

# The Impact of Exercise on Adolescent Mental Health during the COVID-19 Epidemic

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## ABSTRACT

Learning and working from home during epidemic periods might result in impaired physical and mental health. In addition, a lack of physical activity during pandemic periods can interfere with psychological and physical health and increase the risk of death. The purpose of this study is to determine how teenagers' psychological health during the Covid-19 epidemic is affected by physical activity. This study uses a cross-sectional, observational, analytical methodology. Simple random sampling was used to select the respondents. There were 98 individuals in the sample, out of the 130 pupils in total. Teenage psychology during the COVID-19 epidemic is the dependent variable, whereas physical activity is the independent variable. The outcomes.

**Keywords:** covid-19 pandemic, physical activity, psychological, teenagers

## BACKGROUND

The Covid-19 pandemic that has occurred since the beginning of 2020 has had a very broad impact on the changing patterns of human activity (Steve, 2021). (Sherina, 2021). The secondary effects of this pandemic include the closure of various public facilities and restrictions on mobility. (Diah, 2020). Lack of physical activity during pandemic periods can interfere with physical and psychological health and can lead to a higher risk of death, learning and working activities from home during pandemic periods leading to a decrease in physical and mental health. (Charles, 2021).

Corona Virus Disease 2019 (Covid-19) was first on December 31, 2019, a disease that is spreading worldwide. This virus is called Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-COV2). The outbreak began in the Wuhan region of China's Hubei province with reports of cases of unknown causes of pneumonia. (WHO, 2021). The World Health Organization (WHO) (2021), a total of Covid 19 cases on Monday, February 14, 2022, with 402,957,131 confirmed cases. The United States with a total of 76,354,040 cases, India with 42,080,664 cases, Brazil with 26,326,454 cases.

There were 19,890,150 cases in France, 17,689,885 in the United Kingdom, 12,257,664 in Russia, 12,051,852 in Turkey, 11,449,601 in Italy, 10,938,030 in Germany, 10,938,030 in Spain. (WHO, 2021). The latest case data in Indonesia on Monday 14 February 2022 with a total of 4,807,778 cases (Covid Treatment Task Force 19, 2021). The East Java Municipal Information Service (2022) showed total Covid-19 or coronavirus-positive patients in East Java Province as of Monday 14 Feb 2022 to 399,989 people, recovered patients to 370,160 people, deceased patients to 29,735 people, active cases to 94 people, suspects to 10,628 people, likely to 911 people. The data above is cumulative so that even though there are recovering patients, the number of confirmed positive patients remains unchanged. (Dinas Kominfo Provinsi Jawa Timur, 2022).

A Salgado (2020) study in Spain showed that 72% of subjects aged 18 and over experienced psychological distress during Covid-19. Another study was also conducted in China two weeks after COVID-19 spread. The study was conducted on respondents aged 14-35 years. The results showed that almost 40.4% of respondents had psychological problems and 14.4% had symptoms of post-traumatic stress-disorder (PTSD). (Liang, 2020). Data in Indonesia recorded an increase in mental health disorders from 2019 to 2020, precisely during the Covid-19 pandemic. In 2019 recorded mental disorder experienced by 197 thousand cases in all age groups. (Kemenkes RI, 2021). A recent study by Rahayuni (2021) of students using the DASS-21 scale, consisting of 1,210 respondents (67.3% women) out of 194, found that 13.8% had mild depression, 12.2% had moderate depressions, 4.3% had severe depression and 4.3% were very severe depressions, while 7.5% had light anxiety, 20.4% had moderately severe anxieties, 8.4% were severe stresses, up to 24.1% were mild, 5.5% were moderate, and 2.6% were severely stressed. Student status is significantly associated with high psychological problems, with a presentation of 5 to 35%, while the incidence of depression is 2 to 19% and anxiety incidence is 2-30% compared to those working. The female gender type, student status, certain physical symptoms and self-assessed health status are significantly linked to the greater psychological impact of the outbreak and higher levels of stress, anxiety, and depression. (Rahayuni, 2021). Results of Liang study (2020), showed that almost 40.4% of respondents had psychological problems and 14.4% had symptoms of post-traumatic stress-disorder. (PTSD).

