

Risk of Stress in Asian Senior High School Students: A Systematic Review

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Abstract: Introduction: Stress in secondary high school has a tendency to increase over time from many factors. As a result, it can cause mental health disorders in students, leading to suicidal thoughts. Objective: To explain risk-factor of stress in Asian senior high school students. Methodology: We use related keywords to search for studies in many databases, including PubMed, Thailis, Eric, and web base search. All eligible studies published between 2000 and 2021 were retrieved and reviewed. Results: A total of 6,043 studies were found, and 7 studies were included in qualitative synthesis. Of the 7 included, 6 studies were conducted in Thailand and 1 study was performed in India. Conclusion: There were 6 factors in total which are sex, grade, academic result, parents' income, students' program, and parents' education. The result shows that gender is a vital factor that affects the level of stress in secondary high school despite the other factors.

Keywords: senior high school, stress, stress factors, mental disorders, Asia

1. Introduction

Stress is any influence of internal or surrounding environment on living being which disrupt its homeostasis.¹ Today's life is mixed up with stress in all its aspects. It is well known that a major factor contributing to depressive disorder is stress.² Moreover, there is evidence that stressful life events are causal for the onset of depression.³ If the stress stacks up excessively, it will lead to many possible negative health issues, especially mentally, which root for worse overall work efficiency.^{4,5} It can be said that stress is life-threatening.

Stress in secondary high school students has been a persistent issue. According to World Health Organization, 4.6% of adolescents worldwide experienced an anxiety disorder. There is a still larger percentage of children and adolescents in whom anxiety goes undiagnosed owing to the internalized nature of the symptoms.⁶ The increasingly competitive society and the idea of pursuing their education bring about pressure and expectations to students.^{6,7} There is evidence that adolescence seems to be the age when stress usually occurs. Since adolescence is a critical period full of changes, they need to adjust themselves to changes.⁸ Changes can cause stress which leads to many health issues.⁹

In general, compared with Western countries, Asian countries have a higher average suicide rate as acute life stress (e.g., family conflicts, job, and financial security issues) plays a more important role than Western countries. The overall suicide rate in Asia is approximately 19.3 per 100,000, about 30% higher than the global rate of 16.0 per 100,000.¹⁰ Therefore, the present systematic review aims to explain risk-factor of stress in Asian senior high school students and to be aware of factors affecting stress and the lives of students and parents.

2. Method

Data sources and search strategies

The following databases were used to search for original research articles from January 2000 until December 2021: PubMed, Eric, Researchgate, and Thailis. Strategic search terms included "stress", "high school", "student", "factor", and "secondary" with slight modifications based on the database. References of articles derived for full-text review were scanned to identify potential studies not indexed in the above databases. There was no study design and no language restriction.

Study selection

From these articles, the included studies were selected according to the following criteria: 1) that were performed in factors affected the stress level of Asian senior high school students, 2) that presented the number of students who were exposed and were not exposed to each factor, 3) the full text is available. Studies that not published between January 2000 and December 2021, studies that not study in Asian students, and studies that are not displayed as original research such as comments, expert opinions, conference meeting abstract, editorials, systematic reviews, meta-analyses, and letters were excluded. The authors independently scanned all the titles, abstracts, and full-text articles to determine whether there was any conflict. When disagreements regarding eligibility occurred, we were resolved by consensus discussions.

Data extraction and outcome measures

Data extractions from all possibly appropriate articles were performed independently by the three reviewers (N.W., K.P., and T.M.). Discrepancies were resolved by consensus discussions. The data extracted and described included the following: the author's name, the published year, the country of studies, study design, sample size, characteristics of students (such as gender and grade), types of school, related

factors that affected the level of stress in senior high school students, and the stress measurement. The outcome of interest was the level of stress in senior high school students.

Quality assessment

Studies included in this review were assessed for methodological quality by 3 of the authors. Since the included studies were either a cohort, cross-sectional or case-control design, the Newcastle-Ottawa Scale was used to appraise study quality. This scale uses a star system to assess the quality of a study in 3 domains: selection, comparability, and outcomes/exposure. Instances of disagreement between investigators were solved by consensus.

Statistical analysis

Overall effects were analyzed and stratified according to risk factor for predicting stress on high school student. If data was available, a pairwise meta-analysis with a DerSimonian-Laird random-effects model was used to estimate treatment effects, pooled weighted mean differences (WMD) or risk ratios (RR) along with 95% confidence intervals (CI) for continuous and dichotomous outcomes, respectively. Statistical heterogeneity between studies was assessed using the I^2 values. I^2 values lower around 25%, 25%–75%, and greater than 75% indicate low, moderate, and high heterogeneity, respectively. The software used for data analysis was STATA version 16 (STATA Corp, College Station, TX, USA).

