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JOURNAL OF
ADOLESCENT
HEALTH

www.jahonline.org

Original article

Mental Health Problems Among Indonesian Adolescents: Findings of a Cross-Sectional Study Utilising Validated Scales and Innovative Sampling Methods

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Article history: Received March 3, 2024; Accepted July 12, 2024

Keywords: Adolescents; Anxiety; Community-based; Depression; Diagnostic; Indonesia; Mental health; School-based; Validated

ABSTRACT

Purpose: This study aimed to estimate the prevalence of mental health problems and identify potential risk and protective exposures for adolescents in Indonesia.

Methods: An innovative sampling approach was applied to simultaneously recruit school- and community-based adolescents aged 16–18 years old from Jakarta (urban megacity) and South Sulawesi (remote province). We used multistage cluster sampling for in-school (N = 1,337) and respondent driven sampling for out-of-school (N = 824) adolescents. Mental health was measured using two validated scales: Kessler-10 and Center for Epidemiologic Studies Depression Scale-Revised. Psychiatric interviews were conducted in a subsample (N = 196) of students from Jakarta to validate the self-report scales.

IMPLICATIONS AND CONTRIBUTION

There are limited data on mental disorders among adolescents in low- and middle-income countries, with no studies found of prevalence and risk factors disaggregated by school and community settings. This study highlights the

Conflicts of interest: There are no disclosures of potential conflict for interest.

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Results: The estimated population prevalence of psychological distress and depression were 24.3% (95% CI = 21.5–27.2) and 12.6% (10.5–14.4) for in-school and 23.7% (20.7–26.7) and 23.5% (20.4–26.5) for out-of-school adolescents, respectively. In participants who completed a psychiatric interview, common psychiatric morbidities were social anxiety, depression, and suicidality. Compared to in-school females, male in-school adolescents reported a lower prevalence of psychological distress (16.9% (13.1–20.7) vs. 30.4% (26.4–34.4)) and depression (10.1% (7.2–13.1) vs. 14.6 (11.4–17.8)). By contrast, for out-of-school adolescents, males reported a higher prevalence of psychological distress (25.2% (21.6–28.9) vs. 20.2% (15.1–25.3)) and depression (26.3% (22.5–30.1) vs. 16.9% (11.8–21.9)). In-school adolescents who did not seek healthcare despite a perceived need were more likely to report psychological distress and depression.

Discussion: Adolescent mental health problems are highly prevalent in Indonesia, with substantial variation by gender, geography, and school enrolment. This study and its approach to sampling and measurement may serve as a model to improving mental health surveillance across other settings.

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burden of poor mental health across different adolescent groups in different settings in Indonesia, indicating unmet mental health care needs among young people in the context of a rapid geographical and socio-economic transition in the developing world.

Mental health is a fundamental human right that has been recently recognized as a global development priority [1]. Mental disorders have emerged as a leading cause of disease burden globally, driven by reductions in communicable diseases and increased exposure to mental health risks. Modelling studies have shown that the burden of depressive and anxiety disorders, which accounted for more than 60% of global mental disorders in 2020, increased by 61.1% (56.9–65.0) and 53.7% (48.8–59.1), respectively from 1990 to 2019 [2,3]. Recent research in high-income countries (HICs) shows that over the past decades, the incidence of depression and anxiety has increased by more than two-fold in adolescents and young people while remaining stable or decreasing in older age groups [4,5].

The majority of mental disorders first occur in adolescence. The World Health Organization estimated that more than half of all cases of mental disorders begin by age 14, yet most cases are neither identified nor treated, resulting in negative impacts on education, socialization, and antisocial behaviours [6,7]. Studies in HICs have shown a growing and significant burden of poor mental health among adolescents aged 10–24 years, particularly in females in the U.S., [8] Canada, [9] and Iceland [10]. However, there is limited data on the prevalence and risk factors of mental disorders in children and adolescents in low- and middle-income countries (LMICs). The mean coverage of prevalence data across six mental disorders for those aged 5–17 years in LMICs was 4.5% compared to 26.4% in HICs; strikingly, many LMICs had no data on any disorder [11]. A review reported that the prevalence of mental disorders among youth in LMICs ranged from 0%–28% for depression and 8%–27% for anxiety [12] similar to that in HICs, but little is known about how this burden varies by gender, socio-economic status, and especially, by school enrolment and setting (e.g., urban or rural).

Adolescent mental health is a multidimensional concept [13]. To date, most studies have focused on mental health risks (e.g., exposure to bullying) rather than key symptoms or diagnoses of common mental disorders [14]. Data on the burden of common mental disorders is needed, as well as knowledge of social and environmental determinants. Understanding how prevalence and risk of mental disorders differs by different groups, such as those who attend school or do not attend school, is also required. Epidemiological surveillance has focused on in-school adolescents due to this being an accessible sampling frame. These data

gaps are major barriers to effective and responsive policies and interventions for adolescent mental health [15,16].

