

Original Research



Prevalence and correlates of anxiety disorders among school children aged 13-15 years in Colombo District, Sri Lanka

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Abstract

Introduction: Anxiety disorders (AD) being the most prevalent psychological problem among children and adolescents remain largely unrecognized due to their nature. If unattended, AD could lead to many adverse outcomes.

Objectives: To assess the prevalence and correlates of anxiety disorders among children aged 13-15 years attending government Sinhala medium schools in Colombo District, Sri Lanka

Methods: A school-based cross-sectional study was conducted among 1524 children in Sinhala-medium government schools aged 13-15 years old selected by stratified cluster sampling. The presence of any anxiety disorder and its correlates were assessed using a pre-tested self-administered questionnaire that included validated Screen for Child Anxiety Related Disorders (SCARED). Multivariable analysis with binary logistic regression was carried out using backward elimination method to determine the association between anxiety disorders and selected correlates identified at bivariate analysis at $p < 0.05$ level.

Results: The adjusted prevalence of anxiety disorders was 12.3% (95% CI: 9.8%, 14.9%). Factors significantly associated with having any anxiety disorders at the multivariable analysis included being female (OR=3.0; 95% CI: 2.0, 4.4; $p < 0.001$), residing away from the family (OR=4.6; 95% CI: 1.2, 17.8; $p = 0.027$), low to moderate self-esteem (OR=1.6; 95% CI: 1.1, 2.5; $p = 0.022$), having stress (OR=2.3; 95% CI: 1.5, 3.6; $p \leq 0.001$) and depression (OR=2.5; 95% CI: 1.4, 4.5; $p < 0.001$), attending tuition classes for 5-7 days per week (OR=2.9; 95% CI: 1.9, 4.3; $p < 0.001$), non-engagement in sports activities (OR=1.6; 95% CI: 1.1, 2.6; $p = 0.028$), having a sibling/s less than one year of age (OR=2.9; 95% CI: 1.2, 6.6; $p = 0.015$), father's low level of education (OR=2.0; 95% CI: 1.1, 3.8; $p = 0.04$) and mother engaged in foreign employment (OR=5.3; 95% CI: 2.0, 13.9; $p = 0.001$) and having an insecure attachment style (OR=2.7; 95% CI: 1.8, 4.0; $p < 0.001$).

Conclusions & Recommendations: The prevalence of AD is high in this community and is associated with multiple personal, family and educational factors. Screening for ADs need to be considered at routine mental health services.

Keywords: anxiety disorders, adolescents, prevalence, correlates

Introduction

Anxiety disorders (AD) are the most prevalent form of psychopathologies among adolescents (1-3). They are usually underreported and underdiagnosed due to the nature of their presentation as fear or worry which may not be recognized as unreasonable (4). Estimated prevalences of AD in different communities vary slightly due to differences in the studied age groups, assessment instruments, information source (e.g., self-report, parent/teacher report), method of data aggregation (from multiple information sources or multiple assessment waves) and the diagnostic systems used (i.e., DSM-III-R, DSM-IV, ICD-10). Also, data aggregation from various assessment waves in prospective-longitudinal studies, the number and type of diagnoses included in summary categories (e.g. any anxiety disorder) and the strictness of application of criteria in generating diagnoses (e.g., impairment required or not) are other reasons for the varying prevalence (5). In spite of the notable variation in prevalence estimates, the lifetime prevalence of any anxiety disorder in studies with children or adolescents is about 15% to 20%. In particular, it is remarkable that the period prevalence estimates, for example, 1-year or 6-month rates, are not considerably lower than lifetime estimates. This fact indirectly indicates that anxiety disorders exhibit a persisting course.

The aetiology of anxiety disorders is still relatively unknown and there is no pathognomonic marker with which a presumptive diagnosis of an anxiety disorder is made. The principles of multifinality (i.e., many outcomes of the same risk factor) and equifinality (i.e., diverse risk profiles leading to the same endpoint) apply to many of the risk pathways investigated on anxiety disorders. Although we distinguish between intrinsic and extrinsic risk factors for the development of anxiety disorders, there is increasing evidence that there is a bidirectional association between the factors included under these two domains (6). When the correlates of anxiety disorders are considered, they

can be broadly categorized into individual and extrinsic factors. Individual factors include genetic factors, temperaments such as behavioural inhibition and anxiety sensitivity, pre-existing psychiatric/medical disorder, autonomic reactivity, respiratory sensitivity and neurobiological factors. The exogenous factors include drug use, parenting modelling, parenting sensitization and life events (6).

