ORIGINAL ARTICLE

Factors associated with depressive symptoms among adolescents in Indonesia: A cross-sectional study of results from the Indonesia Family Life Survey

Haerawati Idris, Fatimah Tuzzahra

Authors:

Haerawati Idris
(Corresponding author)
Faculty of Public Health, Sriwijaya University, Raya Palembang KM 32., Indralaya, Ogan Ilir, South Sumatra, Indonesia.
Email: haera@fkm.unsri.ac.id

Fatimah Tuzzahra
Faculty of Public Health, Sriwijaya University, Raya Palembang KM 32., Indralaya, Ogan Ilir, South Sumatra, Indonesia.

Abstract

Introduction: Depression is one of the mental illnesses that affect adolescents worldwide. This study analysed the factors associated with depressive symptoms among adolescents in Indonesia.

Methods: A quantitative cross-sectional study was conducted using secondary data from the Indonesian Family Life Survey 2014. The sample included 3,603 adolescents aged 10-19 years. Data were analysed using logistic regression statistical tests.

Results: Of the adolescents, 29.1% had depressive symptoms. The bivariate analysis showed that sex, region, economic status, chronic illness history, sleep quality, smoking habit, and personality type were associated with a higher probability of depressive symptoms among the adolescents.

Conclusion: A history of chronic diseases contributes the most to the occurrence of depressive symptoms among adolescents. To reduce the prevalence of chronic diseases associated with depression, the Indonesian government must make preventive efforts through early detection among young people.

Introduction

Mental health is an important global issue. Health is not just about one's physical appearance but also about mental and social states.[1] Mental illness is a worldwide public health concern.[2] According to the World Health Organization, about 20% of adolescents worldwide in any given year may experience mental health disorders.[3] Some evidence suggests increasing rates of depression and anxiety symptoms in some countries,[4] including Indonesia.

Adolescence is variously defined as a period of transition from childhood to adulthood. It involves a rapid change in many aspects, including biological, psychological and sociocultural aspects. Globally, there are nearly 1.8 billion people aged 10–24 years, constituting one quarter of the total population. Approximately 89% of young people aged 10–24 years live in low- and middle-income countries.[5] This age group constitutes a large proportion of the Indonesian population.[6] In Indonesia, there are 43.5 million individuals aged 10–19 years, accounting for about 18% of the total population.[7] A recent study has reported that the prevalence of depression was 5.1% among adolescents in Indonesia.[8]

Depression is a mental disorder defined as a feeling of sadness and worry for a long time, accompanied by a feeling of meaninglessness.[9] Prolonged depression can affect work, school and daily life. The worst effect of depression is suicide.[10] If depressive disorders are not well controlled, there may be high losses for both individuals and countries. Depression may decrease human productivity, especially among adolescents, owing to its long-term impacts and double the health burden in a country.[11] It is important to focus on prevention, and early intervention has been stronger than ever, especially for young people.[12]

The three types of preventive interventions for depression among adolescents are universal, selected and indicated, according to the IOM report.[13] Regardless of the risk, universal preventive treatments focus on the general public or community. A curriculum that informs all high school freshmen in the neighbourhood about the risks of substance misuse is an example of a general preventive

programme. Selective preventive initiatives focus on a subgroup's members who are more likely to develop an illness, such as children of parents with depression. Finally, programmes for indicated prevention are designed to reach everyone who exhibits preclinical symptoms or indicators of a certain condition. A curriculum that teaches depression-preventive methods to youth with subclinical depressive symptoms is an example of a suggested preventive programme.

Previous studies have reported many factors associated with depression among adolescents. A systematic review has reported parental factors as factors that increase the prevalence of depression among young people.[14] Family- and school-related factors may be significantly associated with depressive symptoms in China.[15] A family history of depression and exposure to psychosocial stress are the strongest risk factors for depression in adolescents.[16] The recent study conducted by Suryaputri et al. in 2022 reported that having a female sex, smoking, drinking alcohol, having a chronic disease and having a parent with depression were factors associated with youth depression.[8]

There is limited research exploring the factors associated with depressive symptoms among adolescents in Indonesia. The results of this study are expected to enable the Indonesian government as well other governments to prevent depression among adolescents. This study aimed to explore depression-associated factors among adolescents in Indonesia.