Indonesia is the world's largest archipelago and the fourth-most populous country. Adolescents account for nearly a quarter (>65 million) of the total population of 280 million people. The country is undergoing a fast epidemiological transition with an increasing burden of noncommunicable diseases [17]. Emerging evidence from the Indonesia Basic Health Research Data show an increased prevalence of emotional mental disorders among people aged 15 years and older from 6.0% to 9.8% from 2013 to 2018 [18]. There are also concerns that, too often, studies in Indonesia have used assessment measures with limited validity and have solely focused on adolescents in schools [19]. The objective of the present study was to determine the population prevalence of poor mental health and its correlates among in-school and out-of-school adolescents in Indonesia. This study contributes to the global effort in addressing a critical data gap on mental health disorders among adolescents in LMICs, particularly among those who are not engaged in school.

Methods

Study design and measures

We undertook a sequential mixed-methods study to understand mental health problems and health risks among Indonesian adolescents. The detailed study protocol has been previously published [20]. In brief, we undertook this research in Jakarta (an urban megacity) and South Sulawesi (a remote province) to capture Indonesia's geographic and socio-economic diversity; Jakarta and South Sulawesi differed substantially by population density (15,366/km² vs. 397/km²), population size of 15–19 year olds (706,550 vs. 68,112), and Human Development Index (80.06 vs. 68.33) at the time of sampling [20]. We first undertook a formative qualitative inquiry with two groups of adolescents, those who attended school and those not enrolled in school, and found that depression and stress were core concerns in both groups [21]. We then undertook cross-sectional surveys of adolescents aged 16–18 years (to coincide with senior secondary school grades 10–12, the onset of mental disorders, and developmental capacity to explore complex issues) [20], sampling

from 24 randomly selected schools (multistage cluster sampling) and 16 community settings (respondent driven sampling - RDS). These two distinct sampling frames were employed so as to enable engagement with these distinct population groups; extensive details of sampling strategies are provided in the published protocol [20]. Data were collected between February and December 2018. All participants completed a self-reported questionnaire, which included validated measures of adolescent mental health (the Centre for Epidemiologic Studies Depression Scale-Revised (CESD-R) and the Kessler Psychological Distress Scale – 10 items (K10). These two scales were selected as they aligned with the major mental health problems identified through our formative inquiry, modelled burden of disease, and have also been used in comparable populations. The findings from these two surveys are the focus of this paper.

We have previously validated both of these measures in Indonesian adolescents using the Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID) and have previously reported optimal thresholds for detecting mental health problems for the K10 and CESD-R [22]. The procedure around psychiatric interview is detailed in the protocol [20]; in brief, we limited this assessment to school-based adolescents in Jakarta to ensure we could follow-up any clinically concerning findings. We calculated that a sample size of 180 was required to estimate the sensitivity and specificity of a threshold of K10 and CESD-R, with a precision of <10%. In each eligible

class, six consenting students were randomly selected. The interviews were conducted by psychiatry trainees under the supervision of senior clinical psychiatrists (TW and FK) the day after the survey to minimize respondent burden. We used eight modules of the MINI-KID deemed relevant for this study (depression, dysthymia, panic disorder, social anxiety disorder, separation anxiety, generalized anxiety, and adjustment disorder and suicidality). In this paper, specific psychiatric morbidities identified by the MINI-KID are presented for those reporting psychological distress to characterize the types of morbidities.

Our choice of potential determinants and correlates of adolescent mental health were also informed by the formative qualitative inquiry and the literature. These measures are summarized in Table 1.

Statistical analysis

We analyzed the school and community-based samples separately, given the distinct sampling methodologies. For the school-based sample, population prevalence of poor mental health and independent exposure effects were weighted using poststratification inverse-probability weights. Taylor-linearized variance or standard error estimation was used for inference. For the community-based sample, the RDS (Volz–Heckathorn) estimator [23] was used to derive and apply the sampling

