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## Adolescent Loneliness in 70 Countries Across Africa, America, and Asia: A Comparison of Prevalence and Correlates

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### A B S T R A C T

**Purpose:** Emerging studies address adolescent loneliness a public health problem due to its negative associations with adverse health. However, evidence concerning adolescent loneliness and its correlation in nonwestern, low- and middle-income countries is scarce. This study examined the prevalence of loneliness and its correlates (i.e., sex, bullying victimization, and peer support) across 70 countries from five WHO regions.

**Methods:** Data were collected from the Global School-based Student Health Survey of children aged 13–17 (2003–2018) years. Loneliness was defined as feeling lonely most of the time or always in the past 12 months based on self-reports. The prevalence of loneliness was estimated, and multivariable logistic regression ascertained prevalence ratios of correlates by country. Meta-analysis was used to examine regional and overall pooled estimates.

**Results:** Among the 248,017 students included in the study, the overall prevalence of loneliness was 11.7% (95% confidence interval (CI): 10.6–12.7), with significant variations across countries. Girls (vs. boys prevalence ratio (PR) = 1.4 95% CI: 1.3–1.4), students who experienced bullying victimization (PR = 2.2, 95% CI: 2.1–2.3), and students who reported a lack of close friends (PR = 1.8, 95% CI: 1.7–1.9) were at increased risk of experiencing loneliness. There was significant heterogeneity between countries for sex and lack of close friends but not for bullying victimization.

**Discussion:** Adolescent loneliness is prevalent globally, especially in Africa and the Eastern Mediterranean. The considerable heterogeneity in its prevalence and correlates suggest that tailoring to the country context may benefit policy initiatives. Bullying may be a common intervention target in all countries.

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### IMPLICATIONS AND CONTRIBUTION

A considerable proportion of adolescents experience loneliness, highlighting the need for intervention at the global level. While the role of sex and peer support on adolescent loneliness differed by country, this study found compelling new evidence that reducing bullying could be a common target for intervention across diverse countries.

**Conflicts of interest:** The authors declare no competing interests to disclose.

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Loneliness is the subjective perception of a discrepancy between one's desired and actual quantity or quality of social relationships [1]. Across the life course, loneliness is particularly important during adolescence when children face dynamic biological, psychological, and social changes [2]. Emerging studies

have demonstrated that loneliness may adversely affect adolescents' mental and physical health. Adolescent loneliness is associated with various health risk behaviors such as smoking, alcohol intake, and substance use [3]. It increases the risk of psychopathology, which may last into adulthood [4]. Additionally, adolescent loneliness is a consistent risk factor for adolescent suicide, a leading cause of death within this age group globally [5,6].

Approaches targeting adolescent loneliness may improve adolescents' health and well-being at the global level. A recently published meta-analytic review examined the global prevalence of loneliness across all age groups, including adolescents [7]. The study found considerable heterogeneity in adolescent loneliness across regions, from 9.2% in South-East Asia to 14.7% in the Eastern Mediterranean region [7]. A potential explanation for this heterogeneity is that experiencing loneliness is associated with social and cultural norms [8,9]. For example, expectations for individuality may promote feelings of loneliness among adolescents in some countries. On the contrary, high expectations for interdependence and sociability in other countries may also increase loneliness through unfulfilled expectations of social connection. Relatedly, gender-based expectations in a country may also be associated with feelings of loneliness and may lead to sex differences in adolescent loneliness [9]. Furthermore, while positive (e.g., peer support) and negative (e.g., bullying victimization) peer relationships are important correlates of adolescent loneliness [10], their role may differ by country, as illustrated in studies of bullying victimization [11]. However, reports on adolescent loneliness, particularly its correlates, derive predominantly from high-income western countries, and evidence regarding adolescents living in nonwestern or low- and middle-income countries is limited. Investigating adolescent loneliness and its correlates in multiple non-western country settings using comparable data will help us understand the nature of adolescent loneliness and inform the design of sensitive interventions for adolescents living in non-western countries with varying income levels.

Building upon a previous review [7], this study investigated the prevalence of adolescent loneliness and explored its association with potential correlates (sex, bullying victimization, and peer support) across 70 primarily low- and middle-income countries.

## Methods

### Data source

The Global School-based Student Health Survey (GSHS) is a self-administered questionnaire developed by the World Health Organization (WHO) in collaboration with the United Nations Children's Emergency Fund, United Nations Educational, Scientific and Cultural Organization, and the United Nations Program on HIV/AIDS, with technical assistance from Centers for Disease Control and Prevention [12]. The survey focused on exploring the prevalence of health behaviors and protective factors of students aged 13–17 years. The GSHS uses a standardized two-stage sample design that considers the probability of sample selection by schools, classrooms, grade, and sex. It employs a standard school-based methodology and core questionnaire modules, core-expanded questions, and country-specific questions combined to form a self-administered questionnaire that can be administered during one regular class period [12]. Details of the

survey design, recruitment process, and fieldwork are described elsewhere [12].

