Are Adverse Childhood Experiences Associated with Depression in Early Adolescence? An Ecological Analysis Approach Using GEAS Baseline Data 2018 in Indonesia

Mustikaningtyas Mustikaningtyas[1,2], Anggriyani Wahyu Pinandari[3,4]*, Diana Setiyawati[5,6], Siswanto Agus Wilopo[3,4]

[1]Student of Doctoral Program Medicine and Health Science, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia; [2]National Population and Family Planning Board of Indonesia, Special Region of Yogyakarta, Indonesia; [3]Center of Reproductive Health, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia; [4]Department of Biostatistics, Epidemiology and Population Health, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia; [5]Center of Public Mental Health, Faculty of Psychology, Universitas Gadjah Mada, Yogyakarta, Indonesia; [6]Faculty of Psychology, Universitas Gadjah Mada, Yogyakarta, Indonesia

Abstract

BACKGROUND: Child and adolescent violence and harassment have frequently happened in Indonesia in the past 5 years. Adverse childhood experiences (ACEs) at an early age involve traumatic events, which can cause long-term negative effects on mental health and well-being.

AIM: This cross-sectional study aimed to examine the correlation between ACEs and depressive symptoms among early adolescents in Indonesia.

METHODS: Using Indonesia's Global Early Adolescent Study (GEAS), data analysis included 4684 early adolescents with 2207 boys and 2477 girls from three sites: Semarang, Lampung, and Bali. Depressive symptoms were collected using self-reported questionnaires. Simple and multiple logistic regressions were used to examine how ACEs, individual, family, and peer-level predictors predict depressive symptoms with odds ratio (OR) and 95% confidence interval (CI).

RESULTS: Nearly 80% of adolescents have experienced at least one ACE; the prevalence of experiencing depressive symptoms in boys and girls was closely similar. Adolescents with ACEs were two times more likely to have depressive symptoms (OR: 2.01, 95% CI: 1.70−2.38). Among the family-level predictors, only wealth was significantly associated with depressive symptoms. All variables in peer-level predictors including communication with peers, peer perception of having sex, and dating through unadjusted until adjusted models significantly predict depressive symptoms, (OR: 1.39, 95% CI: 1.20−1.61), (OR: 1.82, 95% CI: 1.14−2.91), and (OR: 1.18, 95% CI: 1.02−1.36), respectively. After adjusting with individual, family, and peer-level, only sex, wealth, and peer-level variables were associated with depressive symptoms.

CONCLUSION: ACEs strongly predict depression when the analysis was adjusted for social-ecological predictors. Recognition of the significant roles of family and peer-level predictors is important to improve adolescent health and well-being.

Introduction

Child and adolescent violence and harassment frequently happen in Indonesia. Recently, studies and documentaries of child violence reveal many challenging teenage issues including bullying, sexual abuse, sexual harassment, quarreling, suicide, and homicide [1]. The Ministry of Women's Empowerment and Child Protection data indicated that 47.7% of boys and 18% of girls aged 13−17 years old experienced at least one physical or psychological abuse in 2013 [2]. Research showed that adolescents who experience more than one maltreatment during childhood have an increased risk of poor mental health [3]. It occurs because adolescence is a critical period of rapid growth and development in physical, emotional, sexual, and cognitive aspects [4], [5].

Maltreatment and living in an abusive environment that is harmful to a child's and adolescent's development are referred to as adverse childhood experiences (ACEs). ACEs have been explained as potentially traumatic events that last for an extended period and negatively impact health and well-being [6]. ACEs that occur in childhood involve the development of toxic stress resulting in prolonged or excessive activation of the stress response system. Continuous chronic stress can damage the body and brain, especially for children [7], and excessive stress can interfere with the development of brain architecture and increase levels of stress hormones [8], both of which will cause problems that can last into adulthood [9].

Adolescents who experience ACEs before 18 years of age will face long-term effects on their mental health and well-being such as depression [10].

Short- and long-term effects caused by ACEs include developmental delays in the adolescent health both physically and mentally and reinforce why ACEs are now more recognized as a decisive risk factor for adolescent health and well-being [6], [11]. ACEs also predict many poor health outcomes in adult life, including mental disorders, suicidal thoughts, eating disorders, behavior disorders, drug abuse, alcoholism, and poor social development [12], [13]. These will decrease a person's quality of life, which is associated with mental and physical health conditions [14]. In addition, children and adolescents exposed to ACEs have been shown to have an increased risk of depression [15], [16].