Table 1
Summary of measures included in the population surveys

Study measures & concept	Scale or measure
Outcomes- mental health problems	
Depression	
Centre for Epidemiologic Studies Depression Scale – Revised (CESD-R). Screening tool for depressive disorders [1,2]. Aligned with the Diagnostic and Statistical Manual V.	20-item scale; screening for symptoms of depression last 2 weeks
Stress or psychological distress	
Kessler 10 (K10). Screening tool for nonspecific psychological distress, including both depressive and anxiety disorders [3–5].	10-item scale; screening for symptoms of psychological distress in the last 4 weeks
Correlates	
Sociodemographic factors	
Gender	Self-reported gender (Male/Female/other)
Subjective family socioeconomic status	Perceived/self-reported family SES (Upper class/Low-middle class)
Health-related behaviours	
Smoking	Tobacco use: (Ever smoked/Never smoked)
Alcohol consumption	Alcohol use: (Had tried alcohol/Never tried alcohol)
Physical activity	Physically active for a total of at least a 60 minutes per day last 7 days (Yes/No)
Healthcare-seeking behaviours	
Sought mental health care last 12 months	Sought care for mental health needs (Yes/No)
Forgone care last 12 months	Did not seek health care when they thought they needed it (Yes/No)
Community-related factors	
Community safety: Self-reported levels of neighborhood safety [6].	3-item 5-level Likert scale. Higher the score lower perceived community safety
Social connectedness: Self-reported levels of connectedness to others (friends, teachers, etc.) [7].	8-item 5-level Likert scale. Higher score stronger sense of social connection
Family-related factor	
Family attachment: Thoughts and feelings about connections with mother and father [8].	4-item 4-level Likert scale. Higher score stronger sense of attachment
Psychological factors	
Self-efficacy: General ability to deal with different demanding situations [9].	6-item 4-level Likert scale. Higher score higher perceived self-efficacy
Quality of life: Multidimensional measure of perceived generic quality of life [10,11].	15-item scale (0–10). Higher score higher perceived quality of life
Polyvictimisation: Juvenile victimisation questionnaire [12].	12 items on being victimized of physical, verbal, and social abuse A cut-off value of four or more was used to define 1-year period of polyvictimisation. [13] (Yes/No)
Self-harm	Have ever tried to harm yourself: Never/Yes at least one

SES = social economic status.

weights for population estimates. Bootstrapped standard errors were used for inference.

Missing data for outcomes and covariates were imputed using multiple imputations (MI) (250 imputation sequences) for both prevalence estimations and logit regression analyses in both school and community-based populations [24]. We used multivariate imputation model with data augmentation, an interactive Markov chain Monte Carlo method to impute missing values – a method recommended for handling missing data in epidemiological and clinical research, assuming that missing data process is missing at random [25]. For outcomes, we choose to exclude observations with greater than three and six missing values in the K10 and CESD-R scales, respectively, from the imputation procedure as these were deemed to provide insufficient data for the imputation models [25,26]. Logistic regression models (unadjusted and adjusted odds ratios) were performed to investigate the associations between selected covariates of social determinants and health behaviours and poor mental health. For regression analyses, inverse probability weights for the complex survey design and population RDS weights were applied for school-based and community-based sample, respectively. Sensitivity analyses were performed with observed data (complete case analyses).

All analyses were performed with STATA software version 17 (Stata Corporation, College Station, TX, USA). Statistical significance level was set at $p \leq .05$.

Results

The key characteristics of the 2,161 study participants (1,337 from schools and 824 from the community) are summarized in Table 2. Adolescents from the community-based (out-of-school) sample were predominantly male (>70%), whereas more than half of the school-based (in-school) sample were female. More than one fifth of the participants in both samples reported psychological distress. The proportion of out-of-school adolescents who reported depression was 15%, which was nearly double that of their in-school peers (8%). Of the 196 adolescents who were randomly selected to complete a psychiatric interview, 70 (36%) reported psychological distress ($K10 \geq 18$) on the day prior to the interview. The full descriptive characteristics of the study samples are presented in Table S1, Supplementary file.

The population prevalence of mental health problems is shown in Table 3, disaggregated by sample type and gender. Overall, nearly a quarter of study participants reported psychological distress and/or depression. In-school females reported a higher burden of psychological distress (30.4% [95% CI = 26.4–34.4]) and depression (14.6% [11.4–17.8]) compared to their male counterparts (16.9% [13.1–20.6] and 10.1% [7.2–13.1]), respectively. This pattern was reversed in out-of-school adolescents, in whom a higher proportion of males than females reported symptoms of depression (26.3% [22.5–30.1] vs. 16.9% [11]) and psychological distress (25.2% [21.6–28.9] vs. 20.2% [15.1–25.3]). A sensitivity analysis (estimation of prevalence without MI—a complete case analysis) showed similar results (Table S2, Supplementary file). There was a moderate positive correlation ($r = 0.61$) between the K10 and CESD-R measures (Figure S1, Supplementary file).

Common psychiatric morbidities for those who completed psychiatric interview were social anxiety (35/70), suicidality (24/70) separation anxiety (15/70) and depression (14/70) (Table 4). Sixty six percent of participants who completed the interview

and reported psychological distress ($n = 46$) fulfilled criteria for at least two mental health disorders and 34% ($n = 24$) met criteria for suicidality (Table 4).

