



## Research Article

## Psychological Distress among Adolescents in Laos, Mongolia, Nepal, and Sri Lanka

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## ABSTRACT

**Purpose:** The purpose of this study was to explore psychological distress and examine the relationship between this distress and individual, family, and school factors among adolescents in four low- and middle-income countries (LAMICs) in Asia (i.e., Laos, Mongolia, Nepal, and Sri Lanka).

**Methods:** A total of 4,098 adolescents attending public schools in the four LAMICs were surveyed as part of the Healthy School Development Project, which aimed to develop school capacity for improving (1) health among all school members and (2) the school environment through tailored school health programs. Psychological distress, family factors (i.e., parental understanding and monitoring, and parental tobacco and alcohol use), and school factors (i.e., having close friends, not bullied, school attendance, and health education) were assessed using self-report questionnaires. Data were collected from September to November in 2012 and 2013. Data analysis comprised descriptive statistics, Chi-squared testing, and logistic regression.

**Results:** Over half of the participants were women (53.2%–64.1%), and 33.7% (in Sri Lanka) to 53.8% (in Laos) were aged older than 15 years. Approximately 32.9% reported the presence of psychological distress; moreover, 7.9%–13.2% reported suicidal ideation. Parental monitoring and being bullied were associated with psychological distress in all four countries.

**Conclusion:** One-third of adolescents experience psychological distress across these four LAMICs, which poses a substantial public health issue. Adolescents can benefit from family and school-based approaches for screening, ameliorating, and preventing psychological distress.

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## Introduction

Studies indicate that approximately half of those with mental health disorders first experience the corresponding symptoms at approximately 14 years of age [1]. Indeed, approximately 20% of all adolescents suffer from a mental illness such as anxiety or depression [1]. Mental illness negatively affects various functionalities in many areas, such as in school, with peers, and at home [2]. In terms of cost, worldwide mental health issues amounted to US\$2.5 trillion in 2010, and this cost is estimated to reach US\$6 trillion by 2030 [3].

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Of particular concern are mental health issues in low-income (i.e., gross national income per capita < US\$1,005.00 as of the 2016 fiscal year) and middle-income (i.e., gross national income per capita between US\$1,006.00 and US\$12,235.00 as of the 2016 fiscal year) countries (hereafter, LAMICs) as defined by the World Bank country classification [4]. In part, this concern stems from not only insufficient mental health resources in these countries [5] but also limited mental health-related policy and/or legislation [6,7]. Compared to the ratios of 7.47 psychiatrists per 100,000 population and 33.24 mental health nurses per 100,000 population that are prevalent in high-income countries, LAMICs, in contrast, possess only 0.05–1.39 psychiatrists per 100,000 population and 0.36–8.20 mental health nurses per 100,000 population [5].

The majority (i.e., 76%–85%) of those with severe mental illness in LAMICs do not receive treatment; in contrast, only 36%–50% of their counterparts in high-income countries do not receive treatment [8].

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In addition, low-income countries spend as little as US\$1.53 per capita on mental health, while high-income countries can spend as much as US\$58.73 per capita [5]. Moreover, LAMICs receive the lowest amounts of government health funding for mental health [6]. Furthermore, LAMICs typically have not established health-related policy or begun to implement mental health–related policy or legislation [6,7]. As a result of this policy vacuum, mental health prevention or promotion activities at school levels in these countries are not reported in a recent World Health Organization report [6].

By 2030, an estimated 90% of our planet's 2 billion adolescents will reside in LAMICs [9]. The rapid growth of this population, coupled with the limited resources of LAMICs [6], poses a serious public health problem. Therefore, the implementation of evidence-based interventions to prevent and manage child and adolescent mental illness in LAMICs should be an imperative. Unfortunately, limited research is being conducted and insufficient resources are available to meet the needs of adolescents with mental health problems—particularly in LAMICs [6]. Although evidence-based interventions indeed are available that could be adapted for use in LAMICs [10], little is known about the factors that influence psychological distress among adolescents—and appropriate intervention models—in LAMICs.