Depression is a common mental disorder worldwide in most age groups [17]. Depression is a serious mood disorder that can affect a child's and adolescent's development, including physical, emotional, and social [18]. Depression is characterized by depressed moods most of the day, loss of interest or pleasure, weight loss, insomnia or hypersomnia, fatigue or loss of energy, feelings of guilt or low self-worth, poor concentration, and recurrent thoughts of death [19]. Globally, 4.4% of the population suffer from depression, and cases are still increasing, especially in low-to-middle income countries (LMIC) [17]. Particularly in adolescents, the prevalence is estimated to be between 4 and 5% [20]. In Indonesia, depression cases are about 6.1% in people age >15 years old [21]. Meanwhile, based on the data from the Indonesian Family Life Survey (IFLS) 5 in 2015, the depressive symptoms among adolescents were about 29.2% [22]. Depression is a rare issue in childhood but commonly occurs in adolescence [23]. Depression will severely impact adolescent life in many aspects, such as school, behavior and social disorders, drug abuse, bad reproductive and sexual health, and even suicidal thoughts [24].

Understanding adolescents' mental health focuses on individual factors and considers environmental factors. Ecological approaches shift the focus from the individual to the environment. The ecological model helps to explain how depressive symptoms are influenced by the microsystem, mesosystem, and macrosystem. Each level of the individual, family, and peer interactions contributes to each other [25], [26]. The ecological framework supports the view that the causes of mental health disorders, including depression in adolescents, are from the individual and environmental factors involved in adolescent life and development, such as family, school, peers, and community [27]. Peers play an important role in adolescent life, and the closest environment next to family is the peer group since adolescents spend most of their time within a peer group [28]. An ecological approach is widely used to understand adolescent mental health comprehensively.

To date, research concerning ACEs and depression varies worldwide but remains scarce in LMICs, whereas various studies showed that ACEs are more frequently happening there than in high-income countries [29]. Abusive childhood experiences powerfully predispose adolescents to poor mental health [30]. Studies that involve early adolescents as respondents showed that the more they have had ACEs, the more depressive symptoms emerge even after a long period [31]. A significant correlation was found between ACEs and adolescents' poor mental health, particularly depression. To the best of our knowledge, many studies have focused only on a single factor rather than multiple factors that contribute to child and adolescent depression. In addition, studies about early adolescent depression in Indonesia are still limited, particularly research examining mental health issues through the ecological approach. Related research showed during adolescence, relationships with parents and friends are very supportive for their development in the future [32]. Besides family, peers play an important role in adolescents' lives, as vital sources of support for their mental health [33].

This study investigated the association between ACEs and self-reported depressive symptoms among early adolescents in Indonesia adjusted by other socioecological factors (individual, family, and peers). There were several protective factors identified, including individual, family, and peer levels in this research, that could mitigate early adolescent depression.

Methods

Research design

This cross-sectional study used the baseline survey of Global Early Adolescent (GEAS) in Indonesia. GEAS-Indonesia was a school-based survey focusing on early adolescents aged 10−14 years, conducted by John Hopkins University (JHU) and a World Health Organization (WHO) partnership with Rutgers and the Center for Reproductive Health, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada. Using a smartphone-based questionnaire, it measured three cross-cultural components: A 10-module health instrument, a vignettes-based measure of gender equality, and assessment of gender norms [34].

Population and sampling

GEAS-Indonesia was conducted in three sites: Semarang (Central Java Province), Denpasar (Bali Province) and Bandar Lampung (Lampung Province). The total sample method resulted in 4684 early adolescents aged 10−14 years from the seventh grade of junior high school at eighteen selected schools.

It consisted of 2207 boys and 2477 girls. Based on data quality, some participants were excluded from the multivariable analysis based on survey questions to which they provided no meaningful response (i.e., "Don't know" or "Refuse" answers). Table 1 shows the exact numbers of respondents used for the multivariable analysis. Most respondents have experienced ACEs, with at least one in the past year (78.2%), and 2421 adolescents (51.7%) strongly indicate depressive symptoms. Most respondents are girls (52.9%), age 12 (72.1%), and from rich families (22.8%).