Preliminary data survey conducted by the researchers on January 11, 2022 Indonesia has revealed the number of Pregnancy students of Semester I as 130 people. The results of the preliminary study with interviews with 10 students are known that 5 (50%) say they often feel stressed, anxious because of the restrictions on mobility of the community set by the Government to prevent the spread of Covid 19. So the learning process is only done online. It makes students feel bored, lack of concentration on the given material, even lack of physical activity during the pandemic period can interfere with physical and psychological health. Three (30 per cent) of students said that they often feel sad and upset, and the students lost interest in all previously liked activities such as playing football, jogging, tennis and so on because of restrictions on public mobility. While 2 (20%) of students said that there were restrictions on community mobility, where adolescents were not interested in doing activity. They also began to withdraw from the neighborhood, including close friends.

One of the factors that influences the psychological youth during the Covid-19 pandemic is physical activity. (Oktaviany, 2021). Physical activity is any body movement produced by skeletal muscles that requires energy expenditure such as walking, cycling, sports, recreation, and can be done at any skill level and for pleasure. Physical activity can help inining physical, mental, and quality of a healthy lifestyle (Nurmidin, 2020). But during the Covid-19 pandemic people tend to reduce physical activity and it also reduces relaxation activity. It can also trigger the emergence of student stress. (DepKes, 2021).

The imposition of social restrictions and physical activity and the closure of schools for adolescents are factors that can affect adolescent psychology. (Bull, 2019). Working or staying at home for a long period of time and the existence of a policy of restricting the maintenance of social activities (PPKM) is a factor in significantly reducing the level of physical activity of adolescents. (Kemenkes RI, 2021). Physical activity plays an important role in human life, affecting physical, intellectual, social and emotional development. Lack of physical activity causes disturbance of the body's metabolic processes, resulting in a decrease in physical freshness, health, skills and even affecting capacity, creativity, and intelligence that in turn will lead to hypokinetic diseases, that is, diseases arising from lack of movement such as coronary heart, hypertension, obesity, anxiety and depression, lower back pain, joints and bones. (Arief, 2020).

PSBB regulations and online learning make the whole student spend a lot of time at home. Students are known to suffer from reduced physical activity and have moderate levels of stress. During the course online, it is known that students have less physical activity behavior and cause stress in students. (Willis, 2020). Lack of physical activity affects weight gain because students have poor adherence to diets and activities such as jogging, relaxing walks and so on. (Kemenkes RI, 2021). Physical activity can trigger a variety of brain chemicals such as adrenaline that can reduce feelings of anxiety. One can also feel happier and more relaxed by doing a variety of different activities (Suprapti, 2020). Stephens (2017) evidence from epidemiological research indicates that levels of physical activity are positively associated with good mental health, if mental health is understood as positive interests, general well-being and relatively rare symptoms of anxiety and depression.

The solution to the above problem is that students should be able to cope with and avoid psychological disorders during the Covid 19 pandemic by performing mild physical activity such as relaxing walking, jogging and so on in order to prevent psychological disturbances such as stress, anxiety, loss of interest in doing activity due to restricted mobility of the community. Students can also use coffee strategies such as sleeping at home, practicing meditation, praying, talking to friends over the phone, using social media, engaging in family activities, listening to music, playing games, making crafts to be able to cope with psychological disorders during the Covid 19 pandemic.

## METHODS

The research design used in this study is observational analytics with a cross sectional method approach. The sampling technique used is Simple Random Sampling. A population of 130 with a sample of 98 people. In this study, the independent variable is Physical Activity and the dependent is Adolescent Psychology at the Time of the Covid-19 Pandemic. Processing data through editing, coding, scoring, tabulation stages. The statistical test used is Logistic Regression with a value of  $\alpha = 0.05$ .

## RESULTS

### General Data

<b>Age</b>	<b>Frequency</b>	<b>Percentage (%)</b>
< 18 Years	10	10
18-21 Years	69	71
> 21 Years	19	19
<b>Amount</b>	<b>98</b>	<b>100</b>
<b>Residence</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Elderly</b>	10	10
Cost/Contract	84	86
Brother/sister/grandson/uncle/aunt	4	4
Brother Far	0	0
<b>Amount</b>	<b>98</b>	<b>100</b>

Based on the above table, the age of the respondents is known that the majority of respondents are 18-21 years of age, which is 69 (71%) respondents.

