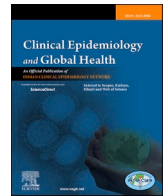




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## Original article



# Adolescents' mental health status and influential factors amid the Coronavirus Disease pandemic

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## ABSTRACT

## Background

The preventive measure of Coronavirus Disease pandemic, such as nationwide lockdown, might lead to stress, depression, and anxiety, prominently in adolescents. Many factors were indicated to influence its severity. This study aimed to investigate the magnitude of COVID-19-related mental health problems in adolescents and the associated factors.

## Methods

This cross-sectional study gathered 2018 adolescents throughout Indonesia from April 22nd-28th 2020. The questionnaire was spread through social media and included Kessler-10 Psychological Distress scale and closed-ended questions about the risk and protective factors. The results were analyzed using Mann-Whitney *U* test, Kruskal-Wallis test, and Logistic Regression.

## Results

The participants were mostly males (91.8%) with a median age of 19. The results showed 54.1% experienced varying degrees of distress. All variables were significantly related with psychological distress during Mann-Whitney-*U* and Kruskal-Wallis test. The logistic regression analysis showed maintaining or improving dietary pattern and sleep quality was found to be protective against psychological distress (OR = 0.497, 95%CI = 0.34–0.725 and OR = 0.515, 95%CI = 0.372–0.714, respectively), while others were risk factors, i.e.: Not having a confidant (OR = 1.539, 95%CI = 1.226–1.931), frequent argument with parents (OR = 1.735, 95%CI = 1.343–2.24), feeling worried (OR = 2.364, 95%CI = 1.528–3.656), chronic diseases (OR = 2.601, 95%CI = 1.468–4.606), and mental illnesses (OR = 9.866, 95%CI = 3.855–25.249).

## Conclusion

More than half of adolescents experienced distress. The findings called for initiatives by experts in providing psychosocial support for adolescents.

## 1. Introduction

Since Coronavirus Disease (COVID-19) was declared a Public Health Emergency of International Concern by World Health Organization (WHO) in January 2020,<sup>1</sup> healthcare professionals and the general public had been made wary of the highly infectious trait of the pathogen behind COVID-19, the severe acute respiratory syndrome coronavirus 2

(SARS-CoV-2).<sup>2</sup> Its multi-organ involvement, and the related morbidity and mortality, had called for worldwide public health measures to contain and slow down the spread of the disease.<sup>3</sup> People were advised to stay indoors and work from home where possible, while social gathering was to be avoided.<sup>4</sup> At the moment, there were cumulatively over 84 million COVID-19 cases around the world, which had resulted in about 1.8 million deaths.<sup>5</sup>

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Fear of contracting the disease and significant changes to people's daily routines had raised concerns about their mental health and well-being. Adolescents, in particular, were facing challenges related to home-schooling and navigating the new dynamic of their relationships with family and friends due to the physical distancing measures.<sup>6</sup> It had been argued that young people were involved in spreading the virus through a lack of respect for quarantine and sanitation procedures. However, a campaign from the United Nations Educational, Scientific, and Cultural Organization (UNESCO) had shone a light on their role in responding to the pandemic, such as: providing their fellow with psychosocial support, volunteering to distribute items for their communities and vulnerable people, fighting misinformation, and raising awareness about proper health measures.<sup>7</sup>

Due to nationwide lockdowns, up to 1.6 billion young people worldwide were affected by school closure and had to switch to remote learning.<sup>8</sup> Such closures meant reduced access to resources they had through school that was essential for stress regulation.<sup>9</sup> In Indonesia, series of polls by the United Nations Children's Fund (UNICEF) showed that 57% of adolescents also faced economic issues as their parent's jobs were affected.<sup>10</sup> Economic uncertainty and stress exacerbated domestic violence in abusive homes.<sup>11</sup> Adolescents with pre-existing mental health problems and low socioeconomic status were found to be disadvantaged and disproportionately hit by COVID-19-associated mental health risks.<sup>9</sup> Another poll discovered the majority of young respondents experiencing the pressure to stay productive, stress and lack of concentration during online learning, as well as feelings of easily irritated, angry, or upset.<sup>12</sup>

The COVID-19 pandemic could also result in increased psychiatric disorders such as post-traumatic stress, depressive, and anxiety disorders, as well as grief-related symptoms.<sup>13</sup> A study in 8079 Chinese students aged 12 to 18 found the prevalence of depression, anxiety, and a combination of both to be 43.7%, 37.4%, and 31.3%, respectively.<sup>14</sup> The magnitude of this problem could not be overlooked since adolescents were projected to make up approximately 25.09% of the population in Indonesia.<sup>15</sup> Despite the importance, the description of COVID-19-related mental health problems and their extent in adolescents, especially in developing countries, was still scarce and needed further assessments.