Table 1: The characteristics of the study population of ACEs and depressive symptom scores

Independent variable	Depression symptoms					
	Below median		Upper median		Total	
	n	%	n	%	n	%
ACEs						
No	604	26.7	418	17.3	1022	21.8
Yes	1659	73.3	2003	82.7	3662	78.2
Sex						
Boy	980	43.3	1227	50.7	2207	47.1
Girl	1283	56.7	1194	49.3	2477	52.9
Age						
10	2	0.1	1	0.0	3	0.1
11	133	5.9	122	5.0	255	5.4
12	1653	73.0	1722	71.1	3375	72.1
13	447	19.8	528	21.8	975	20.8
14	28	1.2	48	2.0	76	1.6
Freedom of voice						
Above median	1194	55.7	1210	54.5	2404	55.1
Below median	951	44.3	1009	45.5	1960	44.9
Freedom of decision making						
Above median	1105	53.3	1161	53.8	2266	53.5
Below median	970	46.7	998	46.2	1968	46.5
Access to social media						
No	205	9.1	222	9.2	427	9.1
Yes	2058	90.9	2199	90.8	4257	90.9
Wealth						
Very poor	427	19.5	505	21.8	932	20.7
Poor	399	18.2	472	20.4	871	19.3
Middle	436	19.9	445	19.2	881	19.6
Rich	515	23.5	513	22.2	1028	22.8
Very rich	413	18.9	379	16.4	792	17.6
Family structure						
Both parents	1985	87.8	2090	86.4	4075	87.0
Mom/dad only	161	7.1	188	7.8	349	7.5
Grandparents/other	116	5.1	142	5.9	258	5.5
Parent-child closeness						
No	794	35.1	951	39.3	1745	37.3
Yes	1469	64.9	1470	60.7	2939	62.7
Parent-child communication						
No	1100	48.6	1237	51.1	2337	49.9
Yes	1163	51.4	1184	48.9	2347	50.1
Parent awareness						
No	837	37.0	952	39.3	1789	38.2
Yes	1426	63.0	1469	60.7	2895	61.8
Communication with peer						
No	1710	75.6	1612	66.6	3322	70.9
Yes	553	24.4	809	33.4	1362	29.1
Peer perception of having sex						
No	2232	98.6	2343	96.8	4575	97.7
Yes	31	1.4	78	3.2	109	2.3
Peer perception on dating						
No	1711	75.6	1675	69.2	3386	72.3
Yes	552	24.4	746	30.8	1298	27.7
Total	2263	100.0	2421	100.0	4684	100.0

Data source: Indonesia GEAS 2018

Variables

Depressive symptoms were measured using a series of self-reported questions. Adolescents were asked whether they were: (1) Worried for no reason, (2) not feeling happy and cannot sleep in the night, (3) feeling sad, and (4) not feeling happy and trying to do self-harm. For each question, they responded with five subscales. The summed score was coded into two categories above and below the mean score. The above mean category indicated a strong indication of depressive symptoms. The independent variable is ACEs which was examined using 13 questions about stressful or traumatic experiences, including violence, neglect, family dysfunction, domestic violence, and family drug abuse. Adolescents were asked to provide their responses in three subscales (often, sometimes, and never) for each question. Often and sometimes, responses were coded as ever experience ACEs. A respondent with experience of at least one ACEs was coded as "Yes" and code "No" was for those who never experienced any ACEs.

Covariates were divided into three categories. At the individual level, variables included sex, categorized into boy and girl, age, and freedom of voice were collected through multiple questions about adolescents' perceived courage to express their opinions. The score for each question was then summarized and categorized into below median for low voice and above the median for higher voice. The same approach was applied for freedom of movement and freedom of decision-making. Access to social media is adolescent time spent in social media at least 2 h a day.

The family level variable is the wealth index measured through a series of questions about household ownership of selected assets, such as television and bicycles, materials of house construction, and types of access to water and sanitation. The responses were then constructed into a composite measure of household cumulative living standards using factor scores generated through principal component analysis. The score was standardized using normal distribution and broke into five percentiles as lowest (very poor), second (poor), middle, fourth (rich), and highest (very rich). Family structure was categorized as a complete set of parents, single parent, and other. Parent-child closeness is adolescents' perception of closeness with their parents. Parent-child communication was collected through questions about: (1) The things that worry them, (2) changes with their body, and (3) problems with their boyfriend or girlfriend (only applies if they have one). Parent-child awareness represents the child perceiving whether the parent(s) know(s) their school, friends, and where they go. Covariates at the peer level are communication with peers indicating whether adolescents communicate at least one topic of sexual reproductive health, perception of having sex, and dating.

Statistical analysis

Descriptive analysis was used to present the distribution and prevalence of each predictor as total and cross-tabulation with the dependent variable. Inferential analysis using simple and multiple logistic regression tests examined how different levels of predictors predict and influence the association between ACEs and depressive symptoms. The exclusion criteria removed

"don't know" and "refuse to answer" responses as well as any missing data in selected variables of this study from the analysis. All tests used a 95% confidence interval (CI) level and the association magnitude was presented in odds ratio (OR). Data were analyzed using STATA software version 15.

