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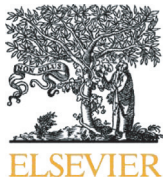

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Anxiety and school absenteeism without permission among adolescents in 69 low- and middle-income countries

Ryan W. Dalforno [a], Hadassah I. Wengert [a], Loan Pham Kim [a,*], Kathryn H. Jacobsen [b]

[a] Pepperdine University, 24255 Pacific Coast Highway, Malibu, CA 90263, USA
[b] Department of Health Studies, University of Richmond, 231 Richmond Way, Richmond, VA 23173, USA

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ABSTRACT

Background: Anxiety disorders are common among adolescents. In high-income countries, anxiety is a known contributor to truancy and school refusal, but this association has been understudied in low- and middle-income countries (LMICs).

Methods: We used complex samples analysis to examine the association between self-reported worry-induced insomnia (an indicator of anxiety) and unauthorized school absenteeism among 268,142 adolescents from 69 LMICs that participated in the Global School-based Student Health Survey (GSHS).

Results: The median proportion of students who reported experiencing symptoms of anxiety most or all of the time during the previous year was 11.4% (range: 3.6%–28.2%); in 44 of the 69 countries, girls had a significantly higher prevalence of anxiety than boys. The percentage of students reporting school absence without permission during the past month was 30.2% (range: 14.7%–56.0%); in 40 countries, boys were significantly more likely than girls to report that they had missed school without permission. In 53 countries, adolescents who reported frequent anxiety were significantly more likely to miss school than adolescents reporting infrequent anxiety; in most of those countries, the association was significant for both girls and boys.

Conclusion: School-based interventions that help children and adolescents learn how to manage stress and refer students with symptoms of psychiatric disorders to healthcare services that can provide formal diagnosis and clinical treatment may be useful for improving both mental health and school attendance, thus contributing to achievement of Sustainable Development Goals related to both health (SDG 3.4) and education (SDG 4.1).

1. Introduction

The Sustainable Development Goals (SDGs) endorsed by the United Nations and thousands of partner organizations spell out a set of global goals for health (SDG 3), education (SDG 4), and 15 other socioeconomic and environmental domains for the 15 years between 2016 and 2030 [1]. The overall health goal is to "ensure healthy lives and promote well-being for all at all ages," and one of the targets within this goal calls for partners to "promote mental health and well-being" (SDG 3.4). The overall education goal is to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all," and one of the targets is to "ensure that all girls and boys complete free, equitable, and quality primary and secondary education leading to relevant and effective learning outcomes" (SDG 4.1). The SDG goals and targets are designed to be interdependent [2]. At the individual level, regular school attendance by children and adolescents can support healthy development as well as learning. At the population level, high rates of school attendance provide greater opportunities for achieving the nutrition (SDG 2), health (SDG 3), education (SDG 4), gender equality (SDG 5), employment (SDG 8), and safety (SDG 16) targets that are relevant for young people.

Anxiety disorders are the most prevalent mental health disorders among adolescents worldwide [3]. In terms of the years lived with disability (YLDs) attributed to mental health disorders, anxiety is second only to conduct disorder in the 10–14 year age group and second only to depressive disorders for the 15–19 year age group [3]. At least 8% of all adolescents who live in low- and middle-income countries (LMICs) have symptoms consistent with an anxiety disorder, and in some countries the prevalence may be as high as one in four teenagers [4]. Risk factors for mental health disorders among adolescents who live in LMICs include poverty [5]; exposure to violence and other adverse childhood experiences (ACEs) [6–8]; low awareness of mental health disorders and the resources and treatments available for those who have them [9]; and other factors that increase stress and limit access to health, educational, and social services.

Students with physical, mental, or social health issues who are chronically absent from school, especially those who do not have parental and school approval to be absent due to medical conditions or other approved

* Corresponding author at: Pepperdine University, 24255 Pacific Coast Highway, RAC 121, Malibu, CA 90263, USA.
E-mail address: Loan.Kim@pepperdine.edu (L.P. Kim).