## Special Data

No	The Physical Activity of Teenagers During the Covid-19 Pandemic	Frequency	Percentage (%)
1	Lightweight	83	85
2	I'm in.	5	5
3	Heavy	10	10
<b>Amount</b>		<b>98</b>	<b>100</b>

  

No	Adolescent psychology at the time of the Covid-19 pandemic	Frequency	Percentage (%)
1	Indicated Disorder	6	6
2	Not Indicated Disorder	92	94
<b>Amount</b>		<b>98</b>	<b>100</b>

Based on the above table shows that the physical activity of adolescents during the Covid-19 pandemic is known to almost all respondents as 83 (85%) respondents in the category of mild.

## Tabulation Results Between Independent and Dependent Variables

		Adolescent psychology at the time of the Covid-19 pandemic			Amount
			Not Indicated Disorder	Indicated Disorder	
Physical activity at the time of the Covid-19 pandemic	Less	Frequency	83	0	85
		%	100%	.0%	100%
	Enough.	Frequency	4	1	5
		%	80%	20%	100%
	Good.	Frequency	5	5	10
		%	50%	50%	100%
<b>Amount</b>		Frequency	92	6	98
		%	94%	6%	100%

Based on the above table shows that Chronic Energy Deficiency (CEK) in pregnant mothers in Puskesmas Ketapang II Sampit district of East Kalimantan Province Citywaringin known all respondents is as many as 22 (100%) respondents in the category does not occur CEK so weight gain of pregnant mother in the appropriate category.

**Data Analysis**

## Statistical Test Results

Variable	Significance Level
Physical activity at the time of the Covid-19 pandemic	0.000
Adolescent psychology at the time of the Covid-19 pandemic	

The results of data analysis showed that the knowledge variable has a degree of significance (0,003), the dietary variable (0,005), the chronic energy deficiency variable (KEK) (0,008). Thus it can be concluded that there is an influence of knowledge, dietary patterns and chronic power deficiency (KEC) on the weight gain of pregnant mothers.

**DISCUSSION**

Physical Activity of Adolescents during the Covid-19 Pandemic based on the results of the study, it was found that the physical activity of adolescents during the COVID-19 pandemic was known to almost all of the respondents as 83 (85%) respondents in the light category. It shows that in the presence of the Covid-19 pandemic so students do physical activity in the

home/cost/contracts like cleaning the house, walking for about 3 minutes, gymnastics and sports that should be done at home. A lot of physical activity can help relieve the level of symptoms of depression and anxiety, otherwise physical inactivity can be associated with poor mental health during the Covid-19 pandemic.

Wicaksono (2020), said that lack of physical activity and decreased body immunity were the most important risk factors for death from Covid-19. Teenage physical activity is closely linked to physical activity activities on campus, as the learning process was blocked by the government during the Covid-19 pandemic, causing a decrease in adolescent physical activity at home alone. (Yeasmin, 2020). In addition to being a challenge to stay fit, behavior at home alone is dangerous for the long term if not combined with active physical activity. (Ashadi, 2020).

According to the researchers, exercising in a sitting position for long periods of time can be detrimental to health, physical activity is the movement of the limbs in the daily activities undertaken, while exercise is the physical activity performed in a planned, measured and structured manner with the goal of fitness and performance. Thus, teenagers are advised to engage in beneficial and nourishing physical activities during the Covid-19 pandemic, such as bed-shaping activities, sweating, squirting, sports frequently practiced by teenagers such as basketball, soccer, running, volleyball, swimming, jogging, cycling.

Adolescent Psychology at the Time of the Covid-19 Pandemic based on the results of the study, it is known that adolescent psychology in the time of the covid19 pandemic is known to almost all respondents as 92 (94%) respondents in the category of Non-Indicated Disorders. It shows that with the Covid 19 pandemic that continues to rise to the present day, where students always cope with feelings of anxiety, worry, stress, unrest and even to get rid of boredom by being only at home where students perform light to heavy physical activities such as cleaning the house, cycling, jogging, walking relaxing, grinding the floor and so on to be able to eliminate boredom and can also prevent psychological disturbance during the COVID 19 Pandemic. Faulkner (2020), said that the level of anxiety that causes stress has an impact on adolescent psychological disorders. One of the factors affecting stress that affects mental health is a decrease in physical activity in adolescents. Sibarani (2020), also said that physical activity can provide many health benefits, including in the face of the Covid-19 pandemic.