Results

The pattern of depression according to predictors at individual, family, and peer-level

Most adolescents reported experiencing at least one ACES in their lifetime. Higher depression symptoms were more likely to come from those who had ACEs (82.7% vs. 73.3%). Nearly equal number of boys and girls showed depressive symptoms. Social media was an essential part of teenagers' daily lives, with 90.9% spending at least 2 h/day to access social media. Most adolescents lived in a family with low-middle economic background and both parents (59.6% and 87%, respectively). Perceptions of parent-child closeness, communication, and monitoring were lower among those who reported higher depressive symptoms than those who never had that experience. Relationships with peers are significant factors for adolescents, but only 29.1% of adolescents communicate with their peers about sexual reproductive health. Most adolescents reported having peers who perceive having sex and dating were not essential. However, higher depressive symptoms were more likely to come from adolescents who discussed sexual reproductive health with peers and had peers who perceived having sex and dating as important.

Association between ACEs and depressive symptoms

Table 2 shows the correlation between depression and selected predictors. ACEs were a strong predictor of depressive symptoms among early adolescents. Those who had at least one ACEs in their lifetime were 1.74 times more likely to report depressive symptoms. The magnitude of ACEs correlation increased after adjusting other predictors at the individual, family, and peer level. The unadjusted analysis also signals the significant correlation of several indicators, such as wealth, parent-child closeness, sexual reproductive health communication with peers, and peers' perception that having sex and dating which are important factors in reporting depressive symptoms. Adolescents from poor and very low-income families (40% lowest quintile of wealth) are more likely to report depressive symptoms than the higher economic status. The role of age, freedom of voice and decision-making, access to social media, family structure, and parent-child

communication and monitoring were not significant in predicting depression even after adjustment analysis.

The first adjusted model illustrates how predictors at the individual level correlate with depressive symptoms. The influence of ACEs and type of sex could significantly predict depressive symptoms, while the other individual-level predictors were not significant predictors. After adjustment, the probability of reporting depressive symptoms was 2 times higher among adolescents who had ACEs experience. Boys were more likely to have depressive symptoms than girls (OR: 1.26, 95% CI: 1.11−1.44).

The analysis found an inconsistent correlation between parent-child closeness and depressive symptoms before and after being adjusted with other variables at the family level. In contrast, the role of wealth, family structure, parent-child communication, and parent awareness is similar across the analysis. After being adjusted with all levels in the final model, family structure, parent-child communication, and parent awareness still consistently do not significantly predict depressive symptoms; however, a significant correlation of wealth and depressive symptoms remains. Living in very poor conditions has the highest OR for depressive symptoms (OR: 1.32, 95% CI: 1.07−1.63). Among predictors in the peer level, communication with peers, peers' perception of having sex and dating could significantly predict depressive symptoms. Results showed consistent OR values whether unadjusted or adjusted with all variables in the final model (OR: 1.39, 95% CI: 1.20−1.61), (OR: 1.82, 95% CI: 1.14, 2.91), and (OR: 1.18, 95% CI: 1.02−1.36), respectively.

Discussion

Most findings in this study align with the present research that consistently showed the experience of stressful life events is significantly associated with an increase in depression [12], [35]. The distinctive contribution of this analysis is that it elaborates the effect of ACEs on depressive symptoms in a nationally representative sample of 10−14 years old early adolescents.

First, we found that nearly 80% of adolescents have experienced at least one ACEs; this number is higher than the ACEs survey in adolescents previously done in Indonesia [2]. In this study, boys and girls tend to have the same prevalence of depressive symptoms, which is different from existing research. One study in India found that boys are more vulnerable to experiencing ACEs than girls, both physically and psychologically [36]. Boys tend to experience more physical violence, but on the other hand, girls face more psychological violence [13]. Another study found boys frequently

Table 2: Unadjusted and adjusted analysis of the predictor's influence on early adolescent adverse childhood experiences on depressive symptoms