Methods
Study design and setting
We used cross-sectional data from the Indonesian Family Life Survey wave 5 – data collected in 2014. The survey was conducted by a team from the RAND corporation in collaboration with Indonesian researchers. The sample of this study consisted of individuals aged 15–65 years. The data survey used a multistage stratified sampling design. The survey was based on a sample of households representing about 83% of the Indonesian population living in 13 of 27 provinces. The survey collected data about individuals and their families and households, the communities where they live in and health and education facilities they use. More information about the setup and available data can be found online (https://www.rand.org/well-being/social-and-behavioral-policy/data/FLS/IFLS.html) and in the study by Strauss et al.[17]

Inclusion criteria
Respondents aged 10–19 years were included in the study (N=3603).

Exclusion criteria
Individuals with missing data were excluded.

Dependent variable
The dependent variable was depressive symptoms, which were evaluated on the basis of the Stress Model of Depression by Schotte et al.[18] The model was developed for the treatment of patients with depression. It contains 10 psychological health questions that indicate depressive symptoms. The questions are selected on the basis of biogenetic, psychological, somatic, sociocultural and protective factors.[18] Herein, data on depressive symptoms were compiled from 10 answers for questions A, B, C, D, F, G, I and J in the psychological health section of the Indonesian Family Life Survey. The answers were then coded (0=rarely or never [<1 day]; 1=a little [1–2 days]; 2=sometimes [3–4 days]; 3=often [5–7 days]). Meanwhile, for questions E and H, the codes were reversed (3=rarely or never [<1 day]; 2=little [1–2 days]; 1=sometimes [3–4 days]; 0=often [5–7 days]). When the data obtained yielded a total of 10 scores, depression was considered.

The level of depressive symptoms among the adolescents was evaluated from the total score and then recorded into four categories (0=no symptoms; 1–9=mild symptoms; 10–14=moderate symptoms; 15=major symptoms). Thereafter, the adolescents who experienced moderate-to-severe depressive symptoms were included in the category of depression. Meanwhile, the adolescents who did not experience any depressive symptoms and those who had mild symptoms were included in the category of no symptoms. The depression variable was evaluated from the total score and then recorded into two categories (code 1 [yes] for the total score=10; code 0 [no] for the total score <10).

Independent variables
The variables examined included sex, education, residence, region, economic status, chronic disease history, sleep quality, smoking habit and personality type. Sex was categorised into 'female' and 'male'. Educational level was divided into three categories: 'primary', 'secondary' and 'tertiary'. Location was grouped into 'rural' and 'urban' and region into 'Sumatra', 'Java and Bali' and 'east region'. History of chronic disease was based on the

respondents' experience of diagnosis within the last 5 years by a health worker. Chronic disease was divided into diabetes or high blood sugar level, tuberculosis, asthma, other lung conditions, heart attack, coronary heart disease, angina, other heart problems, liver, stroke, cancer or malignant tumour, kidney disease or stomach or other digestive diseases. History of chronic disease was categorised into 'yes' or 'no'. Sleep quality was classified as 'good' or 'poor' and smoking habits as 'yes' or 'no'.

We divided the personality type into 'introvert' and 'extrovert'. Data on the personality type were collected from the PSN (personality) section of the questionnaire. When the respondents reported liking doing a thorough job, being reserved, worrying a lot, having an active imagination, valuing artistic and aesthetic experiences and being easily nervous, they were categorised as introverts. When the respondents reported liking a talkative character, coming up with new ideas, being relaxed, handling stress well, doing things efficiently and being outgoing, sociable or sometimes rude to others, they were categorised as extroverts.

In the survey, the economic status was considered a proxy using the per capita expenditure in the form of food, non-food and educational expenses a month. This expenditure was calculated from the amount of household expenditure divided by the number of household members. Thereafter, the economic status was determined according to quintiles of one to five: 'prosperous', 'rich', 'medium', 'poor' or 'impoverished'. Data were analysed through a univariate analysis. We examined the association of the independent variable with depressive symptoms using the chi-square test with significance levels of $P<0.05$ and confidence intervals (CIs) of 95%. Thereafter, we performed multiple logistic regression tests.