It is against this backdrop that we examined the correlates of psychological distress in four LAMICs (i.e., Laos, Mongolia, Nepal, and Sri Lanka) among adolescents, which provides insight into implementing adolescent-centered mental health intervention plans in LAMICs. Although many psychosocial factors feature in previous studies that account for the risk of adolescents developing mental illness in high-income countries [11,12], the study described herein targeted selected individual factors (e.g., gender, age, health status, and socioeconomic status), family factors (e.g., parent–child relationship and parental substance use), and school factors (e.g., friendship, being bullied, attendance, and health education) to determine whether these factors can be observed in LAMICs, as they have in prior studies [12]. In particular, these family and school factors were targeted because they are modifiable; therefore, they are likely featured in typical mental health programs. Owing to the limited amount of research conducted in LAMICs concerning this topic, this study fills an important gap regarding the promotion of adolescent mental health in countries of this type. Moreover, because this study provides a clearer picture of the correlates of psychological distress, authors assert this findings can help in the development of strategies to strengthen the psychological status of adolescents in LAMICs, as well as in other contexts. Furthermore, this picture, based on family and school factors, can guide the development of strategies that more easily can be integrated into adolescent daily routines at both home and school.

## Methods

### *Study design and sample*

A cross-sectional survey was conducted as part of the Healthy School Development Project (HSDP) [13]. The HSDP was designed to develop capacities in middle and high schools to improve not only adolescent health but also school environments through tailored school health education programs in Laos, Mongolia, Nepal, and Sri Lanka. In addition to their interest in participating, these four countries were selected because of their geographical (i.e., Asian continent) and socioeconomic (i.e., LAMIC) similarities in order to know whether we can replicate school-based programs to improve mental health in countries such as these. Inclusion criteria for the project comprised (1) being a public middle and/or high school located in urban or semiurban areas that have had relatively little exposure to international health-related projects and (2)

being a school interested in improving school health. There were no exclusion criteria. The HSDP developed community partnerships with local education and/or health authorities and community-based nongovernment organizations in each country to recruit participating schools. Through a convenience sampling method that is feasible in four countries, 20 public schools across the four countries agreed to participate in the HSDP.

### *Ethical considerations*

In no particular order, the institutional review board of Hanyang University in Seoul, Korea (Approval no. HYI-12-037-1, HYI-13-088-2), the National Institute of Education of Sri Lanka, the Ministry of Health of Laos, the Health Department of Darkhan province in Mongolia, and the Education Department of Bhaktapur district in Nepal approved the HSDP study protocol. Principals, teachers, and students in the 20 participating public schools provided their written informed consent—on forms translated into the official language of each country—before data were collected. The permission of parents was not obtained from student participants because the HSDP did not involve more than a minimal risk for these adolescents. Moreover, ethnic minority parents in each country often speak dialects and would not understand written informed consent translated into the official language. To reduce any potential discomfort among participants from the HSDP's blind survey, all questionnaire items were reviewed by teachers, officers of health or education authorities, medical doctors, and project partners in each country and only approved items appeared in the survey. Responding to the survey did not impinge on the welfare or rights of any of the adolescent participants.

### *Measurements*

Items comprising the HSDP questionnaire were derived and modified from various sources (i.e., the Global school-based student health survey of the World Health Organization, the Korea Youth Risk Behavior Web-based Survey, the California Health Interview Survey, and the Korea National Health & Nutrition Examination Survey) to collect health-related survey data. Items were translated into the official language of each country to assess psychological distress and the factors that contribute to this distress among adolescents. The content validity of the questionnaire was assessed by teachers, officers of health or education authorities, medical doctors, and project partners in each country. A pilot test of the translated questionnaire was conducted in one to two middle and/or high school in each country during May and June, 2012, to verify the content validity. The items regarding smoking and alcohol consumption behaviors were also not included on the Sri Lanka survey because such questions are not culturally accepted.