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reasons, often exhibit poor academic performance and are at high risk of permanently dropping out of school [10–14]. Unauthorized absences may be classified as *truancy* when they are associated with antisocial behaviors and as *school refusal* when they are due to anxiety, depression, or other types of mental distress, but truancy and school refusal are overlapping categories with similar motivations and behaviors [12,15,16]. In high-income countries, frequently missing partial or full days of school without permission is associated with having generalized anxiety disorder, social anxiety disorder, and other anxiety disorders [15]; engaging in self-harm and suicidal thinking [17]; experiencing bullying, social exclusion, and other dimensions of poor peer relationships that might exacerbate anxiety [18]; and engaging in substance use and other risky health behaviors that might be related to coping with anxiety [19–21].

The association between anxiety and being absent from school without permission is well established in high-income countries [15], but has been understudied among populations in LMICs. In this meta-analysis of large, publicly available data sets, we examined self-reported anxiety and unauthorized school absence among secondary students in 69 LMICs. The specific aims for this study were to calculate and compare the prevalence of anxiety and school absence without permission among boys and girls and to examine the possible association between anxiety and unauthorized school absences in these countries.

2. Methods

The Global School-based Student Health Survey (GSHS) explores behavioral risk and protective factors among adolescents, and it is conducted primarily in LMICs. GSHS-participating countries receive technical support from the World Health Organization (WHO) and the U.S. Centers for Disease Control and Prevention (CDC). (High-income countries typically participate in the WHO-sponsored Health Behaviour in School-Aged Children, or HBSC, cross-national survey rather than the GSHS.) Country-specific GSHS questionnaires are created by selecting modules from a validated question bank and translating the survey items into local languages as necessary. Each country's draft questionnaire is pilot tested for comprehension to ensure accuracy prior to implementing data collection in sampled schools. The use of a common question bank ensures that results are directly comparable between countries. Data files containing rows of individual-level responses to core questions are made available to the public approximately two years after data collection.

2.1. Sampling and data collection

A two-stage cluster sampling method is used by all GSHS-participating countries to collect nationally representative data from the schools that are most likely to include students who are 13–17 years old (or, for surveys conducted before 2012, 13–15 years old). In the first stage of sampling, schools educating students in the targeted age range are randomly sampled from a list of all schools in the country using a probability-proportionate-to-size method. In the second stage, a random sample of classrooms with the appropriate age range are drawn from within sampled schools. All students in selected classrooms are invited to complete the self-reported questionnaire during regular school hours.

2.2. Ethical considerations

The CDC- and WHO-approved GSHS protocol receives additional approval from the national ministry of health and/or education of each participating country prior to the initiation of data collection. School administrators can decline the invitation for their schools to participate in the study. Individual student participation is also voluntary. No identifiable information is collected from any student. To further protect the privacy of participants, no names, locations, and other specific identifiers that could be connected to participating schools are included in the publicly available GSHS data files.

2.3. Inclusion criteria

Of the 109 GSHS-participating countries listed on the CDC and/or WHO websites by January 2021, 69 were eligible for inclusion in our analysis. The 50 excluded countries included 22 that completed their most recent round of GSHS data collection prior to 2009, when GSHS updated its question bank; 10 that were missing one of the two key variables about anxiety and school absence; and 8 that were listed as having started the GSHS process but had not entered the data collection phase or posted data files. For countries that have completed several rounds of GSHS data collection and posted more than one data set, only the most recent survey was included in the analysis.

2.4. Anxiety variable

The GSHS survey item about anxiety asks “During the past 12 months, how often have you been so worried about something that you could not sleep at night?” and has a five-point response scale that ranges from ‘never’ to ‘always.’ Sleeping difficulties occur frequently among adolescents who have generalized anxiety disorder and other diagnosed anxiety disorders [22]. Responses of ‘most of the time’ and ‘always’ were coded as indicative of self-reported anxiety; responses of ‘sometimes,’ ‘rarely,’ and ‘never’ were coded as not indicative of anxiety. This dichotomization was consistent with prior GSHS analyses [23,24]. More than 95% of participants in every country answered this question.

2.5. School absenteeism variable

The GSHS survey item about school absenteeism asks “During the past 30 days, on how many days did you miss classes or school without permission?” and has response options of ‘0 days,’ ‘1 or 2 days’, ‘3 to 5 days’, ‘6 to 9 days’, and ‘10 or more days’. Responses of 1 day or more were coded as indicative of school absence without authorization. The response rate to this question was greater than 95% in all countries except for Samoa (85%), Nauru (92%), and Wallis and Futuna (92%) (Table S1).