According to the researchers, with the Covid 19 pandemic, so teenagers have to stay at home for long periods of time due to isolation. The closure of the campus, which has resulted in reduced interaction with peers as well as reduced opportunities for exploration and physical activity, is one of the causes of psychological disorders. However, in this study students always cope with feelings of anxiety, worry, stress, unrest and even to get rid of boredom by being only at home where students do physical activities such as walking and stretching, cleaning the yard/cost, washing dishes, worship, light exercise such as relaxation, jogging and others.

The results of data analysis showed that the level of significance  $0,000 < \alpha = 0,05$  so that H0 was rejected and H1 received thus there was the effect of physical activity on the psychological activity of adolescents during the Covid-19 pandemic in pregnancy students. Based on the cross tabulation results between physical activity and psychological adolescents in the time of COVID-19 Pandemic, it was known that the total number of respondents was 83 (100%) in the category of non-indicated disorders. It shows that in the presence of the Covid-19 pandemic so students do physical activity in the home/cost/contracts like cleaning the house, walking for about 3 minutes, gymnastics and sports that should be done at home. A lot of physical activity can help relieve the level of symptoms of depression and anxiety, otherwise physical inactivity can be associated with poor mental health during the Covid-19 pandemic. In addition to the Covid 19 pandemic that continues to rise to this day, where

students are always coping with feelings of anxiety, worry, stress, unrest and even to get rid of boredom by being only at home where students perform light to heavy physical activities such as cleaning the house, cycling, jogging, relaxing, grinding the floor and so on to be able to eliminate boredom and can also prevent psychological disorders during the COVID 19 Pandemic.

Physical activity can trigger a variety of brain chemicals such as adrenaline that can reduce feelings of anxiety. One can also feel happier and more relaxed by doing a variety of different activities (Suprpti, 2020). Stephens (2017) evidence from epidemiological research indicates that levels of physical activity are positively associated with good mental health, if mental health is understood as positive interests, general well-being and relatively rare symptoms of anxiety and depression. The solution to the above problem is that students should be able to cope with and avoid psychological disorders during the Covid 19 pandemic by performing mild physical activity such as relaxing walking, jogging and so on in order to prevent psychological disturbances such as stress, anxiety, loss of interest in doing activity due to restricted mobility of the community. Students can also use coffee strategies such as sleeping at home, practicing meditation, praying, talking to friends over the phone, using social media, engaging in family activities, listening to music, playing games, making crafts to be able to cope with psychological disorders during the Covid 19 pandemic.

## CONCLUSION

Based on the results of the study, it is known that the physical activity of adolescents during the Covid-19 pandemic is known to almost all respondents of 83 (85%) respondents in the category of mild. According to the research results, the Psychological Psychology of Adolescents during Covid-19 Pandemic was known to all respondents of 92 (94%) in the Category of Non-Indicated Disorders. The data analysis showed that the significance level of  $0,000 < \alpha = 0.05$  so that  $H_0$  was rejected and  $H_1$  was received therefore there was an impact of physical activity on the psychological activity of teenagers during the covid-19. For the Educational Institutions it is expected that it can be an additional reference related to efforts to improve the psychological youth especially in times of pandemic so that can be used as a standard of reference in the provision of health education. For Teenagers/Students is expected to be able to be information material to increase knowledge for students and can overcome and avoid psychological disorders in the time of Covid 19 pandemic by doing light physical activity such as relaxing walking, jogging and so on to prevent psychological disturbances such as stress, anxiety, loss of interest to do activity due to restriction of mobility of the community. For further researchers it is expected to be used as input and basic data for further research and can investigate other factors that influence adolescent psychology during the Covid-19 pandemic.

## REFERENCES

- A. Aziz, Alimul Hidayat. (2017). *Metode Penelitian Keperawatan Dan Teknik Analisis Data*. Jakarta : Penerbit. Salemba Medika.
- Apriansyah, Arif. (2020). *Dunia Remaja*. (Online). [http://www. Dunia Remaja. Htm](http://www.DuniaRemaja.Htm).
- Arief, N. A., Kuntjoro, B. F. T. and Suroto, S. (2020). Gambaran Aktifitas Fisik dan Perilaku Pasif Mahasiswa Pendidikan Olahraga selama Pandemi Covid-19, *Multilateral Jurnal Pendidikan Jasmani dan Olahraga*, 19(2), p. 175. Doi : 10.20527/multilateral.v19i2.9564.
- Ashadi, K., Mita Andriana, L., & Pramono, B. A. (2020). Pola Aktivitas Olahraga Sebelum Dan Selama Masa Pandemi Covid-19 Pada Mahasiswa Fakultas Olahraga Dan Fakultas Non- Olahraga. *Jurnal SPORTIF : Jurnal Penelitian Pembelajaran*, 6(3), 713–728. [https://doi.org/10.29407/js\\_unpgri.v6i3.14937](https://doi.org/10.29407/js_unpgri.v6i3.14937).