Independent variables	Unadjusted OR (CI)	Adjusted OR (CI)			
		Individual level	Family level	Peer level	All model
		Individual level predictors			
ACEs					
No	1	1			1
Yes	1.74 [1.52, 2.01]***	2.19 [1.87, 2.58]***			2.01 [1.70, 2.38]***
Sex					
Boy	1.35 [1.20, 1.51]***	1.32 [1.16, 1.50]***			1.26 [1.11, 1.44]***
Girl	1	1			1
Age					
10	1	1			1
11	1.83 [0.16, 20.5]	2.11 [0.19, 23.7]			1.03 [0.063, 16.8]
12	2.08 [0.19, 23.0]	2.26 [0.20, 25.0]			1.08 [0.067, 17.5]
13	2.36 [0.21, 26.1]	2.53 [0.23, 28.2]			1.10 [0.068, 17.8]
14	3.43 [0.30, 39.5]	3.12 [0.27, 36.3]			1.23 [0.073, 20.8]
Freedom of voice					
Above median	1	1			1
Below median	1.05 [0.93, 1.18]	1.02 [0.90, 1.17]			1.02 [0.89, 1.17]
Freedom of decision making					
Above mean	1	1			1
Below mean	0.98[0.87, 1.10]	1.01 [0.88, 1.15]			1.02 [0.89, 1.16]
Access to social media					
No	1.01[0.83, 1.24]	0.99 [0.79, 1.25]			0.98[0.77, 1.25]
Yes	1	1			1
			Family level predictors		
Wealth					
Very poor	1.29 [1.07, 1.56]**		1.28[1.06, 1.55]*		1.32 [1.07, 1.63]**
Poor	1.29 [1.06, 1.56]**		1.27[1.05, 1.55]*		1.25 [1.01, 1.54]*
Middle	1.11 [0.92, 1.35]		1.11[0.92, 1.35]		1.07 [0.87, 1.31]
Rich	1.09 [0.90, 1.31]		1.08[0.90, 1.31]		1.03 [0.84, 1.25]
Very rich	1		1		1
Family structure					
Both parents	1		1		1
Mom/dad only	1.11 [0.89, 1.38]		1.08 [0.87, 1.35]		1.10 [0.86, 1.40]
Grandparents/other	1.16 [0.90, 1.50]		0.75 [0.48, 1.19]		0.68 [0.41, 1.13]
Parent-child closeness					
No	1.20 [1.06, 1.35]**		1.18 [1.04, 1.34]**		1.13 [0.99, 1.30]
Yes	1		1		1
Parent-child communication					
No	1.10 [0.98, 1.24]		1.07 [0.95, 1.21]		1.04 [0.91, 1.19]
Yes	1		1		1
Parent awareness					
No	1.10 [0.98, 1.24]		1.06 [0.94, 1.20]		1.00 [0.87, 1.15]
Yes	1		1		1
				Peer level predictors	
Communication with peer					
No	1			1	1
Yes	1.55 [1.37, 1.76]***			1.44 [1.26, 1.64]***	1.39 [1.20, 1.61]***
Peer perception of having sex					
No	1			1	1
Yes	2.40 [1.57, 3.65]***			1.87 [1.22, 2.87]**	1.82 [1.14, 2.91]*
Peer perception on dating					
No	1			1	1
Yes	1.38 [1.21, 1.57]***			1.23 [1.08, 1.41]**	1.18 [1.02, 1.36]*
Pseudo R²		0.022	0.004	0.010	0.031
AIC		5658.2	6233.0	6429.5	5428.6
df m		9	9	3	21
Observations		4158	4502	4684	4007

Exponentiated coefficients; 95% confidence intervals [CI] in brackets; Likelihood Ratio (LR) from Akaike; df_m=Degree of freedom of the model, Data source: Indonesia GEAS; *p < 0.05, **p < 0.01, ***p < 0.001.

encounter problems with externalizing behavior such as delinquency and aggressiveness, but girls tend to have internalizing problems such as depression and anxiety [37]. Our findings indicated, adolescent boys were more likely to manifest depressive symptoms at the individual level. In addition, they have more chance of suffering from depressive symptoms than girls; this evidence contrasts with other studies where girls have a higher chance of experiencing depression [38].

This study explains how the early adolescents who experienced ACEs had 2 times higher odds of having depressive symptoms. Repeated traumatic events in childhood will become toxic stress and thus can interfere with early adolescent growth and development. High levels of stress can disturb brain development and toxic stress will cause trauma to the child. Those very early imprints are challenging to forget, harming their mental health [39] especially internalizing symptoms such as depression [40].

Only poverty was consistently and significantly associated with depressive symptoms at the family level. Poverty is a strong risk factor that makes adolescent depression worsen [41]. The poor economic conditions can make that adolescents show more depressive symptoms, so a hard economic situation is related to the higher chance of adolescents experiencing ACEs. Children living in poverty tend to get inappropriate treatment, violence, and even experience periods of hunger and starvation. Moreover, poverty is mainly linked with difficulties experienced in childhood; therefore, poverty itself can be confirmed as one of the ACEs because of its persistent and vast effect on development and health outcomes [42].