2.6. Data analysis

The GSHS data files include three variables—stratum, primary sampling unit (PSU), and weight—that account for the two-stage GSHS sampling method and adjust for regional, grade, age, and sex differences between study participants and each nation's student population (Table S2). The *stratum* variable adjusts for the differences in enrollment among participating schools. The *PSU* variable adjusts for differences in classroom size within participating schools. The *weight* variable adjusts for the probability of a school being sampled, the probability of a classroom within a participating school being sampled, the demographics of sampled schools that did not participate in the GSHS, the demographics of students in sampled classrooms who were absent from school when the data were collected or opted not to complete the questionnaire, and differences between the distribution of participating students by sex within each grade and enrollment figures by sex. Use of all three variables ensures that the results from participating schools are representative of the national student population and allows for cross-country comparison of results.

We analyzed data from each country using the complex samples analysis functions in Epi Info (version 3.5.4; CDC, Atlanta, GA). The counts reported in this paper are unweighted, but all other proportions and statistical results are weighted based on complex samples analysis. We examined differences in responses by sex using 2-sided Pearson's chi-square tests. We examined the associations between persistent anxiety over the past year (that is, experiencing worry-induced insomnia most of the time or always over the past year) and unauthorized school absences during the past month, overall and by sex, using 2-sided Pearson's chi-square tests and odds ratios (ORs) along with their 95% confidence intervals. We considered a 95% confidence interval that did not overlap OR = 1 to be statistically significant.

Since the number of students who participate in a country's GSHS does not represent a consistent proportion of the country's total student population, it is not appropriate to merge the data from all countries for analysis. However, meta-analysis can be used to generate summary statistics across GSHS-participating countries. We calculated pooled prevalence rates and odds ratios using MedCalc for Windows version 20.114 (MedCalc Software, Ostend, Belgium). We used random effects models rather than fixed-effects models because of the heterogeneity across countries that we observed with Cochran's Q test and the I^2 index.

3. Results

A total of 268,142 adolescents from 69 LMICs were included in the analysis. About half (50.2%) of the participants were males; 7.2% were aged 12 years or younger, 17.6% were 13 years old, 22.4% were 14 years old, 20.8% were 15 years old, and 31.8% were 16 years old or older. Among the 69 countries, the median percentage of students who reported experiencing symptoms of anxiety most or all of the time was 11.4%, with values ranging from 3.6% (Myanmar) to 28.2% (Samoa), with a pooled average of 11.2% (Table 1). For girls, the median was 13.4% and the prevalence by country ranged from 3.8% (Myanmar) to 30.1% (Afghanistan), with a pooled average of 12.5%. For boys, the median was 9.0% and the range was 3.2% (Uruguay) to 27.0% (Samoa), with a pooled average of 8.6%. In 44 of the 69 countries girls were significantly more likely than boys to report that they were anxious most or all of the time.

The median percentage of students reporting school absence without permission was 30.2%, with values ranging from 14.7% (Bahamas) to 56.0% (Samoa) across the 69 countries, with a pooled average of 31.3% (Table 1). For girls, the median was 27.3% and the prevalence by country ranged from 9.2% (Bahamas) to 54.0% (Qatar), with a pooled average of 27.0%. For boys, the median was 32.9% and the range was 14.2% (Belize) to 62.2% (Samoa), with a pooled average of 31.6%. In 40 of the 69 countries, boys were significantly more likely than girls to report that they had missed school without permission in the past month.

In 53 of the 69 countries there was a significant association between experiencing anxiety most or all of the time and missing school without permission in the past month, including 9 of 10 countries in Africa, 13 of 21 countries in the Americas, 10 of 12 countries in the Eastern Mediterranean region, 8 of 9 countries in the Southeast Asian region, and 13 of 17 countries in the Western Pacific region. Among boys, this association was statistically significant in 39 countries; among girls, this association was statistically significant in 43 countries. The pooled odds ratio (pOR) was 1.6 (1.5, 1.6) for all participants, 1.6 (1.5, 1.7) for boys, and 1.6 (1.6, 1.7) for girls, which means that the odds of missing school without permission were 1.6 times higher among students experiencing worry-induced insomnia most or all of the time than students who reported experiencing this type of anxiety less often or never.