Prospective studies provide evidence on the relationship between childhood- or adolescent-onset anxiety disorders and impaired psychosocial adjustment in young adults such as difficulty completing secondary education, increased dependency, employment difficulties and impaired social relationships. A longitudinal study had revealed significant linear associations between the number of anxiety disorders reported in adolescence and a range of adverse outcomes in early adulthood. Specifically, as the number of adolescent anxiety disorders increase, there is a corresponding increase in young people's subsequent risk of a range of mental health problems, including anxiety disorders, major depression, nicotine dependence, alcohol dependence, illicit drug dependence and suicidal behaviour. An increasing number of anxiety disorders were also associated with a reduced likelihood of entering university or other training courses, in addition to an increased likelihood of early parenthood (7). The aim of the study was to determine the prevalence and correlates of the anxiety disorders among adolescents.

Methods

This school-based cross-sectional study was conducted in Sinhala medium government schools in Colombo District from July to December 2018. The study population consisted of students of grades 8, 9 and 10. There were 76 193 eligible students from 12 strata based on educational zone and school type. The required sample size was calculated with 95% confidence interval (CI), 5% absolute precision for an anticipated prevalence of having any anxiety

disorder of 20% (8). The final sample size was rounded off as 1600, after adjusting for a design effect of 4.99 and an anticipated level of nonresponse of 25%. Stratified cluster sampling technique was used to select the sample, in which a cluster was defined as grades 8, 9 or 10 class with a minimum number of 20 students. Hence, the study was conducted in 80 clusters from 43 schools selected according to the probability-proportional-to-population-size.

A pretested, validated self-administered questionnaire consisting of two parts was used. The first part consisted of socio-demographic information and Screen for Child Anxiety Related Disorders (SCARED) Child version with 41 items under the five subscales of panic/somatic, generalized anxiety, separation anxiety, social phobia and significant school avoidance. Adolescents were asked to rate the frequency with which they experience each symptom using a three-point, Likert scale (0=almost never; 1=sometimes; 2=often). Summing the scores of all items provides the SCARED total score and if the score is more than the cut-off, the adolescent is considered to have an anxiety disorder (9-10). This instrument has been validated to different settings and languages and is found to be valid and reliable (11). It was culturally adapted, translated to Sinhala language and validated to determine the status of having any anxiety disorder against the diagnosis of consultant psychiatrist based on DSM-IV classification. It is found to be a valid and reliable instrument to assess the status of having anxiety disorders in this target population (12). The second part of questionnaire, which was intended to gather information related to the correlates of anxiety disorders, was developed following an extensive literature search and with inputs from the experts in the fields of psychiatry, psychology, public health and education. Validated tools were used to assess these correlates wherever possible in view of minimizing information bias. It included instruments to assess status of stress & depression, personality trait and temperament (behavioural inhibition (BI)

temperament and anxiety sensitivity (AS)), self-esteem and resilience, attachment style & parenting style, adverse childhood experiences and life events by using depression and stress scales of DAS-21 Questionnaire (13), Self-Reported Behavioural Inhibition Form (14), Child Anxiety Sensitivity Index (CASI) (15), Rosenberg Self-esteem Instrument (16-17), Adolescent Psychological Resilience Scale (18), sEMBU Perceived Parenting Style Scale (19), Attachment Style Classification Questionnaire (20), Adverse Childhood Experience International Questionnaire (ACE-IQ) (21) and Life Events Questionnaire (22), respectively.

Data analysis

Data analysis was conducted by using Statistical Package for the Social Sciences (SPSS) version 22. Scoring of the SCARED Child was done according to the instructions of the developer (9). Based on the clinically validated cut-off, each participant was categorized into either as having any anxiety disorder or not. The adjusted prevalence of having anxiety disorders with 95% CI was calculated by incorporating values of the diagnostic accuracy of validated SCARED Child version (12).