### *Psychological distress*

The presence of psychological distress was defined as reporting more than one symptom elicited by the questionnaire: stress, loneliness, anxiety, sadness, and suicidal ideation, plans, or attempts. Students who responded “most of the time” or “always” to items related to feeling stressed or lonely in the 30 days prior to responding to the questionnaire were classified into the stress group or loneliness group, respectively. Likewise, students who responded “most of the time” or “always” to the item “During the past 30 days, how often have you been so worried about something that you could not sleep at night?” were classified into the anxiety group. Sadness was determined by a response of “yes” to the item “Were you feeling so sad or hopeless for at least 2 weeks or more that you stopped doing some usual activities during the last 12 months?” Suicidal ideation during the past 12 months was

determined by a response of “yes” to the following item: “Did you ever seriously consider attempting suicide?” Suicidal plan during the past 12 months was determined by a response of “yes” to the item “Did you make a plan about how you would attempt suicide?” Students who indicated that they had attempted suicide more than once in response to the item “How many times did you attempt suicide during the past 12 months?” were classified into the suicidal attempt group. The reliability scores based on the Kuder–Richardson 20 were .60, .66, .72, and .73 in Laos, Nepal, Sri Lanka, and Mongolia, respectively.

#### Individual, family, and school factors

Individual factors comprised not only gender, age, and subjective health status but also persistent hunger from a lack of food at home in the 30 days before participating in the survey. Family factors comprised (1) parental understanding and monitoring in the 30 days before participating in the survey and (2) parental tobacco and alcohol use. Students who responded “most of the time” or “always” to the item “How often do your parents or guardians understand your problems and worries?” were classified as participants having parental understanding. Students who responded “most of the time” or “always” to the item “How often did your parents or guardians really know what you were doing with your free time?” were classified as participants who experienced parental monitoring. School factors comprised close friends, bullying in the past 30 days, school absence, and school education. Students who responded “more than one close friend” to the item “How many close friends do you have?” were classified as participants having close friends. Students who responded “more than one day” to the following two items were classified as participants being bullied and school absence without permission, respectively: “How many days were you bullied during the past 30 days?” and/or “How many days did you miss classes or school without permission during the past 30 days?” If students responded “more than once” about receiving health education regarding smoking cessation, problems related with drinking alcohol, and handling stress in the

past 12 months, then they were classified as participants who had received health education.

#### Data collection

Student participants completed the questionnaire in classrooms of their respective schools during the fall of 2012 and 2013. HSPD researchers distributed and collected the questionnaire. Before the questionnaire was distributed to the students in each school, a teacher associated with each school explained the purpose of the study and received written informed consent from students. While the students completed the questionnaire at each school, the teachers were kept outside the classroom to minimize the influence of the teacher on the students' responses to any of the items on the questionnaire. A total 4,172 students who were enrolled in grades 7, 9, and 11 in the four countries completed the questionnaire. After excluding data with insufficient information, a total 4,098 students were included in the analysis.

#### Data analysis

Descriptive statistics were used to describe all variables. Bivariate logistic regression examined the association between psychological distress and individual, family, and school factors. Multivariate-adjusted odds ratios (ORs) and 95% confidence intervals (CIs) were calculated. All analyses were performed with SPSS Statistics for Windows, version 21.0 (IBM Corp., Armonk, NY, USA). As can be seen in Table 1, the distribution of demographic characteristics, family factors, and school factors varied significantly across countries ( $p < .001$ ). Differences in culture and the systems of education among the four Asian LAMICs featured in this study were—and are—inevitable. Therefore, instead of analyzing pooling data from the four countries, we examined the data by country. Missing data are assumed to be missing at random.