Data for 84 countries and territories (N = 279,609) were available at the time of the present study. Nine overseas territories were excluded (Anguilla, British Virgin Islands, Cayman Islands, Cook Islands, Curacao, Montserrat, Niue, Tokelau, and Wallis and Futuna; a total of 9,425 students). Five countries that did not have a loneliness questionnaire in the survey were excluded (Algeria, Mauritius, Senegal, Chile, and Libya; a total of 14,145 students). Of the countries included, 11 (Seychelles, Bahamas, Barbados, Trinidad and Tobago, Uruguay, Kuwait, Oman, Qatar, United Arab Emirates, Brunei, and Nauru) were classified as high-income countries according to the World Bank classification. However, they were included in the analysis as adolescent loneliness in these nonwestern countries is currently understudied. To yield contemporaneous evidence on loneliness, we used the latest dataset for the country with data from multiple survey years; only 16 of the 70 countries held the survey multiple times. We also excluded students with missing age (n = 2,052), sex (n = 2,042), and loneliness status (n = 3,928). The final sample consisted of 248,017 students from 70 countries (Table 1 and Figure A1). We further excluded countries missing specific questions in the association analyses between loneliness and its potential correlates. Syria and India were excluded from the analysis of bullying victimization (n = 11,018) as the bullying victimization question was not included in their surveys. Djibouti was excluded from the analysis of peer support (n = 1,696) for the same reason.

### Assessment of loneliness

Loneliness was assessed by the question: "During the past 12 months, how often have you felt lonely?" The answer options were "never," "rarely," "sometimes," "most of the time," and "always." Those who answered, "most of the time" and "always" were considered lonely. This cut-point enables comparisons with previous cross-country comparisons [13] and has demonstrated expected convergent validity, with strong associations found with suicide based on previous studies that used the same dataset [14].

### Assessment of correlates

**Sex.** Sex was identified by the question: "What is your sex?" We coded males as 0 and females as 1.

**Bullying victimization.** Bullying victimization was assessed by the question: "During the past 30 days, how many days were you bullied?" The answer options were "0," "1 or 2 days," "3–5 days," "6–9 days," "10–19 days," "20–29 days," and "all 30 days." We created a dichotomized variable by coding those who answered more than "0" as having experienced bullying victimization (vs. not). We also created a five-category variable to indicate the frequency of bullying victimization. The categories were "0," "1 or 2 days," "3–5 days," "6–19 days," and "20–30 days."

**Lack of close friends.** The following question on the number of close friends that one has was used to identify those who lacked peer support. The question was: "How many close friends do you have?" Those who answered "0" were coded as 1 (=not having any close friends), and those who answered "1," "2," or "3 or more" were coded as 0 (=having close friends). Additionally, we

**Table 1**  
Survey year and sample size for each country

Country by WHO region	Income classification <sup>a</sup>	Survey year	Sample size
<b>Africa</b>			
Benin	Low income	2016	7,093
Botswana	Upper-middle income	2005	2,125
Ghana	Lower-middle income	2012	3,569
Kenya	Lower-middle income	2003	3,453
Malawi	Low income	2009	2,178
Mauritania	Lower-middle income	2010	1,970
Mozambique	Low income	2015	1,813
Namibia	Upper-middle income	2013	4,388
Seychelles	High income	2015	2,499
Swaziland	Lower-middle income	2013	3,590
Uganda	Low income	2003	3,027
Tanzania	Low income	2014	3,668
Zambia	Lower-middle income	2006	2,051
<b>America</b>			
Argentina	Upper-middle income	2012	27,187
Bahamas	High income	2013	1,335
Barbados	High income	2011	1,608
Belize	Lower-middle income	2011	2,070
Bolivia	Lower-middle income	2012	3,455
Costa Rica	Upper-middle income	2009	2,631
Dominica	Upper-middle income	2009	1,576
El Salvador	Lower-middle income	2013	1,839
Grenada	Upper-middle income	2008	1,469
Guatemala	Lower-middle income	2015	4,210
Guyana	Lower-middle income	2010	2,342
Honduras	Lower-middle income	2012	1,697
Jamaica	Upper-middle income	2010	1,523
Peru	Upper-middle income	2010	2,841
Saint Kitt and Nevis	Upper-middle income	2011	1,709
Saint Lucia	Upper-middle income	2007	1,241
Saint Vincent and the Grenadines	Upper-middle income	2018	1,836
Suriname	Upper-middle income	2009	1,667
Trinidad and Tobago	High income	2011	2,768
Uruguay	High income	2012	3,436
<b>Eastern Mediterranean</b>			
Afghanistan	Low income	2014	2,346
Djibouti	Lower-middle income	2007	1,696
Egypt	Lower-middle income	2011	2,417
Iraq	Upper-middle income	2012	1,988
Kuwait	High income	2015	3,387
Lebanon	Upper-middle income	2011	2,238
Morocco	Lower-middle income	2010	2,827
Oman	High income	2015	3,298
Pakistan	Lower-middle income	2009	5,119
Qatar	High income	2011	1,777
Syria	Low income	2010	3,064
Tunisia	Lower-middle income	2008	2,769
United Arab Emirates	High income	2010	2,533
Yemen	Low income	2014	2,440
<b>South East Asia</b>			
Bangladesh	Lower-middle income	2014	2,965
India	Lower-middle income	2007	7,954
Indonesia	Lower-middle income	2015	11,000
Maldives and Male	Upper-middle income	2014	3,374
Myanmar	Lower-middle income	2007	2,778
Sri Lanka	Lower-middle income	2008	2,549
Thailand	Upper-middle income	2015	2,457
Timor Leste	Lower-middle income	2015	3,395
<b>West Pacific</b>			
Brunei	High income	2014	2,585
Cambodia	Lower-middle income	2013	3,761
Fiji Islands	Upper-middle income	2010	1,610
Kiribati	Lower-middle income	2011	1,555
Lao	Lower-middle income	2015	3,646
Malaysia	Upper-middle income	2012	25,289
Mongolia	Lower-middle income	2013	5,345
Nauru	High income	2011	535