Results

The respondents' characteristics are shown in **Table 1**. Some respondents experienced depressive symptoms (29.1%), and the majority had mild symptoms (67.3%). Most respondents were men (52.7%). The majority had secondary education (86.1%), lived in urban areas (53.4%), came from Java and Bali islands (70.2%) and had no history of chronic illness (80.4%). They mostly had very low economic status (22%), adequate sleep quality (90%), no smoking habits (78.9%) and an extroverted personality (51.4%). Distribution of the respondents' answers according to their depressive symptoms shown in **table 2**.

Table 1. Respondents' characteristics.

Variable	Respondents (N=3603)	
	n	%
Depressive symptoms		
Yes	1048	29.1
No	2556	70.9
Level of depressive symptoms		
No symptoms	130	3.6
Mild symptoms	2.425	67.3
Moderate symptoms	788	21.9
Severe symptoms	260	7.2
Sex		
Female	1703	47.3
Male	1900	52.7
Education		
Primary	255	7.1
Secondary	3102	86.1
Tertiary	246	6.8
Residence		
Urban	1923	53.4
Rural	1680	46.6
Region		
Sumatera	678	18.8
Java and Bali	2531	70.2
East region	394	11

Table 1. Continued		
Variable	**Respondents (N=3603)**	
	n	**%**
Chronic disease history		
Yes	705	19.6
No	2898	80.4
Economic status		
Impoverished	793	22
Poor	741	20.6
Middle	700	19.4
Rich	639	17.7
Prosperous	730	20.3
Sleep quality		
Poor	359	10
Good	3244	90
Smoking habit		
Yes	759	21.1
No	2844	78.9
Personality type		
Introvert	1751	48.6
Extrovert	1852	51.4

Table 2. Distribution of the respondents' answers according to their depressive symptoms.

Questions	Rarely or never (<1 day)		Few (1–2 days)		Sometimes (3–4 days)		Often (5–7 days)	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
I get annoyed with things that usually do not bother me.	1886	52.4	1.031	28.6	549	15.2	136	3.8
I am rarely able to concentrate on my work.	1461	40.5	1.161	32.2	747	20.7	234	6.5
I feel depressed.	2251	62.5	757	21	437	12.1	157	4.4
I feel that I need a lot of efforts.	1448	40.2	995	27.6	636	17.7	523	14.5
I feel that I have good hopes about the future.	217	6	676	18.8	668	18.5	2041	56.7
I feel scared.	2039	56.6	886	24.6	478	13.3	199	5.5
I have trouble sleeping.	1967	54.6	729	20.2	594	16.5	312	8.7
I feel happy.	170	4.7	694	19.3	996	27.6	1743	48.4
I feel isolated.	2696	74.8	512	14.2	298	8.3	97	2.7
I cannot start anything.	2393	66.4	632	17.5	471	13.1	106	3

Table 3. Association between the independent variables and depressive symptoms.

Variables	Depressive symptoms				n	P-value	OR (95% CI)
	Yes		No				
	n	**%**	**n**	**%**			
Sex							
Female	544	32	1158	68	1703	<0.001	1.208 (1.104–1.322)
Male	503	26.5	1397	73.5	1900	ref	
Education							
Primary	91	35.9	163	64.1	255	0.067	1.308 (0.982–1.743)
Secondary	882	28.4	2220	71.6	3102	0.472	0.930 (0.762–1.135)
Tertiary	74	29.9	172	70.1	246	ref	
Residence							
Urban	568	29.6	1354	70.4	1923	0.403	1.037 (0.952–1.130)
Rural	479	28.5	1201	71.5	1680	ref	

Table 3. Continued							
Variables	**Depressive symptoms**				**n**	**P-value**	**OR (95% CI)**
	Yes		**No**				
	n	**%**	**n**	**%**			
Region							
Sumatera	167	24.7	511	75.3	678	<0.001	0.599 (0.503–0.714)
Java and Bali	741	29.3	1790	70.7	2531	<0.001	0.758 (0.674–0.851)
East region	139	35.3	255	64.7	394	ref	
Chronic disease history							
Yes	244	34.6	461	65.4	705	<0.001	1.870 (1.700–2.057)
No	803	27.7	2094	72.3	2898	ref	
Economic status							
Impoverished	260	32.8	533	67.2	793	0.018	1.209 (1.034–1.413)
Poor	199	26.8	542	73.2	741	0.248	0.906 (0.767–1.071)
Middle	196	28	504	72	700	0.680	0.961 (0.794–1.162)
Rich	182	28.5	457	71.5	639	0.892	0.989 (0.837–1.168)
Prosperous	210	28.8	520	71.2	730	ref	
Sleep quality							
Poor	180	50	179	50	359	<0.001	1.248 (1.143–1.362)
Good	868	26.7	2376	73.3	3244	ref	
Smoking habit							
Yes	242	31.8	517	68.2	759	0.042	1.124 (1.006–1.256)
No	806	28.3	2038	71.7	2844	ref	
Personality type							
Introvert	597	34.1	1154	65.9	1751	<0.001	1.402 (1.292–1.522)
Extrovert	450	24.3	1402	75.7	1852	ref	