**Table 1** Sociodemographic Characteristics of the Study Population by Country ( $N = 4,098$ ).

Variables	Nepal n (%)	Laos n (%)	Mongolia n (%)	Sri Lanka n (%)	$\chi^2$	$p^*$
<b>Individual factor</b>						
Women	486 (53.2)	399 (50.8)	518 (54.4)	900 (64.1)	48.98	<.001
Age ( $\geq 15$ years old)	475 (52.0)	438 (53.8)	340 (35.7)	473 (33.7)	139.00	<.001
Overall health status (good or very good)	417 (45.6)	279 (34.4)	377 (39.6)	700 (50.3)	60.53	<.001
Food insecurity (mostly or always)	19 (2.1)	23 (2.8)	32 (3.4)	109 (7.9)	56.96	<.001
Ever smoker (yes)	73 (8.0)	28 (3.5)	134 (14.2)	-	63.70	<.001
Ever alcohol user (yes)	167 (18.3)	268 (33.7)	98 (10.4)	-	149.13	<.001
<b>Family factor</b>						
Parental understanding (mostly or always)	464 (50.7)	205 (25.5)	175 (18.9)	937 (67.7)	680.85	<.001
Parental monitoring (mostly or always)	531 (58.0)	338 (42.4)	442 (47.2)	1114 (80.0)	400.20	<.001
Parent smoking (either or both)	427 (46.8)	230 (28.3)	429 (46.1)	243 (17.9)	298.26	<.001
Parent alcohol use (either or both)	422 (46.3)	532 (66.0)	273 (29.5)	399 (29.3)	347.20	<.001
<b>School factor</b>						
Having close friends (yes)	781 (85.4)	755 (94.0)	908 (97.0)	1355 (97.0)	152.86	<.001
Bullied (no)	786 (86.0)	686 (84.6)	710 (75.4)	1060 (76.5)	54.23	<.001
School attendance (yes)	652 (71.8)	652 (80.5)	744 (79.4)	1158 (87.1)	80.83	<.001
Health education (yes)	519 (57.6)	562 (74.1)	608 (68.2)	1177 (88.2)	280.16	<.001
<b>Psychosocial distress (yes)</b>						
Perceived stress (mostly or always)	291 (33.2)	259 (33.3)	289 (33.4)	436 (32.1)	0.63	.889
Loneliness (mostly or always)	25 (2.8)	15 (1.9)	71 (7.5)	49 (3.5)	44.63	<.001
Anxiety (mostly or always)	67 (7.4)	34 (4.2)	120 (12.9)	125 (9.0)	43.79	<.001
Sadness (yes)	43 (4.7)	23 (2.9)	48 (5.1)	77 (5.5)	8.39	.039
Suicidal ideation (yes)	215 (23.5)	208 (25.9)	184 (19.7)	380 (27.4)	19.29	<.001
Suicidal plan (yes)	96 (10.5)	74 (9.2)	123 (13.2)	110 (7.9)	17.93	<.001
Suicidal attempt ( $\geq 1$ time)	56 (6.2)	56 (7.0)	54 (5.8)	64 (4.6)	5.95	.114
	40 (4.4)	29 (3.6)	44 (4.7)	61 (4.4)	1.36	.715

\* Significance of difference in proportion among countries of each variable tested using Chi-square test.

## Results

The sociodemographic characteristics and psychological distress of the participants by country are shown in Table 1. Over half of the participants (50.8%–64.1%) were women. The number of participants aged 15 years or older ranged from 33.7% (i.e., Sri Lanka) to 53.8% (i.e., Laos). Approximately 32.9% of the student respondents reported the presence of psychological distress across the four countries, and we observed no statistically significant difference by country ( $p = .889$ ). Likewise, suicidal attempts were reported at approximately 4.2% across the four countries ( $p = .715$ ), and 24.4% of the students reported that they felt sad at least 2 weeks some time during the 12 months before completing the survey.

Table 2 displays the results from bivariate logistic regressions analyses. Only variables found to be statistically significant were included in multiple logistic regressions to examine predictors of psychological distress. Overall, across the four countries, parental understanding and monitoring were associated with decreased distress among the participants, and being bullied was associated with increased psychological distress.