This study aimed to investigate the presence and the magnitude of mental health problems among adolescents during the COVID-19 pandemic, while also determining protective and risk factors associated with the severity of the mental health problems. Traditionally, adolescence is described as the period between 10 and 19 years of age.<sup>16</sup> (However, more recently proposed definition of adolescents, covering the age 10–24 years, was better aligned with contemporary pattern of adolescent growth and the timing of role transitions that had greatly transformed in the 21st century.<sup>17</sup> Therefore, adolescents in this study were defined as individuals in the 10 to 24-year age group. Distinction between genders was not available, as the scope of this phase were beyond merely biological maturation. Meanwhile, the more generic term young people was not clearly defined.

The mental health problems were determined using the Kessler-10 (K10). K10 is a 10-question screening scale of psychological distress, which encompassed symptoms such as: feeling depressed, nervous, restless, and tired out. K10 has been known for its brevity, strong psychometric properties, and ability to discriminate cases from non-cases.<sup>18</sup> Several studies have deemed it reliable and valid for use in adolescents, such as in Indonesia and Hongkong.<sup>19,20</sup>

## 2. Methods

### 2.1. Study participants and sampling

This cross-sectional study was conducted online throughout Indonesia from April 22nd to 28th 2020. The questionnaire was targeted for participants from the age of 10–24, with the exception of students

who were taking health and medicine majors as well as people who work in medical professions. At the beginning of the questionnaire, there was an introductory page, explaining that the questionnaire was for a research and participation was voluntary. It also contained a summary of the research, including the purpose and duration of the study. The participants could opt to continue or quit the study. Later in the questionnaire, there were questions that inquired participants' age and profession, and should they have been in the exclusion criteria, the online form would take them to the end of the section, without filling in the rest of the questions. Thus, their data would be excluded.

A broadcast message along with a poster were distributed via Instagram stories and Whatsapp groups. The poster contained basic information about the study and URL link to the online, self-reported questionnaire. People who took interest in this study were allowed to fill in the questionnaire, and to help forwarding the poster for the purpose of gathering more participants online.

The amount of the minimum sample was calculated based on the formula for uncoupled numeric comparative analytic study. The mean and standard deviation were derived from study by Zhou et al.<sup>14</sup> Type 1 error ( $Z\alpha$ ) of 5% and type 2 error of 20% ( $Z\beta$ ) were utilized. It resulted in minimum sample of 174 subjects. A total of 2018 respondents from all 34 provinces of Indonesia completed the questionnaire and were included in the analysis.

### 2.2. Instruments

#### 2.2.1. Demographic information

A section of the survey was to inquire of the respondents about their demographic information, including age, gender, education, province of current residence, occupation, and monthly income. Primary education referred to elementary school, secondary junior and senior high school, and tertiary bachelor's degree and its equal. Monthly income ranges were categorized into: less than five million Rupiah, five to ten million Rupiah, and more than ten million Rupiah.

#### Kessler-10

The Kessler Psychological Distress Questionnaire are based on anxiety and depressive symptoms that the respondents experienced over the past 30 days. The term 'distress' encompassed symptoms such as: feeling depressed, nervous, restless, and tired out. The respondents were instructed to rate the occurrence using a 5-item Likert Scale ranging from 1 (none of the time) to 5 (all of the time). The Indonesian version was utilized, and the results were analyzed as a quantitative variable. The severity of the psychological distress could be classified as well (<20), mild (20–24), moderate (25–29), and severe ( $\geq 30$ ).

### 2.3. Protective and risk factors

A set of questions were developed after literature review, which was then evaluated by experts in Child and Adolescent Health as well as Psychiatry to reach an agreement. This package comprised of questions regarding social support system (having a confidant, keeping in touch with friends, living partner, frequent arguments with parents), a history of chronic disease(s) and/or mental illness, dominating affect, and lifestyle-related factors.