A bivariate analysis followed by a multivariable analysis using binary logistic regression was conducted to identify potential correlates of anxiety disorders, after controlling for potential confounders. Crude odds ratios (OR) were calculated with 95% CI. Correlates that showed statistical significance at $p < 0.1$ in the bivariate analysis were included in the multivariable analysis using backward stepwise elimination method. This model gave adjusted OR (AOR) and 95% CI.

Results

Out of the total 1600 children, 1524 completed the study; hence the response rate was 95.25%. Table 1 summarizes the basic characteristics of the study sample. The adjusted prevalence of anxiety disorders, according to the SCARED Child version (Sinhala) (12) was 12.3% (95% CI: 9.8%, 14.9%).

Table 1: Basic characteristics of the children in the sample (N=1524)

Characteristics	No.	%
Sex		
Male	717	47.0
Female	807	53.0
Age in completed years		
13	679	44.6
14	845	45.4
Ethnicity		
Sinhala	1402	92.0
Tamil	5	0.3
Muslim	113	7.4
Burgher	4	0.3
Religion		
Buddhist	1381	90.6
Hindu	2	0.1
Christian	28	1.8
Islam	113	7.4
Status of having physical illness/ illnesses		
Yes	93	6.1
No	1431	93.9
Type of physical illness		
Asthma	56	3.7
Migraine	09	0.6
Allergic rhinitis	09	0.6
Other	14	0.9
Status of ever smoking		
Yes	22	1.5
No	1484	98.5
Status of ever consumption of alcohol		
Yes	17	1.1
No	1496	98.9

In the bivariate analysis, 41 factors emerged as statistically significant predictor variables of anxiety disorders. Five predictors (ever smoke, ever consumed alcohol, parents were separated or divorced, have been sexually abused, having a household member who was treated violently) were having less than 5 as the expected value in more than 20% cells in their respective contingency tables. Therefore, those five variables were not included in

the multivariable analysis.

Tables 2, 3 and 4 summarises the results of the bivariate analysis and that of the multivariable analysis of the correlates of anxiety disorders retained in the final model. Out of 16 factors retained in the final model, 15 factors made a unique statistically significant contribution at a p-value less than 0.05.

Table 2: Socio-demographic and personal predictors of anxiety disorders in children aged 13-15 years (N=1524)

Characteristic	Having anxiety disorder		Crude OR ¹ (95% CI)	Adjusted OR ² (95% CI)
	Yes	No		
Sex				
Female	208 (25.8)	599 (74.2)	3.3 (2.5, 4.4)	3.0 (2.0, 4.4)
Male	68 (9.5)	649 (90.5)	1.0	1.0
			p<0.001	p<0.001
Age				
13 years	136 (20.0)	543 (80.0)	1.3 (1.0, 1.6)	-
14 years	140 (16.6)	705 (83.4)	1.0	
			p=0.08	
Ethnicity				
Non-Sinhala	31 (25.4)	91 (74.6)	1.6 (1.04, 2.47)	-
Sinhala	245 (17.5)	1157 (82.5)	1.0	
			p=0.029	
Current residence				
Stay away from the family	20 (69.0)	9 (31.0)	10.8 (4.8, 23.9)	4.6 (1.2, 17.8)
Stay with the family	256 (17.1)	1239 (82.9)	1.0	1.0
			p<0.001	p=0.027
Having physical illness				
Yes	35 (37.6)	58 (62.4)	3.0 (1.9, 4.6)	-
No	241 (16.8)	1190 (83.2)	1.0	
			p<0.001	
Ever smoking				
Yes	9 (40.9)	13 (59.1)	3.1 (1.3, 7.4)	-
No	267 (18.0)	1217 (82.0)	1.0	
			p=0.011	
Ever consume alcohol				
Yes	10 (58.8)	7 (41.2)	6.7 (2.5, 17.7)	-
No	264 (17.6)	1232 (82.4)	1.0	
			p<0.001	
Marks in mathematics				
< 35%	134 (32.8)	274 (67.2)	3.3 (2.5, 4.4)	2.0 (1.3, 3.0)
35% or more	142 (12.7)	974 (87.3)	1.0	1.0
			p<0.001	p<0.001
Ever taken responsibility as a leader				
No	222 (21.3)	818 (78.7)	2.2 (1.6, 3.0)	-
Yes	54 (11.2)	430 (88.8)	1.0	
			p<0.001	
Level of self-esteem				
Moderate to low	248 (20.0)	995 (80.0)	1.8 (1.2, 2.7)	1.6 (1.1, 2.5)
High	28 (10.0)	253 (90.0)	1.0	1.0
			p<0.001	p=0.022