OR: odds ratio

As shown in **Table 3**, female sex was associated with a higher probability of depressive symptoms than male sex. Residence in Java and Bali and Sumatera was associated with a higher probability of depressive symptoms than residence in the east region. A history of chronic disease was associated with a higher probability of depressive symptoms than its counterpart. An impoverished economic status was associated with a higher probability of depressive symptoms than a prosperous economic status. A poor sleep quality was associated with a higher probability of depressive symptoms than a good sleep quality. Smoking was associated with a higher probability of depressive symptoms than non-smoking. An introverted personality was associated with a higher probability of depressive symptoms than an extroverted personality.

According to the multivariate analysis (**Table 4**), eight factors were associated with depressive symptoms: sex, education, region, economic status, chronic illness history, sleep quality, smoking habit and personality type. The most dominant variable was a history of chronic disease (OR=2.781; 95% CI=2.308–3.350) after being controlled for sex, education, region, economic status, sleep quality, smoking habit and personality type.

Table 4. Final model analysis of the factors associated with depressive symptoms among adolescents in Indonesia.

Variables	Characteristics	P-value	OR (95% CI)
Sex	Male (ref)		
	Female	<0.001	1.592 (1.385–1.831)
Education	Tertiary (ref)		
	Primary	0.016	1.461 (1.074–1.990)
	Secondary	0.404	1.093 (0.886–1.350)
Region	East region (ref)		
	Sumatera	<0.001	0.564 (0.468–0.681)
	Java and Bali	<0.001	0.730 (0.644–0.828)

Table 4. Continued			
Variables	**Characteristics**	**P-value**	**OR (95% CI)**
Chronic illness history	No (ref)		
	Yes	<0.001	2.781 (2.308–3.350)
Economic status	Prosperous (ref)		
	Impoverished	0.003	1.278 (1.087–1.503)
	Poor	0.727	0.970 (0.817–1.152)
	Middle	0.980	0.997 (0.817–1.218)
	Rich	0.552	1.056 (0.882–1.263)
Sleep quality	Good (ref)		
	Poor	<0.001	1.302 (1.136–1.493)
Smoking habit	No (ref)		
	Yes	<0.001	1.442 (1.197–1.736)
Personality type	Extrovert (ref)		
	Introvert	<0.001	1.588 (1.414–1.782)

Discussion

Our study aimed to explore depression-associated factors among adolescents in Indonesia. Our findings showed that about 29.1% of the adolescents in Indonesia had depressive symptoms. The variables associated with depressive symptoms were sex, education, region, economic status, chronic illness history, sleep quality, smoking habit and personality type. Female was associated with a higher probability of depressive symptoms than male, in line with the findings by Suryaputri et al. in 2022 that female sex was associated with depression among young poeple.[8] This finding may be explained by the puberty timing and status among women.[19]

Herein, a lower educational level was associated with a higher probability of depressive symptoms. Joshi et al.[20] found that an individual with a low educational level is more at risk for depression. Education also refers to one's knowledge in overcoming problems. An individual with a higher educational level has broader abilities and knowledge; hence, he/she could better deal with life problems.[21]

We also found that the young people residing in Sumatera and Java and Bali had a higher probability of depressive symptoms than the young people residing in the east region. The Java–Bali region is the most densely populated region, containing just over 60% of the population's land mass. The remaining provinces in the outer Java–Bali region span from Sumatra to the eastern island and represent a diverse population.[22] Sumatra is not particularly densely populated, with just over 90.4 people per km² – more than 50 million

people in total. Sumatra is a large island in the western region that contains extensive biodiversity-rich lowland forests.[23] The eastern region spreads in East Nusa Tenggara, East Kalimantan, Southeast Sulawesi, Maluku, North Maluku, West Papua and Papua. There is a larger proportion of poor people in this region, including East Nusa Tenggara and Papua island (i.e. 31.5% and 20.2%, respectively).[24]