Keeping in touch with friends was defined as regular contact with a minimum of twice a week. Frequent argument with parents was a subjective comparison to the situation before the pandemic, whether it was felt there were more arguments or not. History of chronic diseases comprised asthma, COPD, tuberculosis, cardiovascular disease, diabetes mellitus, autoimmune, hepatitis, and cancer. Meanwhile, mental illnesses remained unspecified. These variables, along with having a confidant, were categorized into 'yes' or 'no' answers.

Lifestyle-related factors consisted of dietary pattern, intensity of exercise, and quality of sleep. The participants were asked if these lifestyle-related factors of theirs had improved, worsened, or remained unchanged, based on their own subjective perception. Living partners

were classified into living with parents, relatives/friends, and alone. The dominating affect was defined as a feeling that most often recurred during the quarantine. The respondents were provided with options to choose the one most suitable to their experience.

#### 2.4. Data analyses

The data were compiled in Spreadsheet and analyzed with Statistical Package for the Social Sciences (SPSS) version 22.0. Demographic data were highlighted narratively in percentage. Normality was tested using One-Sample Kolmogorov-Smirnov. The outcome variable, psychological distress, was found not to be normally distributed. Therefore, the Mann-Whitney *U* test and the Kruskal-Wallis test were chosen. The Mann-Whitney *U* test was used for 'yes or no' questions, and the Kruskal-Wallis test was for questions with three or more answer choices. Post-hoc analysis of Kruskal-Wallis test results was done using the Dunn test. The Dunn test assisted in determining which pair, between each of the three variables and the outcome, had significant association.

The multivariate model was derived from Logistic Regression analysis. The independent variables would be included in the model when the bivariate analyses of each independent variable with dependent variable resulted in  $p < 0.25$ . Every variable was qualified to be included.

In the logistic regression analysis, any variable with  $p > 0.05$  would have been removed from the model. In this case, "Keeping in touch with friends", "Living partners", and "Intensity of exercise" were removed. No OR changes of more than 10% occurred in the remaining variables after these variables were removed one by one. Therefore, the final model was achieved.

### 3. Results

A total number of 2018 subjects from all 34 provinces of Indonesia participated for this study. The participants were 10–24 years of age, with a median of 19 years old. Most participants were male (91.8%) with education level of secondary/high school (83.4%) and monthly income of less than Rp5,000,000 or approximately USD 350 (56.7%). Exclusion criteria was applied for people who were from health-related majors and professions.

The degree of psychological distress among adolescents during the pandemic, as evaluated with the Indonesian version of the Kessler-10 Psychological Distress Scale, was displayed in Table 1. More than half of the participants (54.1%) experienced distress, ranging from mild to severe. Factors influencing adolescents' distress during the pandemic were analyzed. For 'yes or no' questions, the Mann-Whitney *U* test was utilized because the outcome variable, psychological distress, was found not to be normally distributed. The results were presented in Table 2.

For questions with three or more answer choices, the Kruskal-Wallis analysis were done and presented in Table 3, along with Dunn's post hoc analysis to specify which pairs were significantly different. Participants with worsened dietary pattern, quality of sleep, and intensity of exercise were significantly associated with a higher level of distress than the improved or unchanged ones. The five most common answers to the dominant affect were bored (23.2%), worried (15.7%), unbothered (13.8%), eager to help or do something (12.2%), and relaxed (6.8%). Participants who admitted being relaxed and those unbothered were significantly associated with lower level of distress, compared to those

**Table 1**  
Severity of psychological distress in adolescents.

Severity of Psychological Distress	Frequency (n = 2018)	Percentage (%)
Mild (20–24)	387	19.2
Moderate (25–29)	289	14.3
Severe ( $\geq 30$ )	415	20.6
Well (<20)	927	45.9

who admitted being worried and bored.

Since the Mann-Whitney *U* and the Kruskal-Wallis test showed significant p-values for all independent variables, these variables were further included in logistic regression analysis. In the multivariate model, three variables, "Keeping in touch with friends", "Living partners", and "Intensity of exercise", had insignificant p-values and, thus, were not kept in the model. The final multivariate model of factors associated with psychological distress was shown in Table 4. The results indicated that unchanged and improved dietary pattern and quality of sleep were found to be protective (OR <1.0), while the rest posed as risk factors for adolescents to develop psychological distress.