All of the predictors on the peer level are significantly related to depressive symptoms. These findings highlighted that the peer level could significantly affect the early adolescent depressive symptoms beneficially. It clearly explained that peers represent an

essential part of adolescent life since most adolescent's time is spent with their peers, especially with the opposite sex [43]. In contrast, findings from another study showed the opposite effect, where adolescents who made communication with their peers about reproductive health have a higher probability of showing depressive symptoms. It might happen because the peer group in which an adolescent communicates may lack proper knowledge about reproductive health. Therefore, the misinformed adolescent experiences unnecessary worry about the unknown. It confirms how crucial it is to prepare a peer to peer communication approach about reproductive health as early as possible based on accurate information. Adolescents can have a significant influence and are more comfortable learning from their peer group. Moreover, the reproductive health material should include positive mental health promotions for well-being and encouragement of positive relationships [44].

Although ACEs have a strong influence on the occurrence of depressive symptoms; however, they are related to each other. This interaction can be observed from differences in OR of ACEs before and after adjusted by the individual, family, and peer-level factors. Initially, ACEs were correlated to depressive symptoms; they are a strong predictor of depressive symptoms. There was no significant change in direction through adjustment in the individual level up to the final model, but the OR increased. This finding shows that the role in each level toward depressive symptoms is complex and intense. The social-ecological model can explain that depressive symptoms are significantly influenced by the microsystem, mesosystem, and macrosystem. Research has shown that each level, whether in individual, family, or peer interactions, contributes to each other in complex interactions [45], [46].

Strength and Limitations of the Study

This study is a pioneer study that discusses depressive symptoms in early adolescence in Indonesia with a large number of respondents. However, the cross-sectional design of this analysis cannot demonstrate any cause-effect correlation. Second, recall data can be biased because adolescents tend to misrepresent memories of past events. Third, identification of the depressive symptoms was not based on clinical review measurements and has not been clinically validated.

Conclusions

ACEs strongly predict depression and adjusted with social-ecological predictors increasing the odds of depressive symptoms. Significant roles of family and peer-level predictor inform mental health practitioners that addressing these variables are essential to improve adolescent health and well-being. These studies can help guide prevention and intervention programs to promote adolescent resilience through family and peer support.

Acknowledgments

Ethical Approval and Consent to Participate

The GEAS-Indonesia study was approved by the Institutional Review Board at Bloomberg School of Public Health, Johns Hopkins University, Maryland-United Stated of America and Faculty of Medicine, Public Health and Nursing of Universitas Gadjah Mada, Daerah Istimewa Yogyakarta-Indonesia.

Funding

References

1. Kumara A, Wimbarti S, Susetyo YF, Kisriyani A. The epidemiology of Indonesian children and adolescent school-based mental health: Validation of school-based mental health information system. Univ J Psychol. 2017;5(3):114-21. https://doi.org/10.13189/ujp.2017.050303

2. Kementerian Pemberdayaan Perempuan dan Perlindungan Anak. Statistik Gender Tematik-Mengakhiri Kekerasan Terhadap Perempuan dan Anak Di Indonesia. Jakarta: Kementerian Pemberdayaan Perempuan dan Perlindungan Anak; 2017.

3. Cheung K, Taillieu T, Turner S, Fortier J, Sareen J, MacMillan HL, *et al*. Relationship and community factors related to better mental health following child maltreatment among adolescents. Child Abuse Negl. 2017;70:377-87. https://doi.org/10.1016/j.chiabu.2017.06.026
PMid:28750346

4. Shlafer R, Hergenroeder AC, Emans SJ, Rickert VI, Adger H Jr., Spear B, *et al*. Adolescence as a critical stage in the MCH Life course model: Commentary for the leadership education in adolescent health (LEAH) interdisciplinary training program projects. Matern Child Health J. 2014;18(2):462-6. https://doi.org/10.1007/s10995-013-1243-8
    PMid:23435919

5. McNeely C, Blanchard J. The Teen Years Explained: A Guide to Healthy Adolescent Development. Baltimore: Johns Hopkins Bloomberg School of Public Health, Center for Adolescent Health; 2009.

6. Boullier M, Blair M. Adverse childhood experiences. Paediatr Child Health. 2018;28(3):132-7. https://doi.org/10.1016/j.paed.2017.12.008

7. Franke HA. Toxic stress: Effects, prevention and treatment. Children (Basel). 2014;1(3):390-402. https://doi.org/10.3390/children1030390
    PMid:27417486

8. National Scientific Council on the Developing Child. Excessive Stress Disrupts the Architecture of the Developing Brain: Working Paper No. 3. 2005/2014. Cambridge, MA: Center on the Developing Child at Harvard University.