Level of resilience				
Moderate to low	196 (22.8)	662 (77.2)	2.3 (1.5, 3.4)	-
High	80 (12.0)	585 (88.0)	1.0	
			p<0.001	
Having stress				
Yes	71 (39.2)	110 (60.8)	3.60 (2.6, 5.0)	6.2 (4.3, 9.0)
No	203 (15.2)	1133 (84.8)	1.0	1.0
			p<0.001	p<0.001
Having depression				
Yes	43 (46.2)	50 (53.8)	4.5 (2.9, 7.0)	2.5 (1.4, 4.5)
No	228 (16.0)	1197 (84.0)	1.0	1.0
			p<0.001	p=0.002
Level of anxiety sensitivity (AS)				
High	162 (42.7)	217 (57.3)	6.8 (5.1, 8.9)	6.2 (4.3, 9.0)
Moderate to low	114 (10.0)	1031 (90.0)	1.0	1.0
			p<0.001	p<0.001
Level of behaviour inhibition (BI)				
High	114 (42.5)	154 (57.5)	4.9 (3.7, 6.6)	3.2 (2.1, 4.7)
Moderate to low	162 (13.1)	1078 (86.9)	1.0	1.0
			p<0.001	p<0.001
Functional type of attending school				
Type 2	57 (23.7)	184 (76.3)	1.5 (1.1, 2.1)	-
Types AB and C	219 (17.1)	1064 (82.9)	1.0	
			p=0.015	
Number of days of tuition classes				
5-7 days	102 (36.4)	178 (63.6)	3.5 (2.6, 4.7)	2.9 (1.9, 4.3)
0-4 days	174 (14.0)	1070 (86.0)	1.0	1.0
			p<0.001	p<0.001
Engaging in sport activity				
No	245 (20.8)	935 (79.2)	2.7 (1.8, 3.9)	1.6 (1.1, 2.6)
Yes	31 (9.0)	313 (91.0)	1.0	1.0
			p<0.001	p=0.028
Engaging in society work				
No	263 (19.6)	1077 (80.4)	3.2 (1.8, 5.7)	-
Yes	13 (7.1)	171 (92.9)	1.0	
			p<0.001	

¹Crude odds ratio with their 95% CI and p-values are presented in bivariate analysis; ²Adjusted odds ratio with their 95% CI and p-values are presented in multivariable analysis. These variables were selected based on having a p-value less than 0.1 in the bivariate analysis.

Discussion

The present study on the anxiety disorders among school children in Sri Lanka addresses an important research vacuum in relation to anxiety disorders in the South Asia region.

The study findings revealed that more than one tenth

of the study participants are likely to have an anxiety disorder and that it is significantly associated with temperament and personality factors. Having an adjusted prevalence compensating for the diagnostic uncertainty of the assessment tool and high response rate led to the provision of precise and valid estimates on anxiety disorders among teenage school children.