Table 5 presents the results of regression analyses of factors associated with psychological distress ($K10 \geq 18$) among adolescents from population-based samples, applying MI. Being male and living in South Sulawesi were protective factors against poor mental health for in-school adolescents but not for their out-of-school peers. In-school males (OR = 0.41, 95% CI = 0.28–0.62, $p < .001$) and males from South Sulawesi (OR = 0.40, 95% CI = 0.26–0.62, $p < .001$) were less likely to report mental health problems compared to their female and urban counterparts, respectively. Similar findings were found for perceived family attachment and perceived quality of life; the more that in-school adolescents felt connected to their parents (mother or father) and the higher their perceived quality of life, the lower the likelihood of reporting poor mental health. These effects were not observed among out-of-school adolescents.

Perceived social connectiveness and community safety were protective against mental health problems in both in- and out-of-school adolescents. For example, in the school sample, for each unit increase in the mean score of the social connectiveness scale (range 1–5; higher scores reflected stronger connections with the people and community around them), adolescents were 38% (OR = 0.62, 95% CI = 0.50–0.76, $p < .001$) less likely to report psychological distress. For the community safety scale (the higher the score, the lower the sense of community safety), each unit increase in the mean score (a decrease in perceived safety) was associated with a 48% increase in the risk of reporting mental health problems among in-school (OR = 1.48, 95% CI = 1.13–1.96, $p < .01$) and out-of-school adolescents (OR = 1.48, 95% CI = 1.16–1.88, $p < .001$).

Being subjected to poly-victimization was a risk factor for poor mental health for both in-school and out-of-school adolescents. In-school adolescents who experienced poly-victimization were nearly three times more likely to report psychological distress than those who did not (OR = 2.57, 95% CI = 1.70–3.87, $p < .001$). The risk increased 50% for out-of-school adolescents (OR = 1.50, 95% CI = 1.00–2.26, $p < .05$). Similarly, in-school adolescents who had ever attempted self-harm (OR = 2.64, 95% CI = 1.63–4.30, $p < .001$) or had forgone care (OR = 2.34, 95% CI = 1.76–3.11, $p < .001$) were more likely to report psychological distress. A similar trend was observed for out-of-school adolescents, but the results were not statistically significant.

The results of regression analyses for depressive disorders (CESD-R ≥ 22) showed similar results to the K-10 findings (Table S3, Supplementary file). Sensitivity analyses (complete case approach) are presented in Tables S4 and S5, Supplementary file, which revealed similar findings. Out-of-school adolescents who had sought care for mental health needs in the past 12 months most frequently reported seeing a traditional healer (37%), followed by a general practitioner (28%) and psychologist (22%). The pattern was reversed for in-school adolescents, of whom 45% had sought care from a general practitioner, followed by a psychologist (29%) and traditional healer (20%) (Table 6).

Discussion

In this study of school- and community-based adolescents in Indonesia, we found that nearly 1 in four 16–18-year-olds reported symptoms of depression or psychological distress.

Table 2
Descriptive characteristics of study participants

Characteristics	Population based samples		Sample with objective (MINI-Kid)
	School-based n (% column)	Community-based n (% column)	
	1,337	824	
Sociodemographic factors			
Province			
Jakarta	611 (45.70)	421 (51.09)	196 (100)
South Sulawesi	726 (54.30)	403 (48.91)	-
Age (years)			
16	631 (47.20)	236 (28.64)	120 (61.22)
17	519 (38.82)	329 (39.93)	58 (29.59)
18	185 (13.84)	257 (31.19)	18 (9.18)
Not stated	2 (0.15)	2 (0.24)	0
Gender			
Female	735 (54.97)	245 (29.73)	110 (56.12)
Male	596 (44.58)	577 (70.02)	86 (43.88)
Not stated	6 (0.45)	2 (0.24)	0
Subjective SES			
Upper class	287 (21.47)	65 (7.89)	54 (27.55)
Low-middle class	987 (73.82)	733 (88.96)	131 (66.84)
Not stated	63 (4.71)	26 (3.16)	11 (5.61)
Health-related behaviour			
Ever smoked			
No	855 (63.95)	475 (57.65)	139 (70.92)
Yes	348 (26.03)	325 (39.44)	48 (24.49)
Not stated	134 (10.02)	24 (2.91)	9 (4.59)
Health-seeking behaviour			
Not seeking health care when needed in the last 12 months (Foregone care)			
No	912 (68.21)	648 (78.64)	119 (60.72)
Yes	360 (26.93)	142 (17.23)	71 (36.22)
Not stated	65 (4.86)	34 (4.13)	6 (3.06)
Psychological factor			
Subjected to polyvictimisation in the past year			
No	781 (58.41)	441 (53.52)	116 (59.18)
Yes	345 (25.80)	269 (32.65)	41 (20.92)
Missing (at least one of the 12 items)	211 (15.78)	114 (13.83)	39 (19.90)
Outcomes - mental health problems			
Depression or depressive disorders (CESD-R ≥ 22)			
No	848 (63.43)	450 (54.61)	123 (62.76)
Yes	106 (7.93)	125 (15.17)	32 (16.33)
Missing (at least one of the 20 items)	383 (28.65)	249 (30.22)	41 (20.92)
Stress or psychological distress (Kessler-10 ≥ 18)			
No	929 (69.48)	571 (69.30)	116 (59.18)
Yes	289 (21.62)	174 (21.12)	70 (35.71)
Missing (at least one of the 10 items)	119 (8.90)	79 (9.49)	10 (5.10)
Community-related factors (mean score: median (range))			
Community safety (higher score reflects lower perceived safety)			
Missing (at least one of 3 items; n %)	5 (0.37)	2 (0.24)	0
Social connectedness (higher score reflects stronger sense of connectedness)			
Missing (at least one of 8 items; n %)	6 (0.44)	2 (0.24)	0