(continued on next page)

**Table 1**  
Continued

Country by WHO region	Income classification <sup>a</sup>	Survey year	Sample size
Philippines	Lower-middle income	2015	8,566
Samoa	Lower-middle income	2011	2,234
Solomon Islands	Lower-middle income	2011	1,305
Tonga	Upper-middle income	2010	2,118
Tuvalu	Upper-middle income	2013	883
Vanuatu	Lower-middle income	2011	1,086
Vietnam	Lower-middle income	2013	3,264

<sup>a</sup> Income classification is based on a report from World Bank (2021).

created a four-category variable to explore a possible dose-response association. The categories were “0 friends,” “1 friend,” “2 friends,” or “3 friends or more.”

#### IRB statement

This study uses publicly available data and is not subject to IRB approval.

#### Statistical analysis

A sample bias analysis was conducted first. Chi-square tests were used to examine differences in demographic characteristics between students excluded because of missing loneliness status. Subsequently, the prevalence of loneliness and its correlates in each country were described using predicted values obtained from linear regression and post-estimation Stata command “mimrgns” [15]. Log-binomial regression models were used to obtain the adjusted prevalence ratios of loneliness associated with each risk factor. A random-effects meta-analysis was conducted using the DerSimonian and Laird inverse methods to generate pooled estimates across countries according to regions based on WHO classification [16]. To formally test the variation across countries, we calculated heterogeneity using  $I^2$  [17].

All analyses incorporated sampling weights provided by the GSHS to account for nonresponse, probability of selection of schools and classrooms, and population distribution by grade and sex, and accounted for clustering at the school level [12]. All analyses were adjusted for age (coded as above or below age 14) to account for the increased prevalence of loneliness at later ages [18]. We used Stata version 15 SE for all our analyses (Stata Corp. LP, College Station, United States of America).

#### Additional analyses

To test the robustness of our analyses to a different cut-point for the definition of loneliness, we conducted sensitivity analysis with different cut-offs. To further explore the associations between the frequency of bullying victimization, number of close friends, and experiences of loneliness, the analysis was repeated using ordered categorical variables by country. As the prevalence of each correlate might affect the prevalence ratio, absolute differences in prevalence were estimated by obtaining predicted values from this regression model via postestimation Stata command “mimrgns” [15], and we plotted the values using “marginplot.” It also enabled the investigation of potential deviations from linearity in the association.

### Missing data

The percentage of missing data was 1.6% ( $n = 3,929$ ) for lack of close friends and 6.75% ( $n = 15,868$ ) for bullying victimization. All variables included in the analysis models were used to impute each missing factor through multiple imputations by chained equations. Imputation was conducted separately for each correlate and then merged into one dataset. Regression analyses were run across 10 imputed datasets and adjusted by Rubin's rules [19]. Imputed results were similar to those obtained using students' data without missing correlates (Table A1); therefore, the imputed data are presented.

### Results

The characteristics of the 70 countries are summarized in Table 1. The survey year ranged from 2003 to 2018 (median of the survey year, 2012). There were 13 countries from Africa, 20 from the Americas, 14 from the Eastern Mediterranean, eight from Southeast Asia, and 15 from the West Pacific. Of these countries, eight were classified as low-income, 31 as lower-middle-income, 20 as upper-middle-income, and 11 as high-income countries according to World Bank criteria in 2021. Our sample bias analysis revealed that girls, students who experienced bullying victimization, and students without close friends were more likely to be excluded from the analysis (Table A2).

The prevalence of the correlates for each country is illustrated in Table 2. Of the 248,017 adolescents, 51.7% were girls, 35.1% had experienced bullying victimization during the past month, and 8.2% reported a lack of close friends. There was a considerable difference in the prevalence of correlates across countries: the percentage of girls ranged from 24.8% in Pakistan to 60.1% in Bangladesh; bullying victimization ranged from 14.8% in Trinidad and Tobago to 67.8% in Egypt; and lack of close friends ranged from 1.9% in Brunei to 17.9% in Swaziland.

### Prevalence of loneliness

The overall pooled prevalence of loneliness, defined as feeling lonely most of the time or always during the last 12 months, was 11.7% (95% confidence interval [CI]: 10.6%–12.7%), as demonstrated in Figure 1 (detailed numbers shown in Figure A2). Across the five WHO regions, the prevalence was higher in Africa (13.1%, 95% CI: 10.8–15.3) and the Eastern Mediterranean region (14.7%, 95% CI: 13.1–16.3%). There was considerable overall heterogeneity overall and within each region, ranging from 2.2% in Laos (95% CI: 1.3–3.0) to 25.9% (95% CI: 19.9%–31.9%) in Afghanistan, followed by Samoa (24.1; 21.7–26.6) and Zambia (23.3%; 95% CI: 17.7%–28.9%).

### Sex disparities

Overall, girls were more likely to experience loneliness than boys (prevalence ratio [PR] = 1.4; 95% CI: 1.3–1.4), but with significant heterogeneity across countries ( $I^2 = 82.1\%$ ), as illustrated in Figure 2A. The highest prevalence ratio for girls was observed in El Salvador (PR = 2.8; 95% CI: 1.9–4.0), followed by Guatemala (PR = 2.4; 95% CI: 1.7–3.4) and Uruguay (PR = 2.4; 95% CI: 1.6–3.5). Timor Leste was the only country where boys were more likely to report loneliness (PR = 0.8; 95% CI: 0.7–1.0). There were some regional differences in these associations. Girls showed higher prevalence in almost all American (18/20

countries) and over half of Eastern Mediterranean countries (9/14 countries). However, no significant sex difference was found in most African countries (10/13 countries) and over half of Southeast Asia (5/8 countries).