3. Result

Study selection

A total of 6,043 records were identified through database searching (n=6,006) and other sources (n=37). Of the 6,043 records, 5,967 were deemed ineligible based on title and abstract. Of the 76 articles qualified for full-text review, 69 full-text articles were excluded because they did not meet the study eligibility criteria. The flowchart in Figure 1 presents the results describing exclusions at different stages during the review process. Seven studies were included in this systematic review.^{11–17}

Characteristics of the included studies

The general characteristics of included studies are presented in Table 1. Of the 7 included cross-sectional studies, 6 studies were from Thailand,^{11–16} and 1 study was done in India.¹⁷ Five studies were conducted in high school students (grade 10–12),^{11–15} and one each studied in grade 11 and 12.^{16,17} All studies reported that sex is the factor affecting stress level except the study of Sutthirak D. et al.¹⁶ Grade of students is also one of factors affecting stress level which are presented by two studies.^{13,14} Students' program, parents' education and income are shown by 3^{12,14,17}, 2^{12,17}, and 2^{13,15} studies, respectively. Two studies demonstrated that academic result of the high school students affected their stress.^{13,16}

Risk of stress in senior high school students

6 related factors affected the level of stress in senior high school students are sex, grade, academic result, students' program, parents' income, and parents' education. The significant outcome is presented in all factors except in

parents' education. The details of risk factors are shown in Table 2.

Effect of sex on level of stress

According to Table 2., sex can be seen as one crucial factor that affected the level of stress in secondary school student. Therefore, the authors choose two studies that related to this factor to be included in meta-analysis since these studies use the same measurement and present the same eligible outcomes. The main findings from 2 studies presented the data related to sex indicated that women have a significantly higher level of stress than men (mean difference= 0.12, 95% confidence interval = 0.02–0.21). The forest plot illustrating the effect of sex on senior high school students' stress is presented in Figure 2.

Quality assessment

The methodological quality assessments of the 7 case-control studies included in the systematic review were revealed with the Newcastle-Ottawa Scale. For this scale, studies were considered high quality if they received a score of 7 stars or more. In this analysis, 3 studies^{11,14,15} received 7 stars, 2 studies^{12,13} received 8 stars, and the remaining 2^{16,17} received fewer than 7 stars. The score for each study is presented in Figure 3.

4. Discussion

This systematic review provides a summary of related factors affected the level of stress in senior high school students. We found a various risk factors including sex, grade, academic result, students' program, parents' income, and parents' education. The methodological quality of five of seven case-control studies included in the systematic review was high (the score is higher than 7) according to the Newcastle-Ottawa Scale. From the included studies, the effect of some factors which are academic result and parents' education remained inconclusive. However, it is shown that Women have a significantly higher stress level than men, students in grade 12 have a significantly higher stress level than those who are in grade 10 and 11, students who are studying in English-mathematics program have a significantly higher stress level than those who are studying in English-mathematics A., students whose parents have not enough money and have some debts have a significantly higher stress level. As this systematic review is the first one that provides the information regarding related factors affected the level of stress in senior high school students, there are some limitations that should be noted. First, we found limited number of studies to be included so only 2 studies were included in meta-analysis. Second, this systematic review had diversity of stress measurement, therefore the comparison is difficult to be made.

5. Conclusion

In summary, although various factors that affected level of stress in high school students, the most effective factor is likely to be sex. According to Palirat K.¹¹, Ponpichai W.¹², Techabowornkiat P.¹⁴, and Laipas P.¹⁵, it is presented that women have higher level of stress than men. For other factors, as a very small number of studies were included, it

would be difficult to make a reliable conclusion. Additional studies with large sample sizes are needed.