### 4. Discussion

COVID-19 pandemic was indicated to have adverse long-term consequences on children and adolescents.<sup>21</sup> However, studies assessing adolescents' mental health status during COVID-19, especially in developing countries, were still limited in number. This study aimed to evaluate the mental health status of adolescents, along with factors that influence its severity.

More than half (54.1%) of the participants of this study experienced distress, ranging from mild to severe. This phenomenon may be attributable to disruption in their routine and opportunities for interpersonal communication and engaging in various activities.<sup>22</sup> This number was similar to a study in Chinese students that found the prevalence of depression, anxiety, and a combination of both to be 43.7%, 37.4%, and 31.3%, respectively.<sup>14</sup>

This, however, was somewhat higher than suggested from a systematic review on COVID-19 and mental health in the general population, i.e.: symptoms of anxiety and depression (16–28%) and self-reported stress (8%), which may be associated with disturbed sleep.<sup>23</sup> This discrepancy might be explained by the increasing use of social media among young people, which was likely to lead to cyber-bullying and contribute to depression.

The results of this study indicated that adolescents' distress regarding the pandemic was associated with the social support system (family and peers), history of medical conditions (chronic diseases and mental illnesses), lifestyle changes (dietary pattern and sleep quality), and dominant affect (worried and bored). However, no significant difference in living partners, i.e. living with parents vs alone, was found after the multivariate model, as opposed to the previous study.<sup>24</sup>

Frequent argument with parents was observed to have a negative impact on adolescents' mental health. Previous studies had described derogatory words and other verbal attacks, as well as harsh disciplinary actions from parents to be a source of discomfort and associated with a higher score of mental disorder in adolescents.<sup>25</sup> Conversely, having a confidant was shown to positively affect adolescents' mental health. It was in accordance with a study explaining the role of peers as valuable for adolescents to communicate their feelings and the problems they were facing,<sup>22</sup> and another study describing that the support from family and social networks lessened the impact of stressors on individuals.<sup>26</sup>

History of chronic disease and/or mental illnesses were also found to be disadvantageous in the face of psychological distress. This was in agreement with previous studies, where lockdown and fear of infection due to the COVID-19 pandemic were reported to exacerbate the existing mental health disorders in adolescents,<sup>27</sup> while also contributing to new onset of stress-related disorders in adolescents with pre-existing vulnerabilities.<sup>9</sup> Other study also identified individuals with existing physical or psychiatric morbidity to be at higher risk for adverse mental health outcomes.<sup>28</sup>

Maintaining or improving dietary pattern and quality of sleep were found to reduce psychological distress. This finding was backed by an expert consensus, stating that a balanced diet and regular rest were amongst the influential measures to maintaining emotional stability and mental health in pediatric population.<sup>21</sup> Improvement of well-being by healthy lifestyle during home confinement was also observed in the

**Table 2**  
Bivariate analysis between stressors and psychological distress in adolescents.

	Psychological Distress Degree				Total (N = 2018)	Mean Ranks <sup>a</sup>	p-value
	Well	Mild	Moderate	Severe			
Having a confidant							
Yes	583	215	156	163	1117	919.56	<0.001*
No	344	172	133	252	901	1126.65	
Keeping in touch with friends							
Yes	752	302	221	298	1573	985.36	<0.001*
No	175	85	68	117	445	1106.2	
Frequent Argument with parents							
Yes	644	297	227	360	1528	1061.33	<0.001*
No	283	90	62	55	490	858.09	
Having chronic disease(s)							
Yes	29	17	19	39	104	1298.26	<0.001*
No	898	370	270	376	1914	996.49	
Having a history of mental illness(es)							
Yes	9	9	11	74	103	1658	<0.001*
No	918	378	278	341	1915	977.35	

<sup>a</sup> The distribution between groups was not similar; \*p-value is significant at  $p < 0.05$ .