### Correlation with bullying victimization

Overall, bullying victimization was associated with the increased prevalence of experiencing loneliness in almost all the countries included, with low heterogeneity across countries (PR = 2.2; 95% CI: 2.1–2.3,  $I^2 = 62.0\%$ ), as illustrated in Figure 2B. The highest prevalence ratio was observed in Costa Rica (4.1; 95% CI: 3.0–5.7), and Cambodia (4.1; 95% CI: 3.0–5.6) followed by Honduras (3.9; 95% CI: 2.8–5.4). The only exceptions were Egypt (PR = 1.6; 95% CI: 0.9–2.8) and Vanuatu (PR = 1.1; 95% CI: 0.6–2.1), where bullying victimization was not significantly associated with loneliness.

### Correlation with lack of close friends

Overall, lack of close friends was associated with a 1.8-times increase in the prevalence of experiencing loneliness (95% CI: 1.7–1.9), as detailed in Figure 2C. However, high heterogeneity across countries ( $I^2 = 84.7\%$ ) was found. While lack of close friends was associated with higher loneliness in most countries in the Americas (18/20 countries), Eastern Mediterranean (11/13 countries), and Southeast Asia (7/8 countries), no associations were found in some African countries (4/13 countries) and nearly half of the Western Pacific countries (7/15 countries).

### Additional analyses

Additional analyses for predicted plots that used ordered categorical variables for this study's correlates further confirmed the findings (Figures A3 and A4, included in the Supplementary File). The association between frequency of bullying victimization and loneliness demonstrated a positive linear association in all countries (except for Vanuatu), thus suggesting a dose–response relationship across countries (Figure A3). The association between number of close friends and loneliness was more mixed across countries. While there was a negative linear association in most countries, indicating a negative dose–response association between the number of friends one has and experiences of loneliness, the association was relatively flat in some countries (e.g., Benin, Malawi, Tanzania, Zambia, Suriname, Afghanistan, Laos, Philippines, Solomon Islands, and Vanuatu) thereby reflecting a null association between these variables (Figure A4). Our sensitivity analysis using different cut-offs of loneliness yielded similar associations in all three correlates (Table A3).

### Discussion

Using comparable data for 70 countries across five WHO regions, we found that 11.7% of adolescents felt lonely “most of the time” or “always” during the past 12 months. However, there were large variations in prevalence across countries that ranged from 2.2% in Laos to 25.9% in Afghanistan. In general, the prevalence of loneliness was 1.4 times higher among girls than boys; bullying victimization and lack of close friends were also associated with a higher prevalence of experiencing loneliness (2.2, 1.7, respectively). While bullying victimization was associated



**Table 2**  
Prevalence of sex, bullying victimization, and lack of close friends

Country by WHO region	Sex (female)	Bullying victimization <sup>a</sup>	Lack of close friends <sup>b</sup>
	%	%	%
<b>Africa</b>			
Benin	48.4	31.2	5.2
Botswana	55.2	49.5	16.1
Ghana	46.3	59.4	11.0
Kenya	52.0	57.1	13.2
Malawi	53.1	44.6	8.9
Mauritania	52.8	45.2	7.3
Mozambique	46.8	44.2	8.9
Namibia	52.7	43.7	12.6
Seychelles	52.9	50.9	9.8
Swaziland	52.5	33.3	17.9
Uganda	48.8	46.3	10.7
Tanzania	52.2	27.8	9.3
Zambia	51.3	59.5	15.2
Subtotal	50.9	45.5	11.2
<b>America</b>			
Argentina	52.4	25.6	5.2
Bahamas	53.7	24.2	8.8
Barbados	54.9	15.3	6.7
Belize	52.9	30.8	7.5
Bolivia	49.5	30.0	8.4
Costa Rica	51.6	19.1	6.4
Dominica	57.4	29.6	8.8
El Salvador	46.3	22.8	5.3
Grenada	55.3	29.6	7.3
Guatemala	50.6	23.0	7.2
Guyana	56.2	40.9	10.7
Honduras	52.5	33.6	6.9
Jamaica	51.0	40.1	12.3
Peru	51.0	46.3	5.8
Saint Kitt and Nevis	55.9	25.2	11.0
Saint Lucia	57.5	27.1	9.0
Saint Vincent and the Grenadines	53.2	NA	9.4
Suriname	49.0	27.8	14.8
Trinidad and Tobago	45.5	14.8	8.5
Uruguay	53.5	20.0	2.0
Subtotal	52.2	27.3	8.0
<b>Eastern Mediterranean</b>			
Afghanistan	57.9	41.5	13.2
Djibouti	43.1	38.5	NA
Egypt	53.7	67.8	7.3
Iraq	43.7	28.4	6.2
Kuwait	53.3	31.8	6.2
Lebanon	53.4	26.2	4.1
Morocco	47.6	17.1	8.9
Oman	52.5	42.2	5.4
Pakistan	24.8	41.4	8.5
Qatar	56.1	38.0	12.0
Syria	60.1	NA	5.0
Tunisia	51.5	32.5	5.1
United Arab Emirates	58.2	21.9	5.9
Yemen	50.8	42.8	6.1
Subtotal	49.0	35.4	7.1
<b>South East Asia</b>			
Bangladesh	60.1	22.7	9.2
India	44.2	NA	10.7
Indonesia	54.4	21.8	3.1
Maldives and Male	57.9	31.6	9.7
Myanmar	50.1	22.7	3.8
Sri Lanka	56.3	37.3	5.3
Thailand	56.8	31.4	5.6
Timor Leste	53.8	31.8	5.3
Subtotal	52.9	28.4	6.5
<b>West Pacific</b>			
Brunei	53.3	24.8	1.9
Cambodia	52.8	21.6	5.3