4. Discussion

Our analysis found that girls in LMICs have higher levels of self-reported anxiety than boys, boys have higher rates of missing school without permission than girls, and both girls and boys who experience anxiety most or all of the time have higher rates of school absence without permission than their classmates with lower levels of anxiety.

Studies in countries across the income spectrum have observed that adolescent girls have higher rates of anxiety symptoms than adolescent boys [25–27]. In high-income countries, the higher prevalence among girls is hypothesized to stem from a variety of possible factors, such as girls feeling more pressure than boys to perform well in school [28], girls having different coping mechanisms than boys when exposed to stressors [29], and boys perceiving that expressions of anxiety may not align with traditionally masculine gender roles [30]. More research on the prevalence of various types of anxiety disorders in LMICs and the sociocultural and other factors that may contribute to onset and severity of these conditions is needed [31].

Boys in most GSHS-participating countries were more likely than girls to be absent from school without permission. The existing literature on school absences does not feature a clear trend by sex. For example, one large study from the United States found that girls were more likely than boys to be truant [32], while another found no difference by sex in school skipping in the previous month [33]. One of the challenges with comparative analyses of school absence is that definitions for absenteeism, truancy, school refusal, and related terms are not consistent across studies. Another challenge is that some reasons for school absence may be considered excused in some contexts but not in others. For example, students in rural areas might have full-time responsibilities on their families' farms during planting or harvesting seasons [34]. If these students participated in the GSHS, they might report that they had not missed school without permission, because their parents knew of and approved their missed days even if school administrators considered the absences to be unauthorized. Some of the reasons for school absence that may be culturally acceptable but not approved by school officials are gendered, such as girls preferentially being asked to provide caregiving services at home when a family member is sick [35]. Student perceptions about what types of absences are acceptable might cause the rate of school absence without permission to be underestimated in the GSHS, and it might contribute to girls appearing to have lower rates of unauthorized absence than boys.

The link between anxiety and school absence that has been confirmed by meta-analyses of data from high-income countries [12,15] is also observed among males and females in most of the LMICs participating in the GSHS [36,37]. The directionality of this association is not able to be tested with cross-sectional data, but it is more likely that anxiety disorders lead to missing more school, rather than nervousness about the possible consequences of missing school without permission leading to persistent worry [15,16]. Prevention, diagnosis, and treatment of anxiety disorders would likely improve both adolescent health metrics and school attendance rates. Since students who are chronically absent have an increased risk of dropping out of school, helping all students learn strategies for coping with stress and referring students with anxiety disorders for clinical treatment might also increase school enrollment and retention rates among adolescents [10–14].

The GSHS is a self-report survey that is designed to evaluate adolescent health behaviors and is not intended to yield diagnoses of clinical health disorders. However, students who report having worry-induced insomnia most or all of the time over the past year are experiencing reduced quality of life due to anxiety and these young people are likely to benefit from mental health resources even if subsequent clinical evaluation does not result in the diagnosis of an anxiety disorder. Unmanaged psychological problems among adolescents are associated with an increased risk of persistent chronic insomnia [38], and young people who do not get enough sleep are more likely than their peers to be diagnosed with a mental health disorder [39]. Anxiety in childhood or adolescence is also associated with an increased likelihood of comorbid and subsequent unipolar depressive disorder [40]. Since most adults with anxiety disorders first experience symptoms during middle childhood or adolescence [41], early interventions during the school years may have long-term benefits for mental health [42].

Many LMICs have limited clinical personnel, facilities, and other resources available for individuals with mental health disorders, especially for children and adolescents [43,44] and for patients whose conditions are classified as mild or moderate rather than severe [45]. While schools also tend to be under-resourced and have an obligation to invest their time and budgets in education rather than health service provision, there are a variety of interventions that could be considered at the national, community, or school level to supplement clinical mental health care, such as whole-school and classroom-based mental health promotion interventions that draw on cognitive behavioral therapy, relaxation techniques, and other approaches to improve skills for coping with stress (including test anxiety), increase self-efficacy, reduce bullying, and destigmatize the use of counseling services [46–50]. Some schools in LMICs have improved school attendance among at-risk youth by implementing early warning systems that enable

Table 1
Percentage, odds ratios and 95% confidence intervals for differences in the prevalence of responses by sex.