**Table 3**  
Kruskal-Wallis analysis of stressors and psychological distress in adolescents.

	Total Participants (n = 2018)	Mean Ranks <sup>a</sup>	Statistics	p-value	Worsened	Unchanged	Improved
Dietary pattern			127.098	<0.001			
Improved	423	894.38			$p < 0.001^b$	$p = 0.059$	–
Unchanged	1292	970.61			$p < 0.001^b$	–	$p = 0.059$
Worsened	303	1352.34			–	$p < 0.001^b$	$p < 0.001^b$
Quality of Sleep			116.603	<0.001			
Improved	348	930.85			$p < 0.001^b$	$p = 0.423$	–
Unchanged	810	875.85			$p < 0.001^b$	–	$p = 0.423$
Worsened	860	1173.10			–	$p < 0.001^b$	$p < 0.001^b$
Intensity of Exercise			54.603	<0.001			
Improved	353	881.19			$p < 0.001^b$	$p = 0.80$	–
Unchanged	884	962.54			$p < 0.001^b$	–	$p = 0.80$
Worsened	781	1127.11			–	$p < 0.001^b$	$p < 0.001^b$
Living partners			11.239	0.004	<b>Alone</b>	<b>Relatives/Friends</b>	<b>Parents</b>
Parents	1644	991.50			$p = 0.022^b$	$p = 1.000$	–
Relatives/Friends	208	1089.24			$p = 0.069$	–	$p = 1.000$
Alone	166	1118.84			–	$p = 0.069$	$p = 0.022^b$
Dominating affects			51.682	<0.001	<b>Eager to Help</b>	<b>Bored</b>	<b>Worried</b>
Bored	469	766.11			$p = 1.000$	–	$p = 1.000$
Worried	316	810.51			$p = 0.554$	$p = 1.000$	–
Unbothered	279	611.76			$p = 0.004^b$	$p < 0.001^b$	$p < 0.001^b$
Eager to help	245	742.35			–	$p = 1.000$	$p = 0.554$
Relaxed	137	596.22			$p = 0.011^b$	$p < 0.001^b$	$p < 0.001^b$

<sup>a</sup> Dunn's Post-Hoc Tests.

<sup>b</sup> p-value is significant at  $p < 0.05$ .

adult population.<sup>29</sup> Negative affect, namely bored or worried, was shown to be deleterious to adolescents' well-being. Expressing negative affect was expected to be a result of the inability to play and meet with friends and engaging in in-person activities.<sup>11</sup>

This study faced several limitations in terms of scope. Mental health determinants of adolescents, such as a history of abuse and violence, were not taken into account in this study.<sup>25</sup> Compared to the newly-developed tool to screen for COVID-19-related distress, i.e. the COVID-19 Stress Scales (CSS), and taken into consideration these factors' relevance in Indonesia, this study was lacking in measuring participants' fear of economic consequences and their reassurance-seeking behavior.<sup>30</sup> This study did not assess the direct connection between mental health status and sociodemographic factors (e.g.: gender, education, living area) as well as impact of a history of medical conditions in the family, including suspected or confirmed cases of COVID-19, and bereavement.

Due to the social restriction, collecting data by interviewing respondents in-person was not feasible. An online survey might result in

selection bias, as only people with internet access were able to participate in this study. This might also influence comprehension of the questions and their respective answers. The timing of data collection was in the pre-peak period of COVID-19 pandemic, hence the results might exhibit discrepancy with other studies, which was held in subsequent peak and post-peak period of the pandemic.

## 5. Conclusion

COVID-19 has become a worldwide health concern. Amongst its consequences were mental health disorders, which were often overlooked in the adolescent population. Covering all 34 provinces in Indonesia, this study found more than half of its adolescent participants experienced distress. The findings of this study called for initiatives by experts to partner with adolescents in providing psychosocial support and promoting healthy lifestyles among their fellow, possibly through online sessions and/or campaigns. It was also recommended for future studies to examine other possible stressors that might result in a mental



**Table 4**  
Logistic regression analysis of factors influencing adolescents' distress.

Variables	B	p-value	OR	95% CI
Not having a confidant	0.431	<0.001	1.539	1.226-1.931
Frequent Argument with parents	0.551	<0.001	1.735	1.343-2.240
Improved Dietary pattern	-1.054	<0.001	0.348	0.227-0.535
Unchanged Dietary pattern	-0.700	<0.001	0.497	0.340-0.725
Improved Quality of Sleep	-0.663	<0.001	0.515	0.372-0.714
Unchanged Quality of Sleep	-0.715	<0.001	0.489	0.381-0.628
Dominant Affects (Bored, as compared to Relaxed)	0.506	0.016	1.659	1.099-2.504
Dominant Affects (Worried, as compared to Relaxed)	0.860	<0.001	2.364	1.528-3.656
Having a chronic disease(s)	0.956	0.001	2.601	1.468-4.606
History of mental illnesses	2.289	<0.001	9.866	3.855-25.249

health toll, i.e.: excessive social media use and increased violence at home. A follow-up study was also indicated to compare the state of adolescents' mental health between this study and during the recovery phase of COVID-19.