(continued on next page)

**Table 2**  
Continued

Country by WHO region	Sex (female)	Bullying victimization <sup>a</sup>	Lack of close friends <sup>b</sup>
	%	%	%
Fiji Islands	57.5	40.4	6.5
Kiribati	56.6	36.4	2.8
Lao	54.4	18.3	6.2
Malaysia	50.1	23.5	3.3
Mongolia	53.2	32.5	6.2
Nauru	57.9	38.1	8.0
Philippines	54.4	51.5	3.9
Samoa	59.1	67.9	14.4
Solomon Islands	48.3	61.0	12.7
Tonga	54.4	50.6	9.0
Tuvalu	51.8	31.4	16.1
Vanuatu	55.9	64.6	13.3
Vietnam	53.1	28.0	4.3
Subtotal	52.6	39.1	7.5
Overall	51.7	35.1	8.2

NA = not applicable.

Weighted prevalence adjusted for age is shown. Variables missing at the country level are omitted (St. Vincent and Grenadines, Syria, and India for bullying victimization, Djibouti for lack of close friends), and results using imputed data are shown for bullying victimization and lack of close friends.

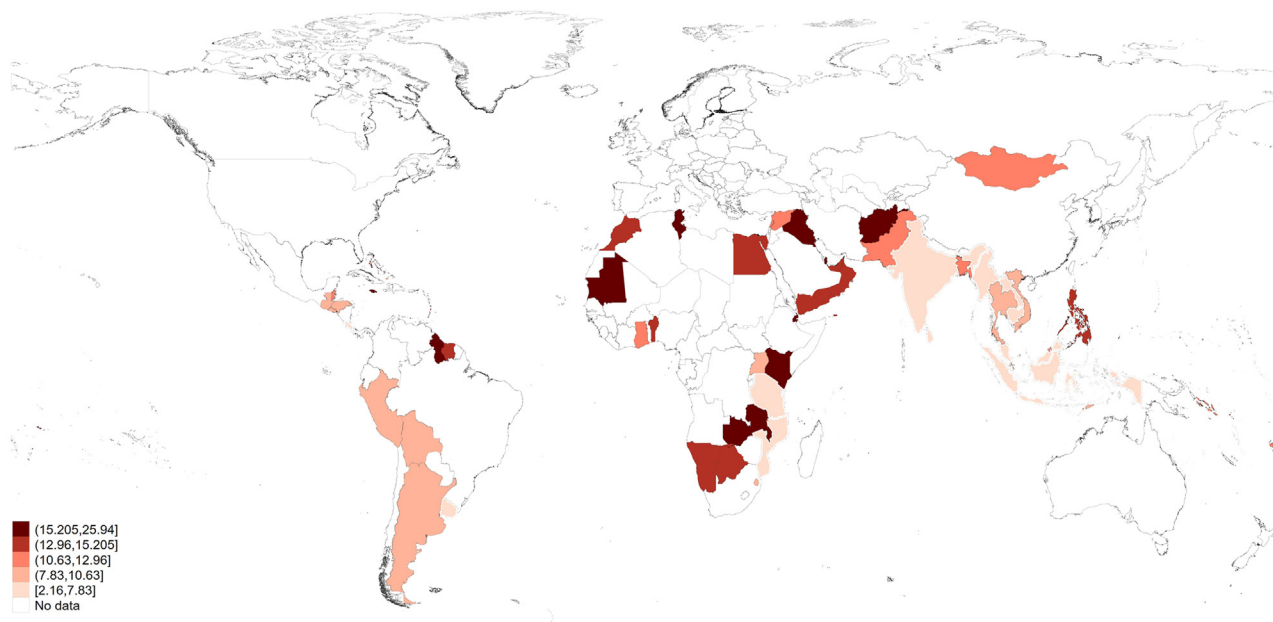
<sup>a</sup> Bullying victimization is defined as experiencing bullying victimization at least once in the last 30 days.

<sup>b</sup> Lack of close friends is defined as not having a single close friend.

with an increased prevalence of experiencing loneliness in almost all countries, the association between sex and lack of close friends differed primarily by country, which demonstrated considerable heterogeneity ( $I^2 = 82.1\%$  for sex;  $84.7\%$  for lack of close friends).