- Asmadi, (2021). *Aktifitas Fisik, Teknik Prosedural Keperawatan : Konsep dan Aplikasi Kebutuhan Dasar Klien*. Jakarta: Salemba Medika.
- Atkinson, R.L., Atkinson, R.C., Hilgard, E.R. (2020). *Pengantar Psikologi Remaja Jilid 2*, Penerbit Erlangga, Jakarta.
- Barwais, F. A. (2020). Physical Activity at Home During the COVID-19 Pandemic in the Two Most- affected Cities in Saudi Arabia. *The Open Public Health Journal*, 13(1), 470–476. <https://doi.org/10.2174/1874944502013010470>.
- Bell, S. L. et al. (2019). The Relationship Between Physical Activity, Mental Wellbeing and Symptoms of Mental Health Disorder in Adolescents: A Cohort Study. *International Journal of Behavioral Nutrition and Physical Activity*, 16(1), pp. 1–12. doi: 10.1186/s12966-019-0901-7.
- Biddle, S. J. H., Ciaccioni, S., Thomas, G., & Vergeer, I. (2019). Physical Activity And Mental Health In Children And Adolescents: An Updated Review Of Reviews And An Analysis Of Causality. *Psychology of Sport and Exercise*, 42, 146–155. <https://doi.org/10.1016/j.psychsport.2018.08.011>.
- Bull, F. C., Maslin, T. S. and Armstrong, T. (2019). Global Physical Activity Questionnaire (GPAQ): Nine Country Reliability and Validity Study. *Journal of Physical Activity and Health*, 6(6), pp. 790–804. doi: 10.1123/jpah.6.6.790.
- Center for Disease Control and Prevention (CDC), (2020). *Coronavirus 2020* [Available from: <https://www.cdc.gov/coronavirus/index.html>].
- Chacón-Cuberos, R. et al. (2019). Relationship between Academic Stress, Physical Activity and Diet in University Students of Education, *Behavioral Sciences*, 9(6), p. 59. doi: 10.3390/bs9060059.
- Charles Leonardo, Dary, Dennys Christovel Dese, (2021). *Gambaran Status Gizi Dan Aktivitas Fisik Remaja Selama Pandemi Covid 19*. *Jurnal Keperawatan Muhammadiyah* 6 (4) 2021.
- Darwis, S. D. (2017). *Metode Penelitian*. Jakarta : EGC.
- DepKes RI. (2021). *Profil Kesehatan Indonesia 2021 : Menuju Indonesia Sehat 2020*. Jakarta : Departemen Kesehatan RI.
- Diah H, Dwi R.H, Fathiyah I. (2020). Penyakit Virus Corona 2019. *Jurnal Respirologi Indonesia*. 2020;40(2).
- Dunton, G. F., Do, B., & Wang, S. D. (2020). Early effects of the Covid-19 pandemic on physical activity and sedentary behavior in children living in the U.S. *BMC Public Health*, 20(1), 1351. <https://doi.org/10.1186/s12889-020-09429-3>.
- Dwyer, M. J., Pasini, M., De Dominicis, S., & Righi, E. (2020). Physical activity: Benefits and challenges during the COVID-19 pandemic. *Scandinavian Journal of Medicine and Science in Sports*. <https://doi.org/10.1111/sms.13710>.
- Faulkner, G., Rhodes, R., & Vanderloo, L. (2020). Physical Activity as a Coping Strategy for Mental Health Due to the COVID-19 Virus: A Potential Disconnect Among Canadian Adults? *Frontiers in Communication*. 1–5. <https://doi.org/https://doi.org/10.3389/fcomm.2020.571833>.
- Fegert, JM, Vitiello, B., Plener, PL, & Clemens, V. (2020). *Tantangan Dan Beban Pandemi Coronavirus 2019 (COVID-19) Untuk Mental Anak Dan Remaja Kesehatan: Tinjauan Naratif Untuk Menyoroti Kebutuhan Klinis Dan Penelitian Pada Fase Akut Dan Kembalinya Normalitas Yang Lama*. *Psikiatri Anak dan Remaja dan Kesehatan Mental*, 14, 20.
- Hurlock, E. B. (2019). *Psikologi Perkembangan : Suatu Pendekatan Sepanjang Rentang Kehidupan*. Jakarta : Erlangga.