In this study, the respondents who had an impoverished economic status were more likely to have depressive symptoms. This finding is in line with some reports that a low economic status contributed to depression.[25,26] Individuals with a low economic status have a 15-percent higher prevalence of depression than those with a high economic status.[27]

This study also revealed that the respondents with a poor sleep quality were more likely to have depressive symptoms. This finding is consistent with a report in Saudi Arabia that people with a poor sleep quality significantly experience depression, anxiety and stress.[28] A poor sleep quality is one of the factors causing depression or depressive symptoms in adolescents.[29] In other words, sleep quality has a close relationship with child welfare. Poor sleeping habits may contribute to psychiatric and neurological disorders (e.g. damage in brain serotonin neurotransmitters wherein serotonin acts as a control centre for affect, sleep and appetite). Adequate sleep is essential to allow the body to function properly and optimally.

This study also demonstrated a relationship between smoking and depression in

adolescents. The smoking respondents were 1.4 times more likely to experience depression than the non-smoking respondents. Similarly, some studies found that smoking-related factors were associated with youth depression.[8,30]

The respondents who had a chronic physical illness were more likely to have depressive symptoms. Having a chronic physical illness is therefore another contributing factor of depression.[31] Data from the National Survey of Child and Adolescent Well-Being collected in the United States show a relationship between chronic illness and child mental health. Younger age groups with chronic disease factors develop more risks of mental disorders than do their counterparts.[32]

Herein, the introvert respondents had a higher possibility of experiencing depressive symptoms than the extrovert respondents. A person's personality is related to adaptation and response to a problem. Previous research also shows that introversion may be a risk factor for suicidal behaviour in patients with depression.[33] According to sex, most women tend to have an introverted personality, which makes them keep their problems to themselves. However, personality is not the sole factor for depression in adolescents. Depression can also be influenced by many other factors, such as sex, age and employment status.

The frequency, diagnosis, treatment and prognosis of adolescent depression vary significantly between nations. Depression is a leading source of disability and hardship globally.[34] Adolescent depression can interfere with crucial developmental processes, which can have long-lasting repercussions on relationships and social status.[35] Our study showed that the most influential variable for depressive symptoms among the adolescents was a history of chronic illness. These findings can have important implications for encouraging the government to implement preventive programmes for chronic illness among adolescents.

This study has some limitations that need to be addressed. First, this study examined only few variables, including sex, education, residence, region, economic status, chronic illness history, sleep quality, smoking habit and personality type. Future research should address this limitation by adding biological factors, family support and other factors. Second, it was difficult to identify the causal mechanism of depression and its risk factors, as this study was a cross-sectional study based on data from the Indonesia Family Life Survey 2014. Third, this study had weak findings because it identified only factors related to depressive symptoms, not their determinants. Despite these limitations, this study has some strengths. With the use of a large national data set, the results could be representative of the adolescent population throughout Indonesia.

Conclusion

Approximately 29.1% of the adolescents in Indonesia experienced depressive symptoms. The variables related to depressive symptoms were female sex, region, impoverished economic status, chronic illness history, poor sleep quality, smoking and introverted personality. The most influential variable for depression was a history of chronic illness. The Indonesian government is suggested to create a chronic disease control policy and programme that can initiate early promotive and preventive efforts for chronic illnesses that can adversely be associated with adolescents' mental health disorders, especially depression.

Author contributions
Haerawati Idris: conceptualized for the research, article then prepared the original draft of the manuscript.
Fatimah tuzzahra: Conceptualized the study design, acquired the raw data for analysis.

Ethical approval
This study has passed the ethics review from the Ethics Review Center of the Faculty of Public Health, Sriwijaya University with number 143/UN9.1.10/KKE/2020.

Conflicts of interest
The authors declare that they have no conflicts of interest.

Data sharing statement
The raw data used in this study are available upon request to the corresponding author.

How does this paper make a difference in general practice?