#### Comparisons with previous studies

In line with previous cross-country studies, we found considerable heterogeneity in the prevalence of loneliness across countries that ranged from 2.2% in Laos to 25.9% in Afghanistan [7]. A potential reason for this high heterogeneity is that experiences of loneliness are likely to be closely tied to one's culture and social norms [9]. Loneliness, by definition, is the subjective perception of a discrepancy between one's desired and actual social relationships [1], and the norms surrounding preferred social relationships may differ by cultural context [9,20]. Some cultures have extended families, which may protect adolescents from loneliness [21]. Second, several previous articles have noted that loneliness increases are associated with the rise of digital media use among adolescents [18,22]. We could not evaluate the time they spent online or the percentage of adolescents that owned smartphones, but the difference in access to digital media may have contributed to heterogeneity across countries. Relatedly, the overall estimate of 11.7% prevalence in this study was slightly lower than previous findings conducted primarily in high-income countries (17% for 37 predominantly OECD countries in 2012 or 14% for Nordic countries in 2014) [18,23]. Although a direct comparison is difficult because of methodological differences, the higher rate of loneliness observed in high-income countries compared to our study could partly be attributed to the difference in access to digital media among adolescents. Although our study cannot address this hypothesis, future studies should explore the mechanism behind the observed



**Figure 1.** Prevalence of adolescent loneliness during the past 12 months for 70 countries. The prevalence of loneliness was defined as feeling lonely “most of the time” or “always” during the past 12 months among adolescents aged 13–17 years. A change in color from pink to dark brown indicates a higher prevalence.

heterogeneity across countries, which may help identify additional preventative targets.

Overall, girls were more likely to experience loneliness; however, this association differed largely among countries and regions. While girls were more likely to experience loneliness in almost all American countries, sex differences were not evident in many African countries and over half of Southeast Asian countries. In many societies, boys are socialized to be more autonomous and independent than girls, though the degree may differ by country or culture [24]. This gender socialization may lead to different expectations of social relationships or socializing behavior by gender, and result in the observed sex differences for adolescent loneliness. This variability in sex differences contrasts with other mental health problems such as depression and anxiety that girls are more susceptible to [25,26]. The results may indicate that the pathway to adolescent loneliness differs from that of other common mental health problems. Future studies should examine the reasons for the variability in sex differences across countries.

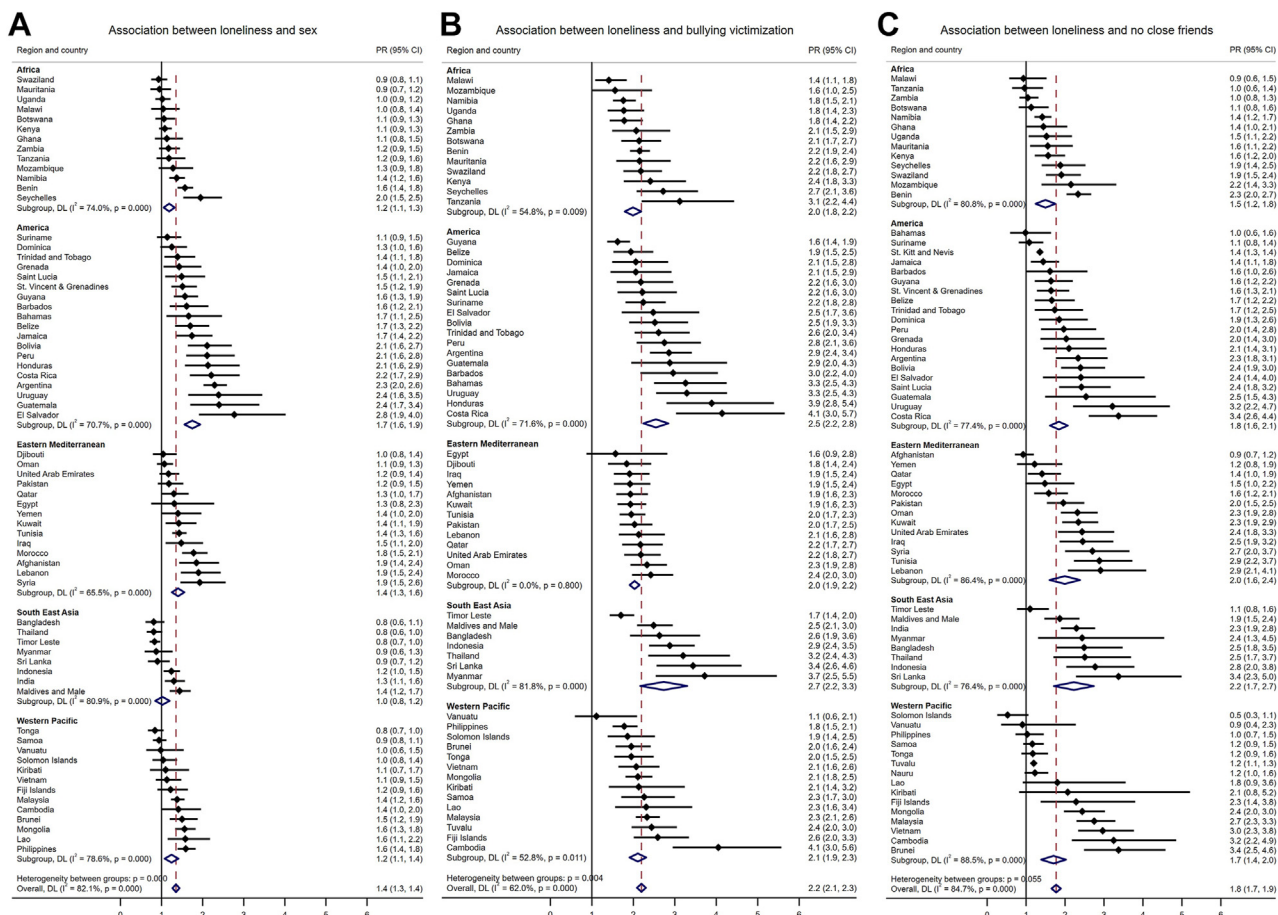
Previous studies conducted in western, high-income countries demonstrated that bullying victimization is an established risk factor for loneliness [27]. This study expanded those results by confirming that bullying victimization was associated with increased adolescent loneliness across almost all countries, irrespective of region or national income level. An additional analysis further confirmed that the prevalence of experiencing loneliness increased with a higher frequency of bullying victimization in almost all countries. Bullying victimization can be modified through intervention [28]. Thus, our results highlight the importance of bullying victimization as an important target for future interventions to reduce adolescent loneliness globally.

