.01) were significantly and positively associated with happiness.

3.6. Discussion

The pandemic COVID-2019 has led to a serious impact on many aspects and become a center of attention of the world. This study found that the majority of participants search and obtain information about COVID-19 from social media (i.e. Facebook, WhatsApp, Instagram) and television. Previous studies found that after first state COVID-19 case announcements, there was a significant increase in the extent to which people seek out information about the epidemic through the internet and several online sources [32], [33]. A study in China about health communication through news media during the early stage of the COVID-19

Outbreak found the top three popular themes of news were prevention and control procedures (32.6%), medical treatment and research (16.6%), and global/local social/economic influences (11.8%) [34]. The reason why social media emerged as the main source of information about COVID-19 is because social media has opened new channel for rapid communication and information circulation [35], [36]. The expansion of internet network and social media has exceptionally changed how the information is delivered and providing the public with timely news coverage.

Table 4. Regression analyses of health protective behaviors associated with feeling anxiety and happiness

Indicators	M(SD)	Feeling anxiety		Happiness	
		R squared	Beta	R squared	Beta
Staying at home	4.16 (0.96)	0.057	0.04*	0.03	0.05
Washing hands	3.39 (1.11)		0.09**		0.01
Wearing a mask	4.19 (1.11)		0.12**		-0.05**
Regular exercise at home	3.05 (1.14)		-0.10*		0.12**
Sun bathing	3.47 (1.16)		0.05*		0.03
Consuming multivitamin	3.76 (1.2)		0.01		0.02
Physical distancing	4.27 (0.86)		0.00		0.05*
Avoiding handshakes	4.55 (0.82)		0.07**		-0.06**
Avoid touching the face	3.65 (1)		0.02		-0.06**
Implementing cough and sneezing etiquettes	4.48 (0.76)		0.02		0.05**

*p<0.05; **p<0.01

Information seeking at the time of an outbreak is prevalent response. During Ebola and H1N1 epidemic, there was an increase in monitoring and information seeking about the health crisis [37]. We found that almost half of participants (44.9%) searched information related to COVID-19 less than three times a day. Only small percentages of participants appear to search for more than 10 times a day. The low rate of daily information seeking could be viewed from a positive angle as a greater exposure of news or information about the outbreak may bring about more psychological distress [38], [39]. Despite the fact that dissemination of information is essential for staying informed, the coverage of current epidemic did negatively affect the psychological well-being in Indonesia, thus lessen the daily information consumption about COVID-19 could act as a protective factor from negative emotional responses. Regarding satisfaction to information provision, the majority of participants stated that they satisfied with the amount of information provided, specifically about how the virus is transmitted and protective behavior to prevent the spread of the virus but less satisfied with available information about the screening test and treatment of COVID-19.

In regard to health protective behavior to prevent the spreading of the virus, we found a high to moderate percentages of participants implementing cough and sneezing etiquettes, avoiding handshakes, physical distancing, staying at home, and wearing a mask. This findings is in line with a study involving 3,464 general population in Indonesia that found the majority of participants show good practices to prevent and mitigate the COVID-19 pandemic [40]. Protective behaviors that tend to be implemented less frequently were washing hands and doing regular exercise at home. The small percentage of participants who practised hand washing (less than 50%) was quite concerning, considering washing hand with soap and water has been proven to effectively curb the virus [41]. In general, sanitation conditions in Indonesia are not sufficient. Previous data from Central Bureau of Statistics in 2019 showed that only 76.07% of the national population has access to hand washing facilities with soap and clean water, and even lower percentages for region outside urban areas [42]. Based on this statistics, none of the country's 34 provinces reported figure above 90 percent, not even our sample's residential locations, which recorded at most 73% to 81% population with access to adequate washing facilities.

We identified that 72% of participants reported having feeling of anxiety and 23% of them reported being unhappy. Female participants were found had significant higher feeling of anxiety compared to male participants. This finding was suported by earlier COVID-19 research where females participants were more likely to experience anxiety than males [43]. However, women might be more anxious in general regardless of COVID-19 pandemic. Gender differences in anxiety could be related to socialization of different gender roles for men and women, i.e women are more inclined to be open about their negative feelings than men [44]. Nonetheless, the role of socialization proccess add to suspectibility of anxiety is complicated.

Participants who had laborer employment experienced higher feeling of anxiety and lower score on happiness. People's level of anxiety during the COVID-19 was not exclusively dealing with health impact in general but also extends to socioeconomic impacts of the epidemic [45]. The consequences from public health measure against the COVID-19 such as job losses, financial insecurities, and disruption to daily activities can led to negative impact on people's mental health and their well-being [46], [47]. People, who have an unstable job position, receive unpredictable income or experienced loss of household income may be

vulnerable to feel more anxious and experience lower well-being due to the uncertainty of the epidemic. Economic anxiety can also apply to people who are economically vulnerable and insecure, even when there is no virus outbreak. Moreover, participants with elementary-high school background reported significantly lower happiness score. People's emotional experiences during the outbreak can be fluctuated through the course of the pandemic and the nature of public health measure applied.