- Depression is one of the mental illnesses that affect adolescents worldwide.
- Adolescence is variously defined as a period of transition from childhood to adulthood. They have high prevalence depression.
- Depression may decrease human productivity, especially among adolescents, owing to its long-term impacts and double the health burden. It is important to focus on prevention, and early intervention has been stronger than ever, especially for young people.
- This finding implies to create a chronic disease control policy and programme that can initiate early promotive and preventive efforts for chronic illnesses that can adversely be associated with adolescents' especially depression symptom.

References

1. Fahmi M, Siregar A, Sunjaya DK, Amarullah G, Rahma R, Panjaitan NA. Social Capital and Mental Health in Indonesia. Department of Economics, Padjadjaran University; 2017. Accessed September 19, 2021. https://ideas.repec.org/p/unp/wpaper/201701.html

2. WHO. The Global Burden of Disease *2004* update. World Health Organization; 2008. Accessed September 20, 2021. https://apps.who.int/iris/handle/10665/43942

3. Marcheselli F, Brodie E, Yeoh SN, et al. Mental health of children and young people in England, 2017. London NHS. Published online 2018. Accessed September 15, 2021. https://www.rcpsych.ac.uk/docs/default-source/improving-care/nccmh/suicide-prevention/monthly-clinic/(6a)mhcyp-behaviours-lifestyles-identities-(2017).pdf

4. Collishaw S. Trends in adolescent depression: a review of the evidence. Depress Child Adolesc W forward London Assoc Child Adolesc Ment Heal. Published online 2009;7–18. Accessed September 11, 2021. https://www.researchgate.net/publication/284033935_Trends_in_adolescent_depression_A_review_of_the_evidence

5. Lassi Z, Moin A, Bhutta Z. Nutrition in middle childhood and adolescence. Dis Control Priorities, (Volume 8) Child Adolesc Heal Dev. Published online 2017:1896. Accessed September 18, 2021. https://pubmed.ncbi.nlm.nih.gov/30212127/

6. Situmorang A. Adolescent reproductive health in Indonesia. Jakarta STARH Progr. Published online 2003. Accessed September 18, 2021. https://pdf.usaid.gov/pdf_docs/Pnacw743.pdf

7. Fatikhani DA, Setiawan A. The relationship between the level of knowledge regarding fast food and the dietary habits among adolescents in Jakarta, Indonesia. *Enferm Clin*. 2019;29:172–175.

8. Suryaputri IY, Mubasyiroh R, Idaiani S, Indrawati L. Determinants of Depression in Indonesian Youth: Findings From a Community-based Survey. *J Prev Med Public Heal*. 2022;55(1):88.

9. Baek SB. Psychiatric rehabilitation of emotional disorders. *J Exerc Rehabil*. 2014;10(4):205.

10. Depression WHO. Other common mental disorders: global health estimates. *Geneva World Heal Organ*. 2017;24.

11. King LA. The Science of Psychology: An Appreciative View. McGraw-Hill Education; 2016. Accessed September 10, 2021. https://www.mheducation.com/highered/product/science-psychology-appreciative-view-king/M9781260500523.html

12. Patel V, Flisher AJ, Hetrick S, McGorry P. Mental health of young people: a global public-health challenge. *Lancet*. 2007;369(9569):1302–1313.

13. Council NR. Preventing Mental, Emotional, and Behavioral Disorders among Young People: Progress and Possibilities.; 2009. Accessed September 15, 2021. https://nap.nationalacademies.org/catalog/12480/preventing-mental-emotional-and-behavioral-disorders-among-young-people-progress

14. Yap MBH, Pilkington PD, Ryan SM, Jorm AF. Parental factors associated with depression and anxiety in young people: A systematic review and meta-analysis. *J Affect Disord*. 2014;156:8–23.

15. Tang X, Tang S, Ren Z, Wong DFK. Psychosocial risk factors associated with depressive symptoms among adolescents in secondary schools in mainland China: A systematic review and meta-analysis. *J Affect Disord*. 2020;263:155–165.