The overall finding of this study that the lack of close friends was associated with experiences of loneliness is consistent with previous literature [2,10,29,30], and the prevalence of experiencing loneliness decreased with an increase in the number of

close friends in most countries. However, there were some exceptions; in some African and Western Pacific countries, there was no significant association between lack of close friends and experiences of loneliness. The dose-response association was also not found in those countries. The results suggest that the role of peer support, indicated by the presence of close friends, may differ by country context. While approaches that enhance adolescents' social connections are beneficial in the reduction of adolescent loneliness [30], this study's results suggest that interventions that focus exclusively on increasing peer connections may be insufficient, particularly in countries where lack of close friends was not significantly correlated with adolescent loneliness. Future studies should also examine the impact of other social connections on adolescent loneliness, such as parent-child relationships and relationships with teachers or within the community.

#### Strengths and limitations

This study provides new evidence on the prevalence and correlates of adolescent loneliness across a range of understudied low-, middle-, and high-income countries from five WHO regions. However, there are some limitations. First, the cross-sectional design limits the capacity to draw strong causal conclusions in the analysis of correlates due to confounding and/or reverse causality. Second, GSHS relied on a single-item question to measure loneliness. While the single-item measure of loneliness correlates well with multi-item scales [9,31], it could result in under-reporting of loneliness, which would result in its underestimation [32]. The GSHS questionnaire only asked about the number of “close” friends, which may not capture the quantity of adolescents' peer relationships. Relatedly, the questionnaire did not specify whether “close” refers to emotional closeness or geographical proximity. While this fact may be obvious in other languages, some English-speaking adolescents might have interpreted this differently. Third, GSHS is a school-



**Figure 2.** Association between loneliness and sex, bullying victimization, and lack of close friends, by country. The prevalence ratio of loneliness by each correlate was obtained from log-binomial regression models adjusted for age. Overall estimates were calculated by meta-analysis with random effects. Error bars show 95% confidence intervals. The red dotted line shows the overall estimate. Reference category is boys for sex; no experiences of bullying victimization in the past 30 days for bullying victimization; and having one or more close friends for lack of close friends.

based survey, and adolescents who were not attending school for various reasons were not included. In addition, our sample bias analysis revealed that boys, those who experienced bullying victimization, and those without close friends were more likely to be excluded from the analysis because of nonresponse on the loneliness measure, which may have led to an underestimation of the associations. Some studies suggest that using indirect measures of loneliness, often multi-item measures, may avoid the activation of negative stereotypes [33]. The use of indirect measures of loneliness in future studies may help increase responses from those participants who may be reluctant to report their loneliness. Fourth, the survey year in this study ranged from 2003 to 2018, and we could not consider the social changes during this period, including the rise in smartphone access and the use of social media, which may have influenced adolescent loneliness [18]. However, the pooled prevalence of loneliness among surveys conducted in the previous decade (i.e., before 2010) and 2010s was similar: 13.0% and 10.8%, respectively.

**Conclusion**

Adolescent loneliness was observed worldwide, across a diverse range of low- and middle-income countries. Given the

negative impact of adolescent loneliness on health and well-being, the results of this study highlight the importance of reducing adolescent loneliness globally. The data suggest that loneliness may be an underrepresented problem in countries that are part of understudied regions (Africa and the Eastern Mediterranean). Girls, those who experienced bullying victimization, and those without close friends were more likely to feel lonely. However, the significant heterogeneity between countries in the prevalence of loneliness and its correlates; particularly, sex and lack of close friends; requires further investigation. The study provides evidence to support consideration of the country context during the formulation of preventive approaches. In contrast, the more limited heterogeneity observed in bullying victimization indicates that reducing bullying could be a common intervention target worldwide.

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K.I. conducted the analysis, M.H. and A.I. verified the analysis. K.I. and M.H. wrote the first draft. All authors contributed to the interpretation of the data, review, revision, and approval of the final manuscript.

### Data Sharing

The datasets supporting the conclusions of this article are available online. <https://www.cdc.gov/gshs/countries/index.htm>.

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### Supplementary Data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jadohealth.2022.12.029>.