Multivariate logistic regression analyses were performed to assess the relationship between psychological distress and correlates that were statistically significant at the bivariate level (see Table 3). Among participants across the four countries, parental monitoring was associated with decreased psychological distress, and being bullied was associated with increased distress. The odds of psychological distress were reduced by 32.0%–43.0% among the participants who reported having parental monitoring. However, the participants who were also bullied were more likely to report psychological distress [i.e., OR = 1.87, 95% CI (1.30, 2.67) for Mongolian students; OR = 3.34, 95% CI (2.16, 5.17) for Nepali students]. Moreover, the psychological distress of Nepali students was positivity associated with older age, school absence, and health education [i.e., OR = 1.46, 95% CI (1.06, 2.00); OR = 1.65, 95% CI (1.18, 2.32); OR = 1.88, 95% CI (1.37, 2.58), respectively], while Nepali students with good health status were less likely to report distress [i.e., OR = 0.71, 95% CI (0.51, 0.97)]. Among Laotian students, all who reported smoking and consuming alcohol were more likely to report distress [i.e., OR = 3.78, 95% CI (1.41, 10.11); OR = 1.66, 95% CI (1.16, 2.37), respectively], while woman students in Laos were less likely to report distress [i.e., OR = 0.68, 95% CI (0.48, 0.95)]. Additionally, Mongolian students who reported having smoked a cigarette were 1.90 times more likely to report psychological distress

[i.e., OR = 1.90, 95% CI (1.19, 3.03)]; Mongolian students who have received health education were 1.49 times more likely to report distress [i.e., OR = 1.49, 95% CI (1.05, 2.12)]. Lastly, older students in Sri Lanka were 2.85 times more likely to report psychological distress [i.e., OR = 2.85, 95% CI (2.13, 3.80)]. However, the odds of distress were reduced by over 60% among students who reported having parental understanding or having close friends [i.e., OR = 0.39, 95% CI (0.29, 0.52); OR = 0.34, 95% CI (0.15, 0.77), respectively].

## Discussion

Mental health has been acknowledged to be a global public health issue, and more service should be implemented in LAMICs in response [7]. Although many evidence-based interventions are available to ameliorate mental health issues, these interventions must be adapted in response to the local needs and culture(s) of the given country [7]. To address such issues of adaptation, the purpose of this study was to examine correlates of psychological distress in LAMICs by surveying adolescent students in four representative countries: Laos, Mongolia, Nepal, and Sri Lanka.

A total of 4,098 adolescents from these four LAMICs, who comprised an almost equivalent gender ratio (except for Sri Lanka, which was 64% woman), participated in the survey. The results indicate that approximately 33% of the participants reported psychological distress. To put these percentages into context, 35% of adolescents in the United States and Canada report feelings of psychological distress [14,15], which reveals a parallel between LAMICs and so-called developed countries.

In terms of individual factors associated with psychological distress, previous studies have reported that older age, gender, overall poor health status, and smoking and alcohol consumption all play a role [1,12,15]. Moreover, previous studies have indicated that adolescent girls are more likely to experience psychological distress than adolescent boys in the United States [15] and Canada [14]. Consistent with the literature [1], our results suggest that psychological distress increases in prevalence during late adolescence. However, in contrast to previous studies, the OR for gender in our study indicates that being woman is a preventive factor vis-à-vis psychological distress in Laos; moreover, no statistically significant relationship between gender and psychological distress in Mongolia, Nepal, and Sri Lanka was observed. This could be because the survey items did not query somatic symptoms (e.g., fatigue)