#### Declarations of interest

None.

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#### Ethics approval and consent to participate

This study was approved by the Ethics Committee of Faculty of Medicine, Pelita Harapan University. The approval letter was issued with the number 141/K-LKJ/ETIK/IV/2020. All subjects have given their consent to participate in this study without coercion.

#### Availability of data and materials

Data sharing was not applicable to this article.

#### CRedit authorship contribution statement

**Stella Angelina:** Conceptualization, Investigation, Formal analysis, Writing – original draft, Writing – review & editing. **Andree Kurniawan:** Conceptualization, Methodology, Validation, Supervision, Writing – review & editing. **Fransisca Handy Agung:** Conceptualization, Methodology, Validation, Supervision, Writing – review & editing. **Devina Adella Halim:** Conceptualization, Investigation, Writing – review & editing. **Felix Wijovi:** Conceptualization, Investigation, Writing – review & editing. **Claudia Jodhinata:** Investigation, Resources, Writing – review & editing. **Nadya Nathalia Evangelista:** Investigation, Resources, Writing – review & editing. **Cindy Monika Agatha:** Writing – review & editing, Resources. **Sisilia Orlin:** Investigation, Resources, Writing – review & editing. **Audrey Hamdoyo:** Investigation, Resources, Writing – review & editing.

#### Declaration of competing interest

None.