This table shows the **key** demographics for the Mini-Kid diagnostic cohort (196 participants), school-based sample (1,337 participants, complex survey design) and community-based sample (824 participants, respondent driven sampling). Reported percentages are within each sub-sample. Comparisons across samples by demography were not possible given different sampling methods. SES = social economic status.

Findings within the subsample of school-based participants who completed a psychiatric interview confirms that reported psychological distress corresponds to substantial morbidity; nearly seven of 10 in-school adolescents who reported psychological distress and completed a psychiatric interview met the diagnostic criteria for at least two mental health disorders and more than a third met the diagnostic criteria for suicidality. This study

makes an important contribution to the literature, in that it demonstrates how mental health scales—largely developed in high-income settings—can be adapted and validated for use in countries like Indonesia. This study also demonstrates how out-of-school adolescents can be sampled— a group that has been pervasively neglected in global surveys which largely utilize a school-based sampling frame. The distinct profile of need for

Table 3
Prevalence of depressive and anxiety disorders with MI by sample and mental health measure

	School-based ^a		Community-based ^b	
	% (95% CI)		% (95% CI)	
	CESD-R (N = 1,258)	Kessler-10 (N = 1,309)	CESD-R (N = 788)	Kessler-10 (N = 812)
Female	14.61 (11.39–17.83)	30.39 (26.39–34.40)	16.87 (11.81–21.92)	20.20 (15.05–25.34)
Male	10.12 (7.18–13.07)	16.92 (13.14–20.70)	26.26 (22.47, 30.05)	25.24 (21.59–28.90)
Female and male	12.64 (10.51–14.76)	24.35 (21.47–27.24)	23.48 (20.41–26.54)	23.75 (20.75–26.75)

^a Weighted prevalence adjusted for school enrollment by grade, gender and province.

^b RDS weighted prevalence.

out-of-school adolescents underscores the importance of this approach.

Our findings for in-school adolescents are in line with a recent report from Indonesia [27] and global estimates [28] that one out of three to five children and adolescents have an anxiety disorder at some point in their childhood, and that the burden of depressive and anxiety disorders is greater in females than males [27,28]. In contrast, for out-of-school adolescents, we found that males had a higher burden of depressive and/or anxiety disorders and were nearly two times more likely to experience depression compared to their female counterparts. This finding may be a result of bias due to differences in sampling methods, but it also suggests the value of further research given the common finding that depression is more common in females [29] and in young people [30]. It also highlights the importance of understanding gender by social context.

In-school adolescents reported around half the prevalence of depression (12.6%) than out-of-school adolescents (23.4%). Assuming that the reasons for being out-of-school include homelessness, parenthood, engagement in work, or vocational

training [20], this finding may reflect both the potential protective impact of school connectedness [31] and the benefit of supportive families. Yet, nearly one quarter of adolescents in school reported psychological distress (24.3%), similar to their peers in the community (23.7%). This may indicate the stress of academic performance that is experienced by high school students, particularly in urban or mega cities and its impact on mental health [32]. Indeed, among young people attending school, we found an excess burden of psychological distress in Jakarta compared to South Sulawesi. Our findings suggest that there are needs and opportunities for improving the coverage and utilization of mental health services for in-school adolescents. Indeed, the Indonesia National Adolescent Mental Health Survey reported less than 3% of adolescents (n = 5,664; 96.4% attending school at the time of the survey) with a mental health problem had accessed services for emotional and behavioral problems, indicating a large unmet need for mental health care in adolescents [27]. Altogether, this evidence highlights the need for strengthening school mental health programs so that Indonesian schools are not only centers where adolescents might academically achieve, but also places that cultivate mental wellbeing [33].