Country	Year	Number	Total			Boys			Girls		
			% anxious	% absent	OR (95% CI)	% anxious	% absent	OR (95% CI)	% anxious	% absent	OR (95% CI)
Africa											
Benin	2016	2536	20.9	26.0	**1.4 (1.1, 1.7)**	21.3	30.2	**1.4 (1.1, 1.9)**	19.8	14.8	1.2 (0.9, 1.7)
Eswatini (Swaziland)	2013	3680	8.8	15.6	**1.8 (1.3, 2.6)**	7.8	18.0	**1.6 (1.1, 2.5)**	9.6	13.0	**2.2 (1.3, 3.5)**
Ghana	2012	3632	14.3	38.5	**1.6 (1.3, 2.1)**	14.2	37.9	**1.7 (1.2, 2.3)**	14.5	38.7	**1.6 (1.2, 2.1)**
Liberia	2017	2744	20.0	47.6	1.2 (1.0, 1.4)	17.9	48.5	1.0 (0.7, 1.4)	21.5	46.3	1.3 (0.8, 2.0)
Mauritania	2010	2063	11.7	39.3	**2.3 (1.6, 3.3)**	11.7	39.9	**2.4 (1.0, 5.5)**	11.2	37.9	**2.0 (1.2, 3.4)**
Mauritius	2017	3012	9.4	24.9	**2.0 (1.4, 3.0)**	7.5	32.7	**1.9 (1.3, 2.8)**	10.8	17.9	**2.4 (1.5, 3.9)**
Mozambique	2015	1918	10.3	24.6	**2.2 (1.7, 2.9)**	8.7	25.5	**2.8 (1.5, 5.1)**	12.2	23.2	1.8 (1.0, 3.0)
Namibia	2013	4531	15.4	26.8	**1.7 (1.5, 2.0)**	14.4	28.5	**2.0 (1.5, 2.7)**	16.2	24.9	**1.5 (1.2, 1.9)**
Seychelles	2015	2540	11.2	30.2	**1.6 (1.2, 2.2)**	9.0	34.0	**2.0 (1.2, 3.2)**	13.3	26.6	**1.5 (1.1, 2.2)**
Tanzania	2014	3793	6.4	27.8	**2.3 (1.7, 3.2)**	6.1	27.0	**2.5 (1.6, 3.8)**	6.2	27.9	**2.1 (1.3, 3.4)**
Americas											
Anguilla	2016	813	9.9	29.5	**2.1 (1.3, 3.2)**	7.1	31.9	1.9 (0.9, 4.2)	12.4	27.3	**2.4 (1.3, 4.3)**
Antigua and Barbuda	2009	1266	14.0	24.1	1.3 (0.9, 2.0)	11.4	26.6	1.7 (1.0, 2.8)	17.2	21.3	1.2 (0.7, 2.2)
Argentina	2012	28,368	9.0	32.4	**1.7 (1.5, 2.0)**	5.7	34.1	**2.0 (1.4, 2.7)**	11.9	30.7	**1.8 (1.4, 2.2)**
Bahamas	2013	1357	14.1	14.7	**2.2 (1.6, 3.2)**	10.7	20.4	**2.7 (1.6, 4.7)**	17.3	9.2	**2.7 (1.6, 4.5)**
Barbados	2011	1629	10.0	22.0	1.5 (1.0, 2.2)	7.1	24.0	1.9 (0.9, 4.0)	12.9	20.1	1.3 (0.8, 2.3)
Belize	2011	2112	12.0	12.5	**1.6 (1.1, 2.3)**	9.0	14.2	**2.1 (1.3, 3.5)**	14.7	10.9	1.4 (0.8, 2.4)
Bolivia	2012	3696	7.3	33.4	**1.7 (1.2, 2.3)**	5.4	34.7	**1.7 (1.1, 2.7)**	9.1	30.8	**1.8 (1.2, 2.6)**
British Virgin Islands	2009	1664	10.5	20.9	**1.3 (1.3, 1.3)**	5.6	24.5	**1.3 (1.3, 1.3)**	15.1	17.6	**1.5 (1.5, 1.5)**
Costa Rica	2009	2679	5.1	37.6	**1.7 (1.1, 2.6)**	3.8	38.4	1.2 (0.5, 2.6)	6.5	36.7	**2.1 (1.1, 3.9)**
Curacao	2015	2765	11.4	26.6	**2.0 (1.5, 2.5)**	7.5	26.1	1.3 (0.7, 2.3)	14.7	26.6	**2.3 (1.7, 3.1)**
Dominican Republic	2016	1481	10.2	26.3	0.9 (0.6, 1.6)	7.0	27.3	0.9 (0.4, 2.1)	13.4	24.6	1.0 (0.4, 2.3)
El Salvador	2013	1915	6.9	35.9	1.3 (0.8, 2.0)	5.2	35.8	1.5 (0.8, 2.8)	8.6	35.8	1.1 (0.7, 1.7)