**Table 2** Bivariate Analysis for Odds of Psychological Distress ( $N = 4,098$ ).

Variables	Nepal		Laos		Mongolia		Sri Lanka	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
<b>Individual factor</b>								
Women	0.82	(0.62-1.08)	0.52	(0.38-0.71)	1.15	(0.87-1.54)	0.64	(0.50-0.80)
Age ( $\geq 15$ years old)	1.59	(1.19-2.11)	1.28	(0.95-1.73)	1.26	(0.94-1.69)	2.52	(1.99-3.20)
Overall health status (good or very good)	0.64	(0.48-0.85)	1.17	(0.85-1.60)	0.65	(0.49-0.88)	0.75	(0.59-0.94)
Food insecurity (mostly or always)	1.01	(0.34-2.99)	2.04	(0.87-4.77)	1.59	(0.71-3.55)	1.96	(1.31-2.92)
Ever smoker (yes)	1.78	(1.08-2.91)	3.97	(1.74-9.03)	2.48	(1.69-3.64)	-	
Ever alcohol user (yes)	2.11	(1.49-3.00)	2.13	(1.56-2.92)	1.92	(1.24-2.98)	-	
<b>Family factor</b>								
Parental understanding (mostly or always)	0.69	(0.52-0.91)	0.62	(0.43-0.88)	0.63	(0.43-0.92)	0.28	(0.22-0.36)
Parental monitoring (mostly or always)	0.62	(0.47-0.82)	0.61	(0.45-0.84)	0.54	(0.41-0.73)	0.34	(0.26-0.44)
Parent smoking (either or both)	1.35	(1.01-1.79)	1.10	(0.79-1.53)	1.35	(1.01-1.79)	1.83	(1.37-2.44)
Parent alcohol use (either or both)	1.08	(0.82-1.43)	1.39	(1.01-1.93)	1.59	(1.17-2.17)	1.72	(1.34-2.20)
<b>School factor</b>								
Having close friends (yes)	1.71	(1.11-2.65)	0.84	(0.44-1.59)	0.34	(0.15-0.78)	0.37	(0.20-0.70)
Bullied (yes)	4.19	(2.79-6.28)	2.10	(1.42-3.11)	2.17	(1.57-2.99)	2.24	(1.73-2.91)
School absence (yes)	2.06	(1.52-2.80)	1.41	(0.98-2.03)	1.82	(1.29-2.57)	2.03	(1.45-2.84)
Health education (yes)	1.75	(1.31-2.35)	1.27	(0.89-1.82)	1.52	(1.10-2.09)	1.30	(0.89-1.90)

Note. CI = confidence interval; OR = odds ratio.



**Table 3** Multivariate Analysis of Psychological Distress by Selected Individual, Family, and School Factors ( $N = 4,098$ ).

Variables	Nepal		Laos		Mongolia		Sri Lanka	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
<b>Individual factor</b>								
Women			0.68	(0.48-0.95)			0.99	(0.74-1.32)
Age ( $\geq 15$ years old)	1.46	(1.06-2.00)					2.85	(2.13-3.80)
Overall health status (good or very good)	0.71	(0.51-0.97)			0.83	(0.60-1.16)	0.88	(0.67-1.15)
Food insecurity (mostly or always)							1.54	(0.95-2.49)
Ever smoker (yes)	1.19	(0.67-2.11)	3.78	(1.41-10.11)	1.90	(1.19-3.03)		
Ever alcohol user (yes)	1.49	(0.98-2.24)	1.66	(1.16-2.37)	1.06	(0.62-1.80)		
<b>Family factor</b>								
Parental understanding (mostly or always)	0.88	(0.63-1.22)	0.74	(0.49-1.11)	0.73	(0.48-1.12)	0.39	(0.29-0.52)
Parental monitoring (mostly or always)	0.68	(0.49-0.95)	0.65	(0.46-0.92)	0.66	(0.47-0.91)	0.57	(0.41-0.80)
Parent smoking (either or both)	1.17	(0.85-1.59)			1.25	(0.90-1.73)	1.47	(0.99-2.19)
Parent alcohol use (either or both)			1.32	(0.92-1.89)	1.16	(0.81-1.65)	1.07	(0.75-1.51)
<b>School factor</b>								
Having close friends (yes)	1.60	(0.97-2.63)			0.51	(0.20-1.30)	0.34	(0.15-0.77)
Bullied (yes)	3.34	(2.16-5.17)	1.89	(1.24-2.87)	1.87	(1.30-2.67)	2.66	(1.91-3.70)
School absence (yes)	1.65	(1.18-2.32)			1.23	(0.82-1.85)	1.43	(0.97-2.10)
Health education (yes)	1.88	(1.37-2.58)			1.49	(1.05-2.12)		

Note. CI = confidence interval; OR = odds ratio.

that are more frequently reported by women than men. Moreover, the presence of ethnic minorities in each country—and the cultural diversity that this can bring—could contribute to the observed gender difference in relation to psychological distress. As such, our findings warrant further investigation of the gender differences related to somatic symptoms compared to their differences related to mood symptoms (e.g., sadness). Moreover, a better understanding of the interplay of cultural factors and presented distress is needed to fully realize culturally tailored approaches for treating psychological distress among adolescents—especially in LAMICs.