There is a dearth of data on the mental health status of out-of-school adolescents, particularly in LMICs. While psychiatric and developmental disorders are known risks for school absenteeism and dropout [34], the prevalence of depressive or anxiety disorders as well as suicidal ideation is largely unknown. Our finding that this group of 16–18-year-olds had nearly double the prevalence of depression than their in-school peers is concerning. We did not assess the extent of developmental comorbidities in this group, which is indicated in future studies. However, the high prevalence of depression and psychological distress suggests that this cohort should be considered a priority population for future mental health policies, programs, and research.

Our finding that family, social, and community connections were correlates of poor mental health among Indonesian adolescents is consistent with previous studies of the determinants of mental health among adolescents before [35] and during the COVID-19 pandemic [36]. However, while social connectedness and community safety were found to be protective factors against poor mental health for both in-school and out-of-school adolescents, family attachment (an adolescent's connection with their mother or father) appears to have different effects on each group. Family connection was protective for in-school adolescents, but not for their out-of-school peers. Previous studies in vulnerable adolescents born to unmarried single parents in large U.S. cities have found that connectedness to parents is a vital protective factor against depression [37]. Our findings raise the question about whether out-of-school adolescents—many of who in our study reported low socioeconomic status—may suffer

Table 4
Mental health morbidities (n) among school-based adolescents who completed the psychiatric interview and reported psychological distress (N = 70)

MINI KID diagnostics	Female (N = 52)	Male (N = 18)	Total (N = 70)
Major depressive episode	10	4	14
Alone (single diagnosis)	1	1	2
Plus another disorder	9	3	12
Dysthymia	7	1	8
Alone	0	0	0
Plus another disorder	7	1	8
Panic disorder	7	2	9
Alone	0	0	0
Plus another disorder	7	2	9
Separation anxiety disorder	14	1	15
Alone	0	0	0
Plus another disorder	14	1	15
Generalised anxiety disorder	3	1	4
Alone	1	0	1
Plus another disorder	2	1	3
Adjustment disorder	8	2	10
Alone	0	1	1
Plus another disorder	8	1	9
Social anxiety disorder	24	11	35
Alone	3	5	8
Plus another disorder	21	6	27
Suicidality	20	4	24
Alone	3	1	4
Plus another disorder	17	3	20
No psychiatric diagnosis (Do not meet diagnostic criteria for any of the above)	16	3	19

Table 5Factors associated with psychological distress (Kessler-10 ≥ 18) among Indonesian adolescents with MI data from the main surveys

	Unadjusted OR (95% CI)		Adjusted OR (95% CI)	
	School-based (N = 1,309)	Community-based (N = 812)	School-based (N = 1,309)	Community-based (N = 812)
Sociodemographic factors				
Province				
Jakarta	Ref	Ref	Ref	Ref
South Sulawesi	0.49 (0.35–0.69)***	0.99 (0.72–1.38)	0.40 (0.26–0.62)***	0.98 (0.68–1.42)
Gender				
Female	Ref	Ref	Ref	Ref
Male	0.46 (0.33–0.66)***	1.33 (0.91–1.93)	0.41 (0.28–0.62)***	1.34 (0.86–2.08)
Subjective socioeconomic status				
Upper class	Ref	Ref	Ref	Ref
Low-middle class	1.01 (0.71–1.44)	1.26 (0.66–2.42)	1.02 (0.69–1.48)	1.50 (0.78–2.89)
Community-related factors				
Perceived social connectedness (higher score stronger sense of social connection)	0.57 (0.46–0.69)***	0.89 (0.77–1.04)	0.62 (0.50–0.76)***	0.78 (0.63–0.95)*
Perceived community safety (higher score lower perceived community safety) ^a	1.56 (1.25–1.95)***	1.47 (1.19–1.82)***	1.48 (1.13–1.96)**	1.48 (1.16–1.88)***
Family-related factor				
Perceived family attachment (higher score stronger sense of family attachment)	0.62 (0.47–0.82)**	1.18 (0.96–1.44)	0.74 (0.55–0.99)*	1.10 (0.88–1.37)
Individual-related factors				
Ever smoked				
No	Ref	Ref	Ref	Ref
Yes	0.83 (0.51–1.35)	1.18 (0.84–1.65)	1.17 (0.72–1.89)	0.85 (0.54–1.33)
Ever had alcohol				
No	Ref	Ref	Ref	Ref
Yes	1.30 (0.82–2.04)	1.38 (0.91–2.09)	0.91 (0.52–1.58)	1.07 (0.64–1.79)
Exercised for 60 minutes in the past seven days				
No	Ref	Ref	Ref	Ref
Yes	0.63 (0.38–1.05)	1.44 (0.87–2.38)	0.94 (0.55–1.59)	1.17 (0.69–1.99)
Perceived general self-efficacy (higher score higher perceived self-efficacy)	0.84 (0.65–1.09)	1.40 (1.13–1.72)**	1.23 (0.89–1.70)	1.39 (1.06–1.82)*
Perceived quality of life (higher score higher perceived quality of life)	0.98 (0.97–0.99)***	1.00 (0.99–1.01)	0.98 (0.97–1.00)*	1.00 (0.99–1.01)
Polyvictimisation				
No	Ref	Ref	Ref	Ref
Yes	2.53 (1.76–3.62)***	1.80 (1.26–2.56)***	2.57 (1.70–3.87)***	1.50 (1.00–2.26)*
Ever attempted self-harm deliberately				
No	Ref	Ref	Ref	Ref
Yes	4.89 (2.93–8.17)***	1.74 (1.10–2.75)*	2.64 (1.63–4.30)***	1.43 (0.86–2.37)
Sought for mental health care in the past 12 months				
No	Ref	Ref	Ref	Ref
Yes	2.64 (1.48–4.68)**	1.27 (0.74–2.19)	1.53 (0.75–3.15)	0.93 (0.50–1.74)
Foregone care in the past 12 months				
No	Ref	Ref	Ref	Ref
Yes	2.86 (2.09–3.90)***	1.50 (0.99–2.27)	2.34 (1.76–3.11)***	1.24 (0.76–2.03)