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#### References

- World Health Organization. *COVID-19 Events as They Happen*. WHO; 2020 [updated 2020 July 31<sup>st</sup>; Cited 2020 Dec 22<sup>nd</sup>]. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen>.
- Zheng J. SARS-CoV-2: an emerging coronavirus that causes a global threat. *Int J Biol Sci.* 2020;16(10):1678–1685.
- Zaim S, Chong JH, Sankaranarayanan V, Harky A. COVID-19 and multiorgan response. *Curr Probl Cardiol.* 2020;45(8), 100618.
- Williams N. Social distancing in the COVID-19 pandemic. *Occup Med (Lond).* 2020; kqaa072.
- Coronavirus Worldometer. *Update (Live)*. Worldometer; 2021 [updated Jan 2<sup>nd</sup> 2021; cited Jan 2<sup>nd</sup> 2021]. Available from: <https://www.worldometers.info/coronavirus/>.
- World Health Organization. Mental Health and COVID-19. WHO; [Cited 2020 Dec 22<sup>nd</sup>]. Available from: <https://www.who.int/teams/mental-health-and-substance-use/covid-19>.
- UNESCO. *COVID-19 Pandemic: Youth Engaged in the Next Normal*. Paris: UNESCO; 2020 [Cited 2020 Dec 30<sup>th</sup>]. Available from: <https://en.unesco.org/news/covid-19-pandemic-youth-engaged-nextnormal>.
- UNICEF Data. *How Many Children and Young People Have Internet Access at Home: Estimating Digital Connectivity during the COVID-19 Pandemic*. UNICEF; 2020 [Cited Jan 1<sup>st</sup> 2021]. Available from: <https://data.unicef.org/resources/children-and-young-people-internet-access-at-home-during-covid19/>.
- Fegert JM, Vitiello B, Plener PL, Clemens V. Challenges and burden of the Coronavirus 2019 (COVID-19) pandemic for child and adolescent mental health: a narrative review to highlight clinical and research needs in the acute phase and the long return to normality. *Child Adolesc Psychiatr Ment Health.* 2020;14:20.
- UNICEF Indonesia. *COVID-19: Young People Should Be Prioritized in Recovery Efforts*. UNICEF; 2020 [Cited 2020 Dec 30<sup>th</sup>]. Available from: <https://www.unicef.org/indonesia/press-releases/covid-19-young-people-should-be-prioritized-recovery-efforts>.
- Lee J. Mental health effects of school closures during COVID-19. *Lancet Child Adolesc Health.* 2020;S2352–4642(20), 30109–7.
- UNICEF Indonesia. *Young People Take the Lead on Mental Health*. UNICEF; 2020 [Cited 2020 Dec 30<sup>th</sup>]. Available from: <https://www.unicef.org/indonesia/coronavirus/stories/young-people-take-lead-mental-health>.
- Guessoum SB, Lachal J, Radjack R, et al. Adolescent psychiatric disorders during the COVID-19 pandemic and lockdown. *Psychiatr Res.* 2020;291, 113264.
- Zhou SJ, Zhang LG, Wang LL, et al. Prevalence and socio-demographic correlates of psychological health problems in Chinese adolescents during the outbreak of COVID-19. *Eur Child Adolesc Psychiatr.* 2020 Jun;29(6):749–758.
- Badan Pusat Statistik. *Jumlah Penduduk Menurut Kelompok Umur Dan Jenis Kelamin*. Jakarta: Badan Pusat Statistik; 2019 [Cited 2020 Dec 30<sup>th</sup>]. Available from: [https://www.bps.go.id/indikator/indikator/view\\_data\\_pub/0000/api\\_pub/58/da\\_03/1](https://www.bps.go.id/indikator/indikator/view_data_pub/0000/api_pub/58/da_03/1).
- World Health Organization. *The Global Strategy for Women's, Children's, and Adolescents' Health (2016–30)*. WHO; 2015 [Cited March 8<sup>th</sup> 2021]. Available from: <http://www.who.int/life-course/partners/global-strategy/ewec-globalstrategy-report-200915.pdf?ua=1>.
- Sawyer SM, Azzopardi PS, Wickremarathne D, Patton GC. The age of adolescence. *Lancet Child Adolesc Health.* 2018;2(3):223–228.
- Kessler RC, Andrews G, Colpe LJ, et al. Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychol Med.* 2002;32(6):959–976.
- Tran TD, Kaligis F, Wiguna T, et al. Screening for depressive and anxiety disorders among adolescents in Indonesia: Formal validation of the centre for epidemiologic studies depression scale – revised and the Kessler psychological distress scale. *J Affect Disord.* 2019;246:189–194.
- Chan SM, Fung TCT. Reliability and validity of K10 and K6 in screening depressive symptoms in Hong Kong adolescents. *Vulnerable Child Youth Stud.* 2014;9(1):75–85.
- Shen K, Yang Y, Wang T, et al. Diagnosis, treatment, and prevention of 2019 novel coronavirus infection in children: experts' consensus statement. *World J Pediatr.* 2020;16:223–231.
- Singh S, Roy D, Sinha K, Parveen S, Sharma G, Joshi G. Impact of COVID-19 and lockdown on mental health of children and adolescents: a narrative review with recommendations. *Psychiatr Res.* 2020;293, 113429.
- Rajkumar RP. COVID-19 and Mental Health: a review of the existing literature. *Asian J Psychiatr.* 2020;52, 102066.
- Cao W, Fang Z, Hou G, et al. The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatr Res.* 2020;287, 112934.
- Mubasyiroh R, Putri IYS, Tjandrarini DH. Determinan Gejala Mental Emosional Pelajar SMP-SMA di Indonesia Tahun 2015. *Buletin Penelitian Kesehatan.* 2017;45(2): 103–112.
- Lei L, Huang X, Zhang S, Yang J, Yang L, Xu M. Comparison of prevalence and associated factors of anxiety and depression among people affected by versus people unaffected by quarantine during the COVID-19 epidemic in Southwestern China. *Med Sci Monit.* 2020;26, e924609.
- Coronavirus Youngminds. *Impact on Young People with Mental Health Needs*. Youngminds; 2020 [Cited Dec 30<sup>th</sup> 2020]. Available from: [https://youngminds.org.uk/media/3708/coronavirus-report\\_march2020.pdf](https://youngminds.org.uk/media/3708/coronavirus-report_march2020.pdf).
- Widakdo Giri. Besral. Efek Penyakit Kronis terhadap Gangguan mental emosional. *Kesmas.* 2013;7(7):309–316.
- Kilani HA, Bataineh MF, Al-Nawayseh A, et al. Healthy lifestyle behaviors are major predictors of mental wellbeing during COVID-19 pandemic confinement: a study on adult Arabs in higher educational institutions. *PLoS One.* 2020;15(12), e0243524.
- Taylor S, Landry C, Paluszek M, Ferguson TA, McKay D, Asmundson JGG. Development and initial validation of the COVID stress scales. *J Anxiety Disord.* 2020;72, 102232.