Table 3: Family related predictors of anxiety disorders in children aged 13-15 years (N=1524)

Characteristic	Having anxiety disorder		Crude OR (95% CI) ¹	Adjusted OR (95% CI) ²
	Yes	No		
Having a sibling/s less than one year of age				
Yes	24 (40.0)	36 (60.0)	3.2 (1.9, 5.4)	2.9 (1.2, 6.6)
No	252 (17.2)	1212 (82.8)	1.0	1.0
			p<0.001	p=0.015
Parents being separated or divorced				
Yes	9 (36.0)	16 (64.0)	2.6 (1.1, 6.0)	-
No	253 (17.6)	1183 (82.4)	1.0	
			p=0.03	
Father having chronic physical illness				
Yes	51 (25.1)	152 (74.9)	1.7 (1.2, 2.3)	-
No	211 (16.5)	1067 (83.5)	1.0	
			p=0.004	
Father's level of education				
Primary or less	23 (24.7)	70 (75.3)	1.6 (0.9, 2.5)	2.0 (1.1, 3.8)
Post primary	242 (17.4)	1147 (82.6)	1.0	1.0
			p=0.075	p=0.044
Mother having chronic physical illness				
Yes	49 (29.9)	115 (70.1)	2.1 (1.5, 3.0)	-
No	225 (16.7)	1126 (83.3)	1.0	
			p<0.001	
Mother's foreign employment				
Yes	20 (48.8)	21 (51.2)	4.6 (2.4, 8.5)	5.3 (2.0, 13.9)
No	254 (17.2)	1220 (82.8)	1.0	1.0
			p<0.001	p<0.001

¹Crude odds ratio with their 95% CI and p-values are presented in bivariate analysis; ²Adjusted odds ratio with their 95% CI and p-values are presented in multivariable analysis. These variables were selected based on having a p-value less than 0.1 in the bivariate analysis.

The prevalence estimated at different settings and using different techniques by research was compared with the findings of the current study. In the instances where screening tools were used to estimate prevalence, those values were adjusted for their sensitivity and specificity by using the technique described by Rogan and Gladen (1978) (23) in view of making those findings comparable. A study conducted by Nair et al. (2013) in India among a random sample of 500 children aged 11-19 years by using SCARED Child Malayalam version has

revealed an unadjusted prevalence of 25.8% (95% CI: 22.1%, 29.8%) (12) and adjusted prevalence of 18.2% (95% CI: 13.2%, 23.8%). Another cross-sectional study conducted in China among 5249 students aged 13-26 years by using a cluster sampling technique had revealed a prevalence of anxiety disorders as 14.1% (95% CI: 13.2%, 15.1%) (24), while a Taiwanese study on a nationally representative sample of 4816 children from grades 3, 5 and 7 by using a stratified cluster sampling technique by conducting structured interviews

revealed an inverse probability censoring weighting 14.0%) (25).
adjusted prevalence of 12.0% (95% CI: 10.0%,

Table 4: Environment related predictors of anxiety disorders in children aged 13-15 years (N=1524)

Characteristic	Having anxiety disorder		Crude OR (95% CI) ¹	Adjusted OR (95% CI) ²
	Yes	No		
Attachment style				
Insecure	213 (31.8)	457 (68.2)	5.9 (4.3, 7.9)	2.7 (1.8, 4.0)
Secure	63 (7.4)	791 (92.6)	1.0	1.0
			p<0.001	p<0.001
Mother's rearing behaviour				
Unfavourable	250 (24.3)	780 (75.7)	5.8 (3.8, 8.8)	2.9 (1.7, 4.9)
Favourable	26 (5.3)	468 (94.7)	1.0	1.0
			p<0.001	p<0.001
Father's rearing behaviour				
Unfavourable	236 (23.2)	783 (76.8)	3.5 (2.5, 4.9)	-
Favourable	40 (7.9)	465 (92.1)	1.0	
			p<0.001	
Contact sexual abuse				
Yes	11 (44.0)	14 (56.0)	3.6 (1.6, 8.1)	-
No	261 (17.7)	1212 (82.3)	1.0	
			p=0.002	
A household member treated violently				
Yes	9 (60.0)	6 (40.0)	6.9 (2.4, 19.7)	-
No	266 (17.7)	1235 (82.3)	1.0	
			p<0.001	
Emotional abuse				
Yes	18 (29.0)	44 (71.0)	1.9 (1.1, 3.4)	-
No	258 (17.6)	1204 (82.4)	1.0	
			p=0.023	
Having alcohol and/or drug abuser in the household				
Yes	19 (30.2)	44 (69.8)	2.0 (1.2, 3.5)	-
No	257 (17.6)	1202 (82.4)	1.0	
			p=0.011	
Having an emotional neglect				
Yes	83 (26.3)	232 (73.7)	1.9 (1.4, 2.5)	-
No	193 (16.0)	1014 (84.0)	1.0	
			p<0.001	
Physical neglect				
Yes	12 (34.3)	23 (65.7)	2.4 (1.2, 4.9)	-
No	263 (17.7)	1224 (82.3)	1.0	
			p=0.012	
Having been bullied				
Yes	33 (41.3)	47 (58.8)	3.5 (2.2, 5.5)	-
No	243 (16.9)	1198 (83.1)	1.0	
			p<0.001	