In this study, it was found that frequent daily information searching about COVID-19, higher amount of information about COVID-19 provided, and grater amount of information about how the virus is transmitted and the impacat of COVID-19 significantly predicted a higher feeling of anxiety and lower happiness. Disproportionate and constant informations about COVID-19 (i.e., threat, infection and death rate) could make people feel more anxious about the current situation which can have an adverse effect on their psychological health. Our finding was confirmed by previous study which showed that information searching about COVID-19 might be related to fear-related emotions [48]. The level of knowledge of COVID19 was correlated with level of anxiety and sensitiveness to some information sources [49].

Despite the dissemination of information is essential measure, the persistent exposure to COVID-19 in mass media can increase the levels of anxiety and fear-related emotions [50]–[52]. Individuals who consuming and received greater amounts of information about COVID-19 from the media had a higher level of anxiety [53]–[55]. Previous research also showed that, the more people get exposed to news content associated with COVID-19 especially on social media, the higher tendency to ruminate over the information [56]. Information seeking about COVID-19 during the pandemic from the internet also correlated with greater symptoms of anxiety and depression [57]. These findings could explain association between information exposure about COVID-19 and feeling of anxiety during the outbreak.

On the other hand, greater amount of information about screening/test for COVID-19 and information about treatment of COVID-19 predicted a lower feeling of anxiety. Information that highlighted the benefits of engaging in certain behavior, focus on protecting oneself and others, and appeal to scientific norms more likely to be persuasive and accepted by public [58]. For this reason, messages that provided information about screening and treatment of the disease might be perceived as useful in helping people lower their negative emotional responses. By receiving this information, people know that the viral infection can be detected and treated early to prevent more severe complication from the disease. This type of informations give people a sense of control amidst of chaos due to the pandemic, it is generally known that the feeling of having control on the stressor can reduce stress. Building up the publicity and transparency of COVID-19 knowledge and careful measures adopted to prevent the spread of COVID-19 or information about the number of people who have recovered and the progress of treatment and vaccines can reduce the anxiety level of the public [59].

We found that information about protective behaviours, referral hospitals for COVID-19 and treatment of COVID-19 can predict higher happiness. It can due to people's supportive attitude toward credibility of information updates and trust in the epidemic control at the time of public health emergency. The type and content of information about current pandemic can determine different emotional responses among people. Higher perceived of knowledge was related with a higher sense of control, which lead to differences in emotional well being during the early stage of the pandemic. Our finding showed that protective behaviours, namely staying at home, washing hands, wearing a mask, sun bathing, avoiding handshakes were associated with greater anxiety. This data could explain the role of anxiety in enforcing precautionary behaviours [60]. Having fear of getting infected can make people implement certain behaviours that reduce the risk of catching the virus, but these worries can also arise from self-protective behavior. It can be said that people who engage in protective behaviours against the spread of the virus were motivated by the feeling of anxiety they experienced. Study among Taiwanese showed that individuals who reported worsening psychological health during the pandemic were more likely to implement protective behaviors (avoiding crowded places and wearing mask) [61].

Our result showed that regular exercise at home was associated with lower feeling of anxiety and predicted happiness. Physical activity is recommended during the COVID-19 pandemic due its multiple benefits on physical health (boost immune system) and mental health (improving mood) [62]. People who do sport are generally happier and have a better well-being, one of the reason for this relationship is that excerise was perceived as being pleasurable [63], [64]. This result may not be resulted within the context of COVID-19 pandemic solely.

We also found protective behaviors were associated with happiness. Implementing protective behaviors can make people feel happier probably because those behaviors can make them feel safer from virus infection amid the pandemic. Perceived personal risk and perceiving health measures as effective associated with reported adoption of protective behaviors during current and past pandemic [65], [66].

Our study has several limitations that should be considered when interpreting the findings. The study used cross-sectional design which can't explain the causality relationship between variables. Future studies can broaden this research by using longitudinal or experimental research designs to explore causal

links between psychological variables and concern about the COVID-19. As this study used a snowball sampling technique, we cannot measure the response rate of the participants. Our participants were limited to internet users and tech savy which makes many underprivileges populations might not be able to participate in the study. Another limitation might be that people give socially desirable answers. It is important for future study to perform a more in-depth study, using diaries to note protective behaviours might be recommended. Additionally, some items of the questionnaire were introduced by us without any prior studies. Thefore, a more comprehensive assessment of instrument psychometric properties are needed. It is desirable to expand further research and consider different variables, such as the physical, psychological and socioeconomic impact, the timing of the survey in the course of pandemic, and the extend of public health measures in Indonesia. Nevertheless, we used a quite large samples in this study and some predictors were significantly predicted the feelings of anxiety and happiness, our results can be useful to design a large scale intervention.

4. CONCLUSION

The majority of the Indonesian people implemented protective measures in particular regarding sneezing and coughing etiquette and social distancing. Greater amount of information about COVID-19 and applying protective behaviour were associated with higher anxiety. Taking protective measures appeared to be related with feeling of happiness. Our study should be replicated in other populations in Indonesia (especially rural and outside Java). Nevertheless, our research has given suggestions about the information provision, application of preventive measure and the factors associated with feelings of anxiety and happiness. This outcome can be valuable to design a psychological intervention for vulnerable groups during and after the COVID-19 pandemic.

ACKNOWLEDGEMENTS

The authors would like to thank all participants for their generous participation in this study. This research was funded by COVID-19 Research Grant from Universitas Padjadjaran, grant number 1735/UN6.3.1/LT/2020.

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