9. Shonkoff JP, Boyce WT, McEwen BS. Neuroscience, molecular biology, and the childhood roots of health disparities: Building a new framework for health promotion and disease prevention. JAMA. 2009;301(21):2252-9. https://doi.org/10.1001/jama.2009.754
    PMid:19491187

10. Campbell JA, Walker RJ, Egede LE. Associations between adverse childhood experiences, high-risk behaviors, and morbidity in adulthood. Am J Prev Med. 2016;50(3):344-52. https://doi.org/10.1016/j.amepre.2015.07.022
    PMid:26474668

11. Chanlongbutra A, Singh GK, Mueller CD. Adverse childhood experiences, health-related quality of life, and chronic disease risks in rural areas of the United States. J Environ Public Health. 2018;2018:7151297. https://doi.org/10.1155/2018/7151297
    PMid:30112012

12. Hunt TK, Slack KS, Berger LM. Adverse childhood experiences and behavioral problems in middle childhood. Child Abuse Negl. 2017;67:391-402. https://doi.org/10.1016/j.chiabu.2016.11.005
    PMid:27884508

13. Cavanaugh CE, Petras H, Martins SS. Gender-specific profiles of adverse childhood experiences, past year mental and substance use disorders, and their associations among a national sample of adults in the United States. Soc Psychiatry Psychiatr Epidemiol. 2015;50(8):1257-66. https://doi.org/10.1007/s00127-015-1024-3
    PMid:25701134

14. Greger HK, Myhre AK, Lydersen S, Jozefiak T. Child maltreatment and quality of life: A study of adolescents in residential care. Health Qual Life Outcomes. 2016;14:74. https://doi.org/10.1186/s12955-016-0479-6
    PMid:27161357

15. Seo J, Lee CS, Lee YJ, Lee MS, Bhang SY, Lee D. The mediating effect of depressive symptoms on the relationship between adverse childhood experiences and problematic internet use in children and adolescents. J Korean Med Sci. 2020;35(31):e282. https://doi.org/10.3346/jkms.2020.35.e282
    PMid:32776724

16. Butler AC. Poverty and adolescent depressive symptoms. Am J Orthopsychiatry. 2014;84(1):82-94. https://doi.org/10.1037/h0098735
    PMid:24826831

17. World Health Organization. Depression and Other Common Mental Disorders: Global Health Estimates. Geneva: World Health Organization; 2017.

18. Clark MS, Jansen KL, Cloy JA. Treatment of childhood and adolescent depression. Am Fam Phys. 2012;86(5):442-8.
    PMid:22963063

19. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. Arlington, VA: American Psychiatric Association; 2013.

20. Thapar A, Collishaw S, Pine DS, Thapar AK. Depression in adolescence. Lancet. 2012;379(9820):1056-67. https://doi.org/10.1016/S0140-6736(11)60871-4
    PMid:22305766

21. Kemenkes RI. Riset Kesehatan Dasar. Jakarta: Badan Penelitian Dan Pengembangan Kesehatan Kementerian Kesehatan RI; 2018.

22. 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;33:52-9. https://doi.org/10.1016/j.ajp.2018.03.017
    PMid:29529418

23. Jaschek G, Carter-Pokras OD, He X, Lee, S, Canino G. Association of types of life events with depressive symptoms among Puerto Rican youth. PLoS One. 2016;11(10):e0164852. https://doi.org/10.1371/journal.pone.0164852

24. Patel V, Flisher AJ, Hetrick S, McGorry P. Mental health of young people: A global public-health challenge. Lancet. 2007;369(9569):1302-13. https://doi.org/10.1016/S0140-6736(07)60368-7
    PMid:17434406

25. Blum RW, Bastos FI, Kabiru CW, Le LC. Adolescent health in the 21st century. Lancet. 2012;379(9826):1567-8. https://doi.org/10.1016/S0140-6736(12)60407-3
    PMid:22538177

26. Bronfenbrenner U. The Ecology of Human Development: Experiments by Nature and Design. Cambridge, MA: United States of America: Harvard University Press; 1979.

27. Blum RW, Astone NM, Decker MR, Mouli VC. A conceptual framework for early adolescence: A platform for research. Int J Adolesc Med Health. 2014;26(3):321-31. https://doi.org/10.1515/ijamh-2013-0327
    PMid:24486726

28. Marin P, Brown B. The School Environment and Adolescent Well-Being: Beyond Academics. Washington, D.C.: Child Trends; 2008.