In contrast with the results of prior studies that indicate a positive relationship between poverty and mental illness in LAMICs [16], our results do not demonstrate a positive correlation between poverty and psychological distress. In fact, we did use food insecurity as a measure of poverty, and its relationship with psychological distress was not statistically significant. The majority of participants denied any food insecurity, in contrast to the few (i.e., only 2%–8%) who did. According to the World Bank, the poverty ratio is 22.7% in Laos, 15% in Nepal, 0.7% in Sri Lanka, and 0.5% in Mongolia [17]. Therefore, we speculate the response of the participants related to food insecurity may not reflect the true nature of their households.

Consistent with the literature [18], our results demonstrate that both smoking and alcohol consumption were associated with psychological distress in Laos and Mongolia. Interestingly, a relatively high prevalence of alcohol drinking behaviors in Laos compared to participants from the other three countries was observed. Authors suspect that the main reason for this is that Laos does not have a minimum legal drinking age, and the consumption of alcohol among young people is socially accepted [19]. Moreover, the respondents in Laos were from rural areas where smoking long has been used as protection from mosquitoes [19], and only 4% of the Laotian sample identified as ever having smoked. Simultaneously, according to our results, smoking behaviors are relatively prevalent among adolescents in Mongolia. For example, 14.2% of adolescents there indicated that they have smoked cigarettes, which is consistent with the results of a study in Mongolia from 2010 that reported that 15.2% of young people aged 15 to 24 years currently smoked cigarettes [20].

Concerning parental factors, the statistically significant relationship between parental monitoring and psychological distress that authors observed suggests that parental involvement functions to ameliorate psychological distress among adolescents. Moreover, participant data from each of the four LAMICs exhibited

comparable patterns concerning this matter. Evidence supports the benefit that parenting programs and parental approaches can have on children and adolescents with behavioral disorders [21], and our findings (e.g., that the adolescent respondents reported less psychological distress when their parents were more involved with their activities) suggest that family-based approaches can be effective in treating psychological distress among adolescents in LAMICs. However, the cultural adaptation of Western interventions prior to deployment in LAMICs must be considered; moreover, parental monitoring would be a factor not to be overlooked in adapting family-based approaches in LAMICs, especially those located in Asia.

The perceived parental understanding of participant distress or concerns varied among the participants from the four LAMICs from 19% (i.e., Mongolia) to 68% (i.e., Sri Lanka), and the strongest relationship [i.e., OR = 0.39, 95% CI (0.29, 0.52)] between psychological distress and parental understanding was observed for Sri Lanka. Meanwhile, 60% of the respondents who perceived good parental understanding were less likely to report psychological distress. A similar pattern can be seen among the students from Laos, Mongolia, and Nepal, although only at the trend level.

Unlike parental understanding, parental monitoring indicates a parent's active involvement in his or her adolescent child's behaviors vis-à-vis avoiding at-risk behavior (e.g., alcohol consumption) and staying on track in school—especially in an Asian context [22]. Moreover, parental monitoring has been recognized as an effective intervention tool that can decrease adolescent health risk behaviors (e.g., sexual activity) in American adolescents [23]; therefore, it follows that parental monitoring is a promising tool to potentially reduce psychological distress in LAMICs in Asia and elsewhere, and examining this tool in these contexts is worthy of subsequent study.

The relationship between friendship and psychological distress is inconclusive. Indeed, no statistically significant relationship was observed between friendship and psychological distress—except for in Sri Lanka. Although friendship certainly can be function as a support (e.g., social support) or a stress (e.g., peer pressure on delinquent behavior), neither the data collected nor its analysis took into account this multidimensional quality of friendship, which poses a limitation. Nonetheless, authors observed that the overall prevalence of bullying in the four LAMICs was approximately 20%, which fits among the wide range (i.e., 5%–57%) of bullying reported in high-income counties [24,25]. Moreover, this finding that students who were bullied in the four LAMICs exhibited a higher risk

for psychological distress is congruent with the findings of prior studies [25]. Although estimating the long-term impact of bullying on adolescents in these four LAMICs remains difficult because of the limited amount of research—and associated data—on bullying in the four countries, the increased risk of developing mental health problems such as depression in the United Kingdom [26] and binge drinking behaviors in Australia [27] that are associated with bullying are well documented [27]. Therefore, subsequent research about and support for the ill effects of bullying and friendship in LAMICs is recommended.