- IPAQ Research Committee. (2020). Guidelines for data processing and analysis of the International Physical Activity Questionnaire (IPAQ)-short and long forms. <Http://www.ipaq.ki.se/scoring.pdf>.
- Kang, S., & Dkk. (2020). Is Physical Activity Associated With Mental Health Among Chinese Adolescents During Isolation In Covid-19 Pandemic? *Journal of Epidemiology and Global Health*. <https://doi.org/https://doi.org/10.2991/jegh.k.200908.001>.
- Kementerian Kesehatan Republik Indonesia. (2020). Pedoman Pencegahan dan Pengendalian CORONA VIRUS DISEASE (COVID-19). Jakarta: Kemenkes RI; 2020.
- Kementerian Kesehatan. (2021). Mengetahui Jenis Aktivitas Fisik. Retrieved from <https://promkes.kemkes.go.id/content/?p=8807>.
- Levani, Y., Hasanah, U., & Fatwakiningsih, N. (2020). Stress dan Kesehatan Mental di Masa Pandemi COVID-19. *Seminar Online Update on COVID-19 Multidisciplinary Perspective*, 134–144.
- Maharani, A. S. (2021). Hubungan Aktivitas Fisik Dan Kesehatan Mental Pada Usia Dewasa Muda Di Masa Pandemi Covid-19. 1–7. <http://eprints.ums.ac.id/id/eprint/89510>.
- Notoatmodjo, Soekidjo. (2017). Metodologi Penelitian Kesehatan. Jakarta : Rineka Cipta.
- Nugraha, P. D., Utama, M. B. R., S, A., & Sulaiman, A. (2020). Survey Of Students Sport Activity During Covid-19 Pandemic. *Jp.Jok (Jurnal Pendidikan Jasmani, Olahraga Dan Kesehatan)*, 4(1), 11–24. <https://doi.org/10.33503/jp.jok.v4i1.805>.
- Nurhadi, J. Z. L., & Fatahillah. (2020). Pengaruh Pandemi Covid-19 Terhadap Tingkat Aktivitas Fisik Pada Masyarakat Komplek Pratama, Kelurahan Medan Tembung. *Jurnal Health Sains*, 1(5), 294–298.
- Nurmalina. (2020). Jenis-Jenis Aktivitas Fisik. (online) <http://digilib.unimus.ac.id/files.pdf>. Diakses pada 24 April 2020.
- Nurmidin, M., Fatimawali and Posangi, J. (2020). Pengaruh Pandemi Covid-19 Terhadap Aktivitas Fisik dan Penerapan Prinsip Gizi Seimbang pada Mahasiswa Pascasarjana. *Journal of Public Health and Community Medicine*, 1(4), pp. 28–32. Available at: <https://ejournal.unsrat.ac.id/index.php/ijphcm/article/view/31169>.
- Nursalam, (2017). Konsep dan Penerapan Metodologi Penelitian Ilmu Keperawatan. Jakarta : Salemba Medika.
- Pan, Y., Yang, Z., Han, X., & Qi, S. (2020). Family Functioning And Mental Health Among Secondary Vocational Students During The Covid-19 Epidemic: A moderated mediation model. *Personality and Individual Differences*. <https://doi.org/10.1016/j.paid.2020.110490>.
- Piggin, J. (2020). What Is Physical Activity? A Holistic Definition for Teachers, Researchers and Policy Makers“, *Frontiers in Sports and Active Living*, 2(June), pp. 1–7. doi: 10.3389/fspor.2020.00072.
- Ria Oktaviany, (2021). Pengaruh Pandemi Covid-19 Terhadap Kesehatan Jiwa Remaja. Naskah Publikasi, <https://doi.org/10.31219/osf.io/wzanr>.