Guyana	2010	2392	14.2	33.7	1.3 (1.0, 1.9)	12.5	40.3	**1.6 (1.1, 2.1)**	15.7	27.2	1.3 (0.9, 1.9)
Honduras	2012	1779	6.0	27.3	**1.8 (1.2, 2.8)**	4.8	30.7	1.1 (0.5, 2.5)	6.8	24.0	**2.7 (1.6, 4.6)**
Jamaica	2017	1667	12.9	28.6	1.5 (1.0, 2.3)	8.8	31.9	1.6 (1.0, 2.5)	16.7	25.4	1.7 (0.9, 3.2)
Paraguay	2017	3149	9.5	16.2	**1.6 (1.2, 2.0)**	6.8	19.0	1.6 (1.0, 2.5)	11.9	13.4	**1.7 (1.2, 2.3)**
Peru	2010	2882	8.9	36.9	1.2 (0.9, 1.5)	6.3	39.8	1.0 (0.7, 1.5)	11.5	33.6	1.3 (0.9, 1.9)
Saint Kitts and Nevis	2011	1740	9.1	39.3	**1.8 (1.8, 1.8)**	7.8	42.2	**1.4 (1.4, 1.4)**	10.5	45.6	**2.2 (2.2, 2.2)**
Suriname	2016	2126	12.5	24.2	**2.0 (1.5, 2.7)**	8.8	27.3	**2.7 (1.9, 3.9)**	15.9	21.2	**1.8 (1.1, 2.9)**
Trinidad and Tobago	2017	3869	13.9	18.3	**1.5 (1.1, 2.0)**	10.8	22.6	**1.6 (1.1, 2.2)**	16.6	14.5	**1.7 (1.1, 2.6)**
Uruguay	2012	3524	5.8	26.7	1.4 (1.0, 2.1)	3.2	27.3	**2.5 (1.3, 4.9)**	8.1	26.3	1.1 (0.7, 1.8)
Eastern Mediterranean											
Afghanistan	2014	2579	24.2	20.5	1.1 (0.7, 1.9)	19.0	25.5	1.3 (0.6, 2.8)	30.1	13.2	1.3 (0.8, 2.1)
Bahrain	2016	3385	17.8	51.1	**1.8 (1.4, 2.3)**	12.1	51.2	**1.5 (1.1, 2.1)**	23.6	50.9	**2.0 (1.4, 2.8)**
Iraq	2012	2038	13.1	29.2	**1.9 (1.3, 2.6)**	9.3	31.0	1.8 (1.0, 3.2)	18.1	26.7	**2.1 (1.5, 2.9)**
Kuwait	2015	3637	21.1	48.5	**1.4 (1.1, 1.7)**	15.6	45.4	**1.4 (1.2, 1.7)**	26.5	51.6	1.3 (1.0, 1.7)
Lebanon	2017	5708	13.7	16.4	**1.6 (1.3, 1.9)**	9.6	20.2	**2.0 (1.5, 2.6)**	17.2	13.3	**1.6 (1.2, 2.1)**
Morocco	2016	6745	16.8	30.7	**1.8 (1.6, 2.1)**	13.8	35.6	**2.0 (1.6, 2.6)**	20.2	24.7	**1.9 (1.6, 2.4)**
Oman	2015	3468	18.3	38.4	**1.6 (1.4, 1.8)**	13.2	42.0	**1.7 (1.3, 2.1)**	23.2	34.3	**1.6 (1.4, 1.9)**
Pakistan	2009	5192	8.4	23.4	1.2 (0.8, 1.7)	8.1	30.1	1.3 (0.9, 2.0)	8.8	12.8	0.9 (0.6, 1.4)
Qatar	2011	2021	17.6	53.7	**1.7 (1.3, 2.2)**	15.7	53.3	**2.5 (1.8, 3.4)**	19.2	54.0	1.3 (0.9, 1.9)
Syria	2010	3102	14.9	33.9	**1.3 (1.1, 1.5)**	11.7	34.4	1.2 (0.9, 1.6)	18.3	33.5	**1.4 (1.2, 1.6)**
United Arab Emirates	2016	5849	16.2	40.8	**1.7 (1.4, 2.1)**	11.9	40.2	**1.9 (1.3, 2.7)**	20.5	41.4	**1.6 (1.3, 2.0)**
Yemen	2014	2655	15.6	36.7	**1.4 (1.1, 1.7)**	13.1	37.8	1.6 (1.0, 2.5)	18.7	34.3	1.3 (1.0, 1.7)
Southeast Asia											
Bangladesh	2014	2989	4.7	30.9	1.6 (0.9, 2.8)	4.4	31.9	1.6 (0.8, 3.1)	4.9	29.0	1.2 (0.7, 2.3)
Bhutan	2016	7576	8.2	25.2	**1.6 (1.3, 2.1)**	7.1	30.6	**1.5 (1.1, 2.0)**	9.1	20.1	**1.9 (1.5, 2.4)**
Indonesia	2015	11,142	4.6	20.1	**1.8 (1.3, 2.4)**	5.0	24.0	**1.6 (1.1, 2.3)**	4.2	16.4	**1.9 (1.2, 3.0)**