### References

- [1] Perlman D. *Loneliness: A sourcebook of current theory, Research and Therapy*. New York: John Wiley & Sons; 1982.
- [2] Luhmann M, Hawkley LC. Age differences in loneliness from late adolescence to oldest old age. *Dev Psychol* 2016;52:943–59.
- [3] Stickle A, Koyanagi A, Kopusov R, et al. Loneliness and health risk behaviours among Russian and U.S. adolescents: A cross-sectional study. *BMC Public Health* 2014;14:366.
- [4] Beutel ME, Klein EM, Brähler E, et al. Loneliness in the general population: Prevalence, determinants and relations to mental health. *BMC Psychiatry* 2017;17:97.
- [5] McKinnon B, Gariépy G, Sentenac M, Elgar FJ. Adolescent suicidal behaviours in 32 low- and middle-income countries. *Bull World Health Organ* 2016;94:340–350F.
- [6] Shain BN. Suicide and suicide attempts in adolescents. *Pediatrics* 2007;120:669–76.
- [7] Surkalim DL, Luo M, Eres R, et al. The prevalence of loneliness across 113 countries: Systematic review and meta-analysis. *BMJ* 2022;376:e067068.
- [8] Chen X, He Y, De Oliveira AM, et al. Loneliness and social adaptation in Brazilian, Canadian, Chinese and Italian children: A multi-national comparative study. *J Child Psychol Psychiatry* 2004;45:1373–84.
- [9] Barreto M, Victor C, Hammond C, et al. Loneliness around the world: Age, gender, and cultural differences in loneliness. *Pers Individ Dif* 2021;169:110066.
- [10] Schwartz-Mette RA, Shankman J, Dueweke AR, et al. Relations of friendship experiences with depressive symptoms and loneliness in childhood and adolescence: A meta-analytic review. *Psychol Bull* 2020;146:664–700.
- [11] Hosozawa M, Bann D, Fink E, et al. Bullying victimisation in adolescence: Prevalence and inequalities by gender, socioeconomic status and academic performance across 71 countries. *EClinicalMedicine* 2021;41:101142.
- [12] Centers for Disease Control global school-based student health survey (GSHS). Available at: <http://www.cdc.gov/GSHS/>. Accessed February 1, 2022.
- [13] Madsen KR, Holstein BE, Damsgaard MT, et al. Trends in social inequality in loneliness among adolescents 1991–2014. *J Public Health (Oxf)* 2019;41:e133–40.
- [14] Smith L, Shin JI, Carmichael C, et al. Prevalence and correlates of multiple suicide attempts among adolescents aged 12–15 years from 61 countries in Africa, Asia, and the Americas. *J Psychiatr Res* 2021;144:45–53.
- [15] Klein D. MIMRGENS: Stata module to run margins after mi estimate. *Stat Softw Compon* 2014.
- [16] Sterne J. *Meta-analysis in Stata: An updated collection from the Stata Journal*. 1st ed. College Station: Stata Press; 2009.
- [17] Higgins JP, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. *BMJ* 2003;327:557–60.
- [18] Twenge JM, Haidt J, Blake AB, et al. Worldwide increases in adolescent loneliness. *J Adolesc* 2021;93:257–69.
- [19] StataCorp. *Multiple-imputation reference manual*. College Station: Stata Press; 2011.
- [20] Oyserman D, Lee SW. Does culture influence what and how we think? Effects of priming individualism and collectivism. *Psychol Bull* 2008;134:311–42.
- [21] Bongaarts J, Zimmer Z. Living arrangements of older adults in the developing world: An analysis of demographic and health survey household surveys. *J Gerontol B Psychol Sci Soc Sci* 2002;57:S145–57.
- [22] Twenge JM. Increases in depression, self-harm, and suicide among U.S. adolescents after 2012 and links to technology use: Possible mechanisms. *Psychiatr Res Clin Pract* 2020;2:19–25.
- [23] Lyra N, Thorsteinsson EB, Eriksson C, et al. The association between loneliness, mental well-being, and self-esteem among adolescents in four Nordic countries. *Int J Environ Res Public Health* 2021;18:7405.
- [24] Rose AJ, Rudolph KD. A review of sex differences in peer relationship processes: Potential trade-offs for the emotional and behavioral development of girls and boys. *Psychol Bull* 2006;132:98–131.
- [25] Parker G, Brotchie H. Gender differences in depression. *Int Rev Psychiatry* 2010;22:429–36.
- [26] Zahn-Waxler C, Shirtcliff EA, Marceau K. Disorders of childhood and adolescence: Gender and psychopathology. *Annu Rev Clin Psychol* 2008;4:275–303.
- [27] Matthews T, Caspi A, Danese A, et al. A longitudinal twin study of victimization and loneliness from childhood to young adulthood. *Dev Psychopathol* 2022;34:367–77.
- [28] Arseneault L. Annual research review: The persistent and pervasive impact of being bullied in childhood and adolescence: Implications for policy and practice. *J Child Psychol Psychiatry* 2018;59:405–21.
- [29] Lee CY, Goldstein SE. Loneliness, stress, and social support in young adulthood: Does the source of support matter? *J Youth Adolesc* 2016;45:568–80.
- [30] Lodder GMA, Scholte RHJ, Goossens L, Verhagen M. Loneliness in early adolescence: Friendship quantity, friendship quality, and dyadic processes. *J Clin Child Adolesc Psychol* 2017;46:709–20.
- [31] Mund M, Maes M, Drewke PM, et al. Would the real loneliness please stand up? The validity of loneliness scores and the reliability of single-item scores. *Assessment* 2022. <https://doi.org/10.1177/10731911221077227>.
- [32] de Jong-Gierveld J, van Tilburg T, Dykstra P. Loneliness and social isolation. In: Vangelisti A, Perlman D, eds. *Cambridge handbook of personal relationships*. Cambridge, UK: Cambridge University Press; 2006:485–500.
- [33] Russell D. The measurement of loneliness. In: Peplau LA, Perlman D, eds. *Loneliness: A sourcebook of current theory, research and therapy*. New York: John Wiley; 1982:81–104.