16. Thapar A, Collishaw S, Pine DS, Thapar AK. Depression in adolescence. *Lancet*. 2012;379(9820):1056-1067.

17. Strauss J, Witoelar F, Sikoki B. The Fifth Wave of the Indonesia Family Life Survey: Overview and Field Report. Vol 1.; 2016. doi:10.7249/wr1143.1. Accessed September 19, 2021. https://www.rand.org/content/dam/rand/pubs/working_papers/WR1100/WR1143z1/RAND_WR1143z1.pdf

18. Schotte CKW, Van Den Bossche B, De Doncker D, Claes S, Cosyns P. A biopsychosocial model as a guide for psychoeducation and treatment of depression. *Depress Anxiety*. 2006;23(5):312-324. doi:10.1002/DA.20177

19. Kwong ASF, Manley D, Timpson NJ, et al. Identifying critical points of trajectories of depressive symptoms from childhood to young adulthood. *J Youth Adolesc*. 2019;48(4):815–827.

20. Joshi S, Mooney SJ, Kennedy GJ, et al. Beyond METs: types of physical activity and depression among older adults. *Age Ageing*. 2016;45(1):103–109.

21. Gallo JJ. Epidemiology of mental disorders in middle age and late life: conceptual issues. *Epidemiol Rev*. 1995;17(1):83–94.

22. Barber SL, Gertler PJ, Harimurti P. Differences In Access To High-Quality Outpatient Care In Indonesia: Lower quality in remote regions and among private nurses is a manifestation of the educational, policy, and regulatory frameworks upon which the Indonesian health system is based. *Health Aff*. 2007;26(Suppl2):w352–w366.

23. Gaveau DLA, Epting J, Lyne O, et al. Evaluating whether protected areas reduce tropical deforestation in Sumatra. *J Biogeogr*. 2009;36(11):2165–2175.

24. Komang YRN, Purwanto E, Marthias T. Healthcare Service Utilisation by Elderly People and Adolescents in Indonesia. *Reg Dev Indones Some Notes Jokowi Gov*. 2017;(13).

25. Peltzer K, Pengpid S. High prevalence of depressive symptoms in a national sample of adults in Indonesia: Childhood adversity, sociodemographic factors and health risk behaviour. *Asian J Psychiatr*. 2018;33:52–59. doi:10.1016/J.AJP.2018.03.017

26. Purborini N, Lee MB, Devi HM, Chang HJ. Associated factors of depression among young adults in Indonesia: a population-based longitudinal study. *J Formos Med Assoc*. 2021;120(7):1434–1443.

27. Christiani Y, Byles J, Tavener M, Dugdale P. Socioeconomic related inequality in depression among young and middle-adult women in Indonesia′s major cities. *J Affect Disord*. 2015;182:76–81.

28. Al-Khani AM, Sarhandi MI, Zaghloul MS, Ewid M, Saquib N. A cross-sectional survey on sleep quality, mental health, and academic performance among medical students in Saudi Arabia. *BMC Res Notes*. 2019;12(1):1–5. doi:10.1186/S13104-019-4713-2/TABLES/3

29. Wu X, Tao S, Zhang Y, Zhang S, Tao F. Low Physical Activity and High Screen Time Can Increase the Risks of Mental Health Problems and Poor Sleep Quality among Chinese College Students. *Plos One*. 2015;10(3):e0119607. doi:10.1371/journal.PONE.0119607

30. Costello DM, Swendsen J, Rose JS, Dierker LC. Risk and protective factors associated with trajectories of depressed mood from adolescence to early adulthood. *J Consult Clin psychol*. 2008;76(2):173.

31. Widakdo G, Besral B. Efek Penyakit Kronis terhadap Gangguan Mental Emosional. *Kesmas J Kesehat Masy Nas (National Public Heal Journal)*. 2013;7(7):309–316. doi:10.21109/kesmas.V7I7.29

32. Kerker BD, Zhang J, Nadeem E, et al. Adverse Childhood Experiences and Mental Health, Chronic Medical Conditions, and Development in Young Children. *Acad Pediatr*. 2015;15(5):510-517. doi:10.1016/J.ACAP.2015.05.005

33. Roy A. Is introversion a risk factor for suicidal behaviour in depression? *Psychol Med*. 1998;28(6):1457-1461.

34. Dardas LA, Bailey Jr DE, Simmons LA. Adolescent depression in the Arab region: A systematic literature review. *Issues Ment Health Nurs*. 2016;37(8):569–585.

35. Clayborne ZM, Varin M, Colman I. Systematic review and meta-analysis: adolescent depression and long-term psychosocial outcomes. *J Am Acad Child Adolesc Psychiatry*. 2019;58(1):72–79.