Maldives	2014	3493	15.1	36.3	**2.1 (1.7, 2.7)**	12.2	39.0	**2.3 (1.4, 3.5)**	18.0	33.2	**2.2 (1.7, 2.9)**
Myanmar	2016	2838	3.6	26.9	**2.4 (1.4, 3.9)**	3.4	32.1	2.3 (1.0, 5.5)	3.8	21.9	**2.7 (1.4, 5.2)**
Nepal	2015	6529	4.6	28.5	**2.0 (1.4, 2.8)**	4.7	28.1	**2.6 (1.7, 4.0)**	4.1	28.5	**1.5 (1.1, 2.2)**
Sri Lanka	2016	3262	4.8	33.6	**1.7 (1.3, 2.3)**	4.4	35.1	1.4 (0.9, 2.2)	5.1	32.2	**2.0 (1.4, 3.0)**
Thailand	2015	5894	8.9	20.4	**2.0 (1.5, 2.6)**	9.1	25.4	**2.3 (1.6, 3.3)**	8.7	15.9	1.7 (1.0, 2.8)
Timor-Leste	2015	3704	12.6	36.3	**1.6 (1.1, 2.2)**	13.2	41.1	1.4 (0.9, 2.2)	11.1	30.9	**1.6 (1.2, 2.2)**
Western Pacific											
Brunei	2014	2599	10.4	37.0	0.9 (0.7, 1.2)	8.1	37.9	0.7 (0.4, 1.1)	12.6	35.9	1.1 (0.8, 1.4)
Cook Islands	2015	701	14.4	37.2	**1.6 (1.1, 2.5)**	9.2	37.4	1.7 (0.8, 3.9)	19.6	37.3	1.6 (1.0, 2.6)
Fiji Islands	2016	3705	13.6	24.6	**2.0 (1.7, 2.4)**	12.5	27.5	**1.9 (1.3, 2.8)**	14.1	21.2	**2.2 (1.8, 2.6)**
French Polynesia	2015	3216	11.9	26.6	**1.7 (1.3, 2.2)**	8.5	26.4	**1.8 (1.1, 2.9)**	15.3	26.8	**1.6 (1.1, 2.3)**
Kiribati	2011	1582	9.2	34.9	**1.6 (1.1, 2.3)**	9.9	39.1	1.5 (0.9, 2.6)	8.7	31.3	1.6 (1.0, 2.7)
Laos	2015	3683	5.0	40.7	**2.2 (1.3, 3.5)**	4.1	43.2	1.9 (0.8, 4.2)	6.0	37.7	**2.5 (1.5, 4.3)**
Malaysia	2012	25,507	5.4	30.9	**1.5 (1.3, 1.7)**	5.0	32.9	1.3 (1.0, 1.6)	5.8	28.7	**1.7 (1.4, 2.1)**
Mongolia	2013	5393	5.7	24.6	**1.8 (1.4, 2.3)**	5.7	31.1	**1.6 (1.1, 2.5)**	5.7	18.4	**2.0 (1.4, 2.8)**
Nauru	2011	578	16.1	43.4	**1.8 (1.8, 1.8)**	15.9	39.8	**2.1 (2.1, 2.1)**	17.4	46.3	**1.6 (1.6, 1.6)**
Philippines	2015	8761	11.0	35.5	**1.3 (1.1, 1.6)**	9.4	37.8	1.2 (1.0, 1.4)	12.6	33.3	**1.5 (1.1, 1.9)**
Samoa	2011	2418	28.2	56.0	**2.0 (1.6, 2.5)**	27.0	62.2	**2.0 (1.4, 3.0)**	28.6	49.4	**2.3 (1.8, 2.8)**
Solomon Islands	2011	1421	13.0	48.8	1.5 (0.9, 2.5)	11.6	47.7	1.6 (0.9, 2.8)	14.3	47.7	1.6 (0.7, 3.5)
Tokelau	2014	140	11.4	50.7	0.7 (0.3, 2.1)	9.2	49.2	0.5 (0.1, 2.8)	14.3	52.9	0.9 (0.2, 3.3)
Tonga	2017	3333	14.6	29.7	**1.5 (1.2, 1.8)**	14.7	34.6	**1.6 (1.2, 2.2)**	14.7	24.6	1.3 (1.0, 1.8)
Tuvalu	2013	943	6.3	38.8	1.0 (1.0, 1.0)	8.5	41.7	**0.8 (0.8, 0.8)**	4.4	36.4	**1.3 (1.3, 1.3)**
Vanuatu	2016	2159	6.8	55.8	**1.6 (1.1, 2.5)**	6.1	60.8	1.9 (1.0, 3.4)	7.5	50.8	1.5 (0.9, 2.7)
Wallis and Futuna	2015	1117	15.6	27.9	**2.0 (1.4, 2.9)**	13.4	32.8	**2.2 (1.3, 3.7)**	17.8	23.0	**2.2 (1.3, 3.8)**
Pooled results (random-effects model)	–	–	11.2	31.3	**1.6 (1.5, 1.6)**	8.6	31.6	**1.6 (1.5, 1.7)**	12.5	27.0	**1.6 (1.6, 1.7)**