29. Blum RW, Li M, Naranjo-Rivera G. Measuring adverse child experiences among young adolescents globally: relationships with depressive symptoms and violence perpetration. J Adolesc Health. 2019;65(1):86-93. https://doi.org/10.1016/j.jadohealth.2019.01.020
    PMid:30930089

30. Nelson CA, Scott RD, Bhutta ZA, Harris NB, Danese A, Samara M. Adversity in childhood is linked to mental and physical health throughout life. BMJ. 2020;371:m3048. https://doi.org/10.1136/bmj.m3048
    PMid:33115717

31. Tsehay M, Necho M, Mekonnen W. The role of adverse childhood experience on depression symptom, prevalence, and severity among school going adolescents. Depress Res Treat. 2020;2020:5951792. https://doi.org/10.1155/2020/5951792
    PMid:32257437

32. Fiorilli C, Capitello TG, Barni D, Buonomo I, Gentile S. Predicting adolescent depression: The interrelated roles of self-esteem and interpersonal stressors. Front Psychol. 2019;10:565. https://doi.org/10.3389/fpsyg.2019.00565

PMid:30930823

33. Platt B, Kadosh KC, Lau JY. The role of peer rejection in adolescent depression. Depress Anxiety. 2013;30(9):809-21. https://doi.org/10.1002/da.22120
    PMid:23596129

34. Center for Reproductive Health. Baseline Report of GEAS in Indonesia: 2019. Yogyakarta: Center for Reproductive Health; 2019.

35. Zare M, Narayan M, Lasway A, Kitsantas P, Wojtusiak J, Oetjen CA. Influence of adverse childhood experiences on anxiety and depression in children aged 6 to 11 Years. Pediatr Nurs. 2018;44(6):267-74.

36. Santoro AF, Suchday S, Benkhoukha A, Ramanayake N, Kapur S. Adverse childhood experiences and religiosity/ spirituality in emerging adolescents in India. Psycholog Relig Spiritual. 2016;8(3):185-94. https://doi.org/10.1037/rel0000038

37. Matos AP, Salvador MC, Costa JJ, Pinheiro R, Arnarson EO, Craighead WE. The Relationship Between Internalizing and Externalizing Problems in Adolescence: Does Gender Make a Difference? Can Int J Soc Sci Educ. 2017;8:45-63.

38. Almuneef M, ElChoueiry N, Saleheen HN, Al-Eissa M. Gender-based disparities in the impact of adverse childhood experiences on adult health: Findings from a national study in the kingdom of Saudi Arabia. Int J Equity Health. 2017;16(1):90. https://doi.org/10.1186/s12939-017-0588-9
    PMid:28558774

39. Lupien SJ, McEwen BS, Gunnar MR, Heim C. Effects of stress throughout the lifespan on the brain, behaviour and cognition. Nat Rev Neurosci. 2009;10(6):434-45. https://doi.org/10.1038/nrn2639
    PMid:19401723

40. Mendle J, Leve LD, Van Ryzin M, Natsuaki MN. Linking childhood maltreatment with girls' internalizing symptoms: Early puberty as a tipping point. J Res Adolesc. 2014;24(4):689-702. https://doi.org/10.1111/jora.12075
    PMid:25419091

41. Coley RL, Sims J, Dearing E, Spielvogel B. Locating economic risks for adolescent mental and behavioral health: Poverty and affluence in families, neighborhoods, and schools. Child Dev. 2018;89(2):360-9. https://doi.org/10.1111/cdev.12771
    PMid:28245340

42. Hughes M, Tucker W. Poverty as an adverse childhood experience. N C Med J. 2018;79(2):124-6. https://doi.org/10.18043/ncm.79.2.124
    PMid:29563312

43. Lam CB, McHale SM, Crouter AC. Time with peers from middle childhood to late adolescence: Developmental course and adjustment correlates. Child Dev. 2014;85(4):1677-93. https://doi.org/10.1111/cdev.12235
    PMid:24673293

44. Crocker BC, Pit SW, Hansen V, John-Leader F, Wright ML. A positive approach to adolescent sexual health promotion: A qualitative evaluation of key stakeholder perceptions of the Australian positive adolescent sexual health (PASH) conference. BMC public health. 2019;19(1):681. https://doi.org/10.1186/s12889-019-6993-9
    PMid:31159767

45. Bronfenbrenner U, Ceci SJ. Nature-nurture reconceptualized in developmental perspective: A bioecological model. Psychol Rev. 1994;101(4):568-86. https://doi.org/10.1037/0033-295x.101.4.568
    PMid:7984707

46. Moore GF, Littlecott HJ, Evans R, Murphy S, Hewitt G, Fletcher A. School composition, school culture and socioeconomic inequalities in young people's health: Multi-level analysis of the health behaviour in school-aged children (HBSC) survey in Wales. Br Educ Res J. 2017;43(2):310-29. https://doi.org/10.1002/berj.3265