Exposure to community violence				
Yes	104 (22.6)	357 (77.4)	1.5 (1.1, 1.9)	-
No	172 (16.2)	891 (83.8)	1.0	
			p=0.003	
Exposure to collective violence				
Yes	22 (25.6)	64 (74.4)	1.6 (0.9, 2.6)	-
No	254 (17.7)	1184 (82.3)	1.0	
			p=0.064	
Someone beside parents suffered serious illness or accident				
Yes	75 (27.8)	195 (72.2)	2.0 (1.5, 2.7)	-
No	201 (16.0)	1052 (84.0)	1.0	
			p<0.001	
Had some kind of serious accident or illness				
Yes	34 (29.8)	80 (70.2)	2.0 (1.4, 3.1)	-
No	242 (17.2)	1165 (82.8)	1.0	
			p=0.001	
Someone besides a parent moving out				
Yes	13 (28.9)	32 (71.1)	1.9 (1.0, 3.6)	-
No	263 (17.8)	1213 (82.2)	1.0	
			p=0.058	
Child's family was victim of property crime				
Yes	12 (30.0)	28 (70.0)	1.98 (0.99, 3.9)	-
No	264 (17.8)	1220 (82.2)	1.0	
			p=0.048	

¹Crude odds ratio with their 95% CI and p-values are presented in bivariate analysis; ²Adjusted odds ratio with their 95% CI and p-values are presented in multivariable analysis. These variables were selected based on having a p-value less than 0.1 in the bivariate analysis.

A study conducted in Germany among 1395 children aged 14-17 years who were selected by using a probability sampling technique and assessed by using a Munich-Composite International Diagnostic interview with a one year recall had revealed that the prevalence of anxiety disorders of 14.4% (95% CI: 12.7%, 16.4%) (26). Bittner et al. (2007) reported a study among 906 aged 9, 11, and 13 years assessed by Diagnostic Scheduled interviews had revealed a weighted prevalence of anxiety disorders of 16.1 % (95% CI: 13.9%, 18.6%) in the USA (27) and Steinhausen et al. (1998) in a study done in Switzerland in a representative sample of 1964 children aged 7-16 years by using diagnosis interview schedule, a prevalence of 11.4% (95% CI: 10.1%, 12.9%). A study conducted in Canada using

a diagnostic interview schedule for children to assess the status of anxiety disorders with six months recall had revealed that the prevalence of anxiety disorder among children aged 12-14 years was 12.2% (28). Based on this evidence, we could conclude that the prevalence of anxiety disorder in adolescents determined in the current study is supported by evidence from diverse contexts, irrespective of their age, whether it was a local or regional or global study, the instrument used to do the assessment and the duration considered to assess the status of anxiety disorder.

As per the multivariable analysis, being a female has increased the likelihood of having an anxiety disorder. This is consistent with a study conducted in

China among 5362 participants aged 13-26 years of age (29). The literature suggests that females experience greater difficulty regulating negative emotions compared to males (30). The present study has revealed that those who reside away from their families were having a greater likelihood of having anxiety disorders. Those who reside away from families may be receiving less care, having worrying thoughts that invariably lead to unhealthy feelings and sometimes to unhealthy behaviours which may result in increased level of anxiety (31). Under temperament and personality factors; a higher level of behavioural inhibition and high anxiety sensitivity were found to be significantly associated. This was consistent with the findings of studies conducted among 644 children with a mean age of 12.7 years in the Netherlands (32) and a prospective study among 151 college students with a 3-year follow up (33), respectively.