Bold values are statistically significant in multivariate analyses.

*** $p \leq 0.001$, ** $p \leq 0.01$, * $p \leq 0.05$.^a The higher the score the lower the participants' confidence about community safety in the neighborhood where they live.

from impaired parenting practices [38], which negatively impact adolescent mental health status [39]. Regardless, access to

Table 6

Mental health service providers visited in the past 12 months

	School-based (n = 51)	Community-based (n = 78)
Traditional healer	10	29
Psychologist	15	17
Counsellor	2	2
General Practitioner	23	22
Nurse	9	12
Adolescent health specialist	6	9
Other	2	2

mental health services is needed, with evidence from this study suggesting that out-of-school adolescents may have less access to professional services compared to their in-school peers.

Our study findings are in line with previous studies that have shown that polyvictimization [40] is a risk factor for mental disorders in adolescents and young adults. Interestingly, we found stronger effects among in-school participants compared to their out-of-school peers. One could assume that out-of-school adolescents are more exposed to polyvictimization. Some have argued that exposure may contribute to the development of better coping strategies in this cohort [41]. However, it may also be that in-school adolescents experience greater exposure to certain forms of victimization that are harder to avoid, such as cyberbullying from school peers, and that greater exposure does

not lessen the impact [42]. These findings point to the need for schools to consider the safety of school environments against different forms of victimization, including emotional safety from all forms of bullying.

We found that in-school adolescents who had not sought medical care when they thought they needed it were more likely to have depression and/or psychological distress compared to those who had sought care. While it is possible that those who had sought care received services that helped lessen their distress [43], the cross-sectional nature of this study limits any causal considerations. Future prospective, longitudinal studies are required to determine the existence of such relationships, which would inform the design of interventions to improve the availability and accessibility of health care, including mental health services, for all adolescents. While school and family can be used as potential platforms for nurturing mental wellbeing for in-school youth, community-based mental health outreach programs are required to meet the needs of young people who are not attending school.

There are several notable strengths in the present study. First, our study concurrently examined mental health problems and their correlates among adolescents aged 16–18 years who are engaged in school ($n = 1,337$) but also those who are not in school ($n = 824$), providing a unique opportunity to compare and contrast the prevalence and determinants of poor mental health between the two adolescent groups. The utilization of specific methods to engage out-of-school adolescents (a pervasively neglected group) is a major strength of this study. Second, this study used high-quality measures of mental health outcome that were specifically validated against a psychiatric interview for this population. We used two different scales (CESD-R and K-10) to measure the burden of mental health problems among adolescents and formally validated these scales against a diagnostic instrument (MINI-KID) to report mental health morbidity data in a subsample of our study population. The inclusion of our diagnostic data and the use of these two culturally verified and validated scales enable valid estimates, providing a comprehensive picture of mental disorders among Indonesian adolescents. These data make an important contribution in the context of limited quality data for adolescent mental health globally, most notably in low-resource settings. Third, the design of the present study was informed by qualitative research. Our understandings of how Indonesian adolescents conceptualize mental disorders and their perceptions of the determinants of mental health meant we were able to develop a culturally and linguistically appropriate questionnaire to obtain valid data from participants in both school and community settings. Fourth, while there are important efforts underway to collect better data for adolescent mental health (including UNICEF's Measuring Mental Health Among Adolescents and Young People at Population Level initiative) [44], these data are some years away; data are urgently needed now to help focus efforts. To our knowledge, the only study that provides comparable high-quality data is the National Adolescent Mental Health Surveys (conducted in Indonesia, Kenya, and Vietnam) [45]. Our study provides an independent set of estimates but also extends on this study by bringing a specific focus on out-of-school adolescents. Our sampling frame of in- and out-of-school adolescents also enables a discussion of the stresses within the education system on mental health.