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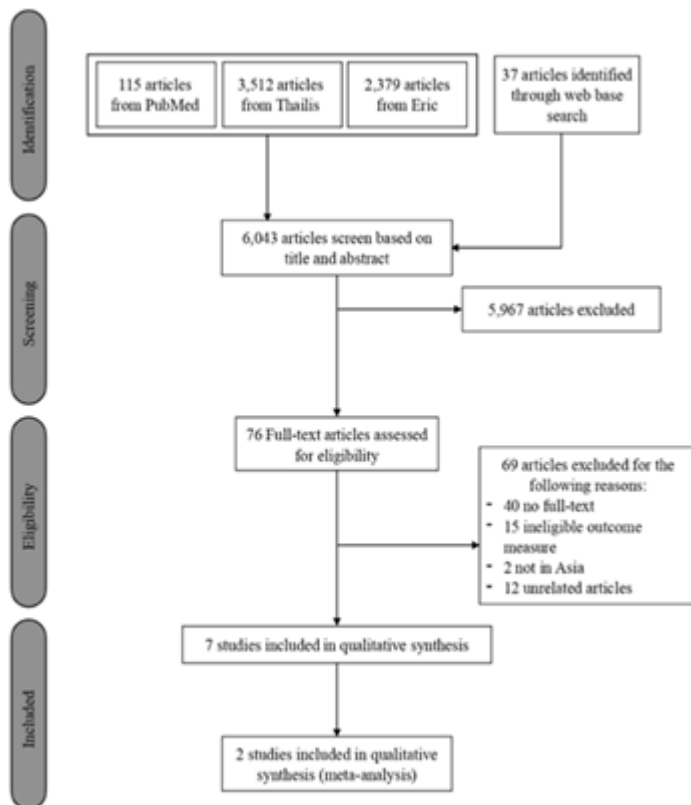


Figure 1: PRISMA flow diagram of included studies

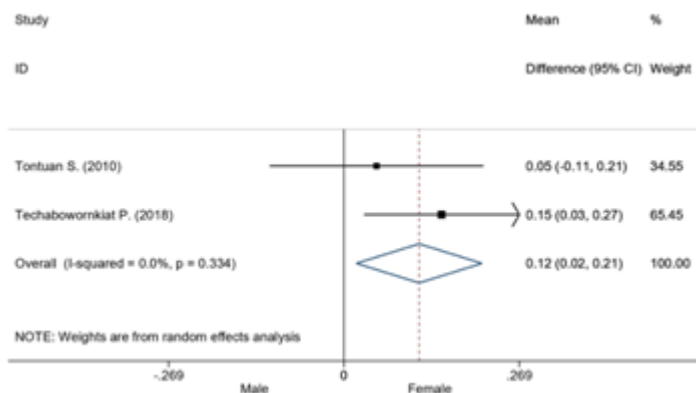


Figure 2: Forest plot illustrating the effect of sex on senior high school students stress

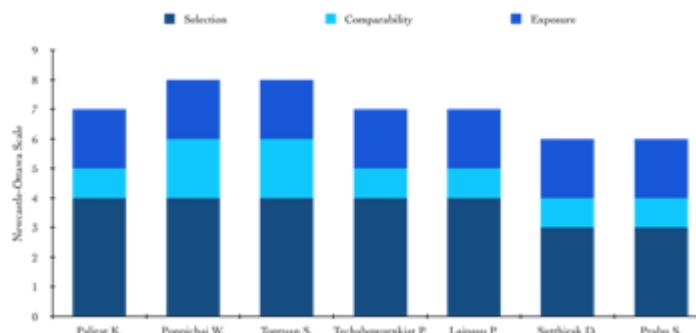


Figure 3: Summary of the quality of the included studies, using the NOS

Table 1: Characteristics of the included studies

Study, country	Design (Newcastle-Ottawa Scale)	Grade	Type of school	N	Men	Women	Factors affected stress level of high school students	Method
Palirat K. (2015) ¹¹ , Thailand	Case-control study (NOS=7)	Grade 10-12	study at government and non-government school	384	136	348	Sex	measured the stress level by Suanprung Stress test-20 (total score=100)
Ponpichai W. (2018) ¹² , Thailand	Case-control study (NOS=8)	Grade 10-12	study at government and non-government school	356	N/A	N/A	Sex	measured the stress level by Suanprung Stress test-20 (total score=100)
							Students' program	
							Parents' education	
Tontuan S. (2010) ¹³ , Thailand	Case-control study (NOS=8)	Grade 10-12	N/A	300	150	150	Sex	measured the stress level by Department of mental health, Thailand 's stress test. (total score=5)
							Grade	
							Academic result	
							Parents' income	
Techabowornkiat P. (2018) ¹⁴ , Thailand	Case-control study (NOS=7)	Grade 10-12	study at non-government school	254	126	128	Sex	measured by their own test rating stress level from 1 to 5
							Grade	
							Students' program	
Laipas P. (2009) ¹⁵ , Thailand	Case-control study (NOS=7)	Grade 10-12	N/A	417	149	268	Sex	measured the stress level by Suanprung Stress test-20 (total score=100)
							Parents' income	
Sutthirak D. (2021) ¹⁶ , Thailand	Case-control study (NOS=6)	Grade 12	N/A	210	31	179	Academic result	measured by their own test rating stress level from 1 to 5
Prabu S. (2015) ¹⁷ , India	Case-control study (NOS=6)	Grade 11	N/A	250	136	114	Sex	measured by the academic stress scale from R.Balaji Rao which consists 40 items and each has 5 alternative choices score from 0 to 4. The total score is 160.
							Students' program	
							Parents' education	