The association of stress and depression with an anxiety disorder is consistent with the existing evidence (34). Costello et al. (2003) has reported that anxiety predicts depression and vice versa, with approximately 30% showing comorbidity between anxiety and depression in children and adolescents (24). With the consensus of the panel of multidisciplinary experts, marks obtained for the mathematics for the immediately preceding term-test was considered as a proxy measure of academic performance. In the present study, those who have poor academic performance have shown a higher likelihood of having anxiety disorders. As per Blanco et al. (2014), an association had been elicited between poor academic attainment and having anxiety disorders (35). This is due to anxiety about one's performance and fear of negative evaluation by others leading individuals to internalize some of those perceptions and to poor academic performance. Alternatively, poor academic performance might make individuals more reliant on the opinions of others, which may lead to anxiety about their evaluation.

According to the present study, children who attended tuition classes more than five or more days per week and those who do not engage in sports activities showed a higher likelihood of having anxiety disorders. Not having adequate time to relax & rest and getting exposed to crowds and other stressful events and get opportunities to develop multiple life skills would be the reasons, respectively. With regard to the family relationship related factors, the children with siblings less than one year of age had shown a higher likelihood of having anxiety disorders. This may be due to the fact that the birth of a new sibling increases their anxiety because of the stressful nature of the transition, strict discipline that accompanies it, significant changes in the mother-firstborn relationship and reduction in maternal attention. These conditions may arouse children's fear of separation and loss of the parent to the new baby. A child's mother being engaged in foreign employment is found to be an associated factor. Also, father's low level of education was found to be associated. In the context of Sri Lanka, fathers are the breadwinners of the families, and their level of education reflects their socio-economic status.

Under the environmental factors, the children who experience unfavourable maternal rearing behaviour that includes anxious and over-protective rearing types had a greater likelihood to have anxiety disorders compared to those who have experienced favourable maternal rearing behaviour (emotional warmth). This association was consistent with available evidence (32). The mechanism behind this phenomenon would be parental modelling, information transfer, and parental reinforcement of anxious or avoidant behaviour of the child that leads to developing anxiety and anxiety disorders. However, in contrast to available literature, in the Sri Lankan set up, paternal rearing behaviour did not show any significant association. This may be due to the pivotal role played by the mother and the mother-centeredness in the family units in Sri Lanka. Insecure attachment style found as an associated

factor is consistent with present day literature including meta-analytic study.

Conclusions & Recommendations

Prevalence of anxiety disorders among school children aged 13-15 years, in the Colombo district, Sri Lanka was high (12.3%; 95% CI: 9.8%, 14.9%). Multivariable analysis revealed that the status of anxiety disorders is associated with multiple factors such as socio-demographic factors (sex and status of current residence), personal factors (self-esteem, stress and depression), temperament and personality

Public Health Implications

- The prevalence of anxiety disorders is high, and it could be a public health concern.
- Factors associated with anxiety disorders such as education and extracurricular related factors, family relationships related factors and environmental factors could be considered as modifiable factors that can be addressed in a tailor-made intervention.

Author Declarations

Competing interests: The authors declare that there is no competing interest regarding the publication of this paper.

Ethics approval and consent to participate: Ethics clearance was obtained from the Ethics Review Committee of the Faculty of Medicine, University of Kelaniya, Sri Lanka (Reference number: ERC P/19/01/2018). Prior to data collection, administrative clearance was obtained from relevant education authorities. Informed written assent and consent was obtained from each participant and their parents respectively prior to data collection.

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factors (anxiety sensitivity and behavioural inhibition), education and extracurricular related factors (academic performance, tuition classes attendance, status of engage in sports activities), family relationships related factors (status of having a sibling/s less than one year of age, father's level of education, mother's status of doing foreign employment) and environmental factors (attachment style and mother's rearing behaviour). These findings warrant tailor-made public health intervention to reduce anxiety among school children.

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Author contributions: SDS designed the study, analysed it, and interpreted the results and prepared the manuscript for publication. DS functioned as the supervisor of whole process and reviewed the manuscripts. SS functioned as the technical supervisor in psychiatry point of view and was involved the whole process of the study.

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