Interestingly, a statistically significant relationship was observed between health education and psychological distress in Mongolia and Nepal (i.e., respondents reported feeling psychological distress in the presence of health education). The findings are inconsistent with a recent systematic review of school-based interventions in LAMICs which has demonstrated the positive effect that health education can have on the psychological distress of adolescent students [28]. Without information regarding the frequency, content, and facilitators of the health education provided in Laos, Mongolia, Nepal, and Sri Lanka, authors are unable to state with certainty whether health education acts as a risk factor for psychological distress. Authors postulate that certain topics of this education (e.g., alcohol drinking behaviors) may not be perceived as serious for adolescents because of the traditional cultural beliefs and practices present in these four Asian countries. Likewise, adolescents may have social stigma addressing mental illness; therefore, the adoption of education in this context may be sub-optimal. Because health education and related interventions can be rather general in nature, they may be insufficient to reduce psychological distress.

The findings suggest that a school-based approach could be a systematic, strategic, and sustainable way to address adolescent mental health problems in LAMICs, although doing so would require not only the cultural adaptation of preexisting interventions but also capacity-building at each individual school. Considering the prevalence of psychological distress that authors observed among the four Asian LAMICs, school-based mental health screening programs or mental health awareness campaigns likely would be effective for the early detection of adolescent psychological distress. In addition, the prevention of bullying or the establishment of an antibullying school environment has been shown to prevent mental illness among adolescents [29], and this type of prevention strategy could be introduced in not only these four LAMICs but also other LAMICs. Moreover, health education that is incorporated into the curriculum of schools in conjunction with trained teachers to deliver the education [28] in these contexts would be beneficial. Obviously, as evidenced by the results, the effect of smoking and drinking alcohol on health should be a topic that is addressed early in this process. Furthermore, because the relationship between school absence and psychological distress can be interpreted as a behavioral indicator of psychological distress [30], teachers in LAMICs can contribute to a given health promotion program by observing and recording the attendance of students. Finally, parent engagement with school systems should not be underestimated.

Because of limitations of design, the results and conclusions of this study should be adopted with caution. First, this study featured a cross-sectional study design; therefore, the results merely reveal associations among our data, and authors do not presume to draw any inferences among the data regarding causality. Second, because this study relied on a convenience sampling method, the generalizability of its results is somewhat limited to the four LAMICs in Asia featured in the study. In addition, students in 8th and 10th grade were not included in the survey. Third, because validated, external scales to detect psychological distress were not deployed in this

study, the self-report survey regarding psychological distress that authors used may not reflect the actual number of cases of psychological distress. Moreover, smoking behaviors targeted in the survey only captured smoking cigarettes; therefore, the use of other tobacco products—including vaping—among the adolescent participants was not detected, and this should be taken into consideration in not only interpreting our results but also designing subsequent studies on the topic. Despite these limitations, the findings contribute to expanding knowledge on psychological distress and its correlates among LAMICs' adolescents and suggest evidence-based practices in family and school settings.

## Conclusion

This study's findings indicate that one-third of children living in four LAMICs in Asia (i.e., Laos, Mongolia, Nepal, and Sri Lanka) experience psychological distress. Interventions that (1) empower the family to ameliorate psychological distress, (2) reduce the likelihood of bullying by peers at school, and (3) provide effective health education programs would benefit adolescents in not only these four LAMICs but also other counties featuring a similar socioeconomic and cultural context. Certainly, additional investigation of the factors that underlie the observed differences among these countries is needed to gain further insight into the adaptation of evidence-based practice in a wider spectrum of socioeconomic and cultural contexts—both within these four LAMICs and beyond. Further research of such interventions could drive policy formation and implementation to reduce psychological distress among adolescents residing in all LAMICs.

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## Conflicts of interest

The authors have no conflicts of interest to declare.

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