schools to identify students with poor attendance, behavioral problems, or low academic performance; proactively notifying parents or caregivers of concerns; and connecting students and their families with appropriate health professionals and other community resources [51].

The limitations of the GSHS that are most pertinent to this analysis include the use of a single question each to assess anxiety and absenteeism and the use of self-reported data that are not validated with clinical examinations or school attendance records. Future analyses of GSHS data would benefit from additional research to validate the worry-induced insomnia question against professionally-administered clinical anxiety screening tests across a variety of the cultural contexts within which the GSHS is conducted. Because only students who are at school on the day of data collection are included in the data file, students who skip school often will be underrepresented. This may mean that the percentage of GSHS-participating students who have been absent from school without permission is lower than the true value. The major strengths of the GSHS include the use of a standardized questionnaire and methodology that enables direct comparisons across countries, the inclusion of geographically and culturally diverse countries from most world regions, the generally high rates of participation among sampled schools and sampled classrooms, and the large total sample size.

This analysis of GSHS data reveals that a large percentage of students in LMICs are missing school without approval. When the unauthorized absences reported by participants are added to all absences due to illnesses and other permissible reasons, a sizeable percentage of adolescents enrolled in secondary school in LMICs are missing many days of school each month. The gap between the SDG targets for educational attainment in this age group and actual attendance rates looms large when chronically-absent enrolled students are added to the tally of adolescents who never enrolled in secondary school and those who dropped out. The global secondary school completion rate (SDG 4.1.2) increased only from 46% in 2010 to 53% in 2019, before the pandemic, and will likely remain far below 100% in 2030 [52]. Anxiety appears to be related to school absenteeism for a significant number of students who skip school and are at elevated risk of dropping out entirely. School- and community-based mental health interventions that help students reduce and manage anxiety will help with achievement of targets related to both SDG 3 and SDG 4.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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