The limitations of this study include the self-reported nature of the data, which were subject to recall and/or social desirability

bias. Our psychiatric interviews were conducted among in-school adolescents, allowing a follow-up or collection of data from them in the main survey. These diagnostic data may not be representative of out-of-school participants, but they do highlight that anxiety and suicidality are important morbidities and that subsequent efforts should include a more specific focus on these. These potential limitations should be considered when interpreting the findings of this study. The cross-sectional study design also does not allow us to further examine or establish causal relationships between risk exposures and poor mental health outcomes or indeed the relationship between school engagement and mental health. This knowledge would help inform specific policy and programming, which would benefit from exploration of longitudinal data. There were significant missing data for outcome measures. However, the robust statistical analysis techniques and methods for handling missing data applied in this study are likely to provide unbiased results. The narrow age band (selected for pragmatic reasons) may be seen as a limitation. However, it enables an in-depth understanding of mental health at a time of life, when needs are changing markedly and when young people are transitioning from school to other social roles.

In conclusion, the burden of mental health problems is evident in both in-school and out-of-school adolescents in Indonesia, with nearly one in four reporting symptoms of psychological distress or depression. Many adolescents also have features suggestive of multiple mental health disorders. Gender differences are evident, with in-school females and out-of-school male adolescents at increased risk of mental health problems. There were differences in risks for and protective factors against poor mental health among in- and out-of-school adolescents, indicating the need for specific measures to address the mental health care needs of each adolescent group. Of note, as these data were collected prior to the COVID pandemic, the contemporary burden may be even greater.

These findings have important implications for policy and practice. They point to the need for broader surveillance of mental health amongst young people in Indonesia, as well as other countries in the Asia-Pacific region. There is a need for actions to promote good adolescent mental health and wellbeing. School mental health programs should focus on improving students' mental health literacy and creating a supportive environment for academic achievement as well as physical and mental well-being. Implementation of community-based mental health programs is recommended to improve the coverage of mental health services and meet the mental health care needs of adolescents in the community. Establishing connections and referral systems between schools, communities, and health facilities for case detection, referral, and management of emotional distress and mental illness is crucial to reducing the treatment gaps shown here and to lessening the burden of mental health problems among adolescents in Indonesia.

Data Sharing Statement

The study protocol is available for sharing. Individual participant data will not be available due to the risk of identifying individuals. Authors MDP, NW, PAA, and PSA had full access to the data and had the responsibility for the decision to submit for publication.

Ethics

All aspects of this study were reviewed and approved by the Alfred Health Human Ethics Committee (Melbourne, Australia approval 114/17) and the Ethics Committee of the Faculty of Medicine, University of Indonesia (Jakarta, Indonesia approval 714/UN2.F1/ETIK/2017).

Patient and public involvement

No patients or members of the public were directly involved in any aspect of the present study.

Acknowledgments

The authors gratefully acknowledge the contribution to this work of the Victorian Operational Infrastructure Support Program received by the Burnet Institute. We would like to thank the study participants, individuals and organisations whose generous supports had made this study possible. We thank Professor Joshua Vogel of the Burnet Institute for his valuable comments on the draft of this manuscript.

Author Contribution

PSA, TW, FK, MDP conceptualised this study. PSA, SL, NRW, ECK, MDP, SMS developed the study protocol and data collection tools. TW, FK conducted psychiatric interviews. AA, FK, TW, YD, BM, AR, BW supported local implementation of the study in country. MDP, PAA, NRW, PSA led the analysis. MDP, NRW, PSA wrote the first draft; SMS, TT, JF, TW, FK, KIC provided critical feedback on the methods and interpretation of results with all authors contributing to the interpretation of study findings. All authors approved the final manuscript and were responsible for the decision to submit the manuscript.

Funding Sources

This study was supported by funding from the Health Cluster of the Australia-Indonesia Centre. Professor Susan M Sawyer is funded by the Geoff and Helen Handbury Chair in Adolescent Health from the University of Melbourne and holds a National Health and Medical Research Council Investigator Grant. Professor Peter S. Azzopardi holds a National Health and Medical Research Council Emerging Leadership Investigator Grant. Professor Jane Fisher is funded by a Professorial Fellowship from the Finkel Family Foundation. The funder of the study had no role in study design, data collection, data analysis, data interpretation or writing of the report.

Supplementary Data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jadohealth.2024.07.016>.

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