* N/A ; not applicable

Table 2: Factors affecting stress level of students

Factors	Study	Sample subgroup	Stress level			Method	Summary
			Mean	SD	Number of each severe level(%)		
Sex	Palirat K. (2015) ¹¹ , Thailand	Men (N=136)	N/A	N/A	N/A	measured the stress level by Suanprung Stress test-20 (total score=100)	Women have significantly higher stress level than men at 0.05 level
		Women (N=248)	N/A	N/A			
	Ponpichai W. (2018) ¹² , Thailand	Men	46.81	10.03	N/A	measured the stress level by Suanprung Stress test-20 (total score=100)	Significant at 0.05 level
		Women	49.4	13.43			
	Tontuan S. (2010) ¹³ , Thailand	Men (N=150)	2.8	0.75	N/A	measured the stress level by Department of mental health, Thailand 's stress test. (total score=5)	Not significant
		Women (N=150)	2.85	0.7			
	Techabowornkiat P. (2018) ¹⁴ , Thailand	Men (N=126)	2.827	0.48	N/A	measured by their own test rating stress level from 1 to 5	Significant at 0.05 level
		Women (N=128)	2.982	0.493			
	Laipas P. (2009) ¹⁵ , Thailand	Men (N=149)	N/A	N/A	Low (N=18) 12.08%	measured the stress level by Suanprung Stress test-20 (total score=100)	Women have significantly higher stress level than men at 0.05 level
					Moderate (N=51) 34.23%		
High (N=60) 40.27%							
Women (N=268)		N/A	N/A	Low (N=9) 3.36%			
				Moderate (N=93) 34.70%			
				High (N=120) 44.78%			
Severe (N=46) 17.16%							
Prabu S. (2015) ¹⁷ , India	Men (N=136)	96.82	32.12	N/A	measured by the academic stress scale from R.Balaji Rao which consists 40 items and each has 5 alternative choices score from 0 to 4. The total score is 160.	Not significant	
	Women (N=114)	94.24	30.71				
Grade	Tontuan S. (2010) ¹³ , Thailand	Grade 11 (N=100)	2.73	0.68	N/A	measured the stress level by Department of mental health, Thailand 's stress	Not significant
		Grade 12	2.93	0.6	N/A		

		(N=100)				test. (total score=5)		
	Techabowornkiat P. (2018) ¹⁴ , Thailand	Grade 10 (N=99)	2.796	0.48	N/A	measured by their own test rating stress level from 1 to 5	Significant at 0.05 level	
		Grade 11 (N=89)	2.956	0.485	N/A			
		Grade 12 (N=66)	2.995	0.497	N/A			
Academic result	Tontuan S. (2010) ¹³ , Thailand	Received less than 2.5 (N=53)	3.09	0.73	N/A	measured the stress level by Department of mental health, Thailand 's stress test. (total score=5)	Students who received less than 2.5 have significantly higher stress level than those who received 2.51-3.00 and more than 3.00. However, students who received 2.51-3.00 have no significant effect more than those who received more than 3.00	
		Received 2.51-3.00 (N=112)	2.75	0.63	N/A			
		Received more than 3.00 (N=135)	2.79	0.77	N/A			
		*from the maximum score which is 4						
	Sutthirak D. (2021) ¹⁶ , Thailand	Received less than 3.00 (N=6)	3.04	N/A	N/A	measured by their own test rating stress level from 1 to 5	Students who received less than 3.00 have significantly lower stress level than those who received 3.00-3.49 and 3.50-4.00. However, students who received 3.50-4.00 have no significant effect more than those who received 3.00-3.49	
		Received 3.00-3.49 (N=32)	3.65	N/A	N/A			
		Received 3.50-4.00 (N=172)	3.74	N/A	N/A			
		*from the maximum score which is 4						
Parents' income	Tontuan S. (2010) ¹³ , Thailand	Less than 10,000 baht per month (N=67)	2.99	0.83	N/A	measured the stress level by Department of mental health, Thailand 's stress test. (total score=5)	Not significant	
		10,001-30,000 baht per month (N=173)	2.76	0.68	N/A			
		More than 30,000 baht per month (N=60)	2.85	0.68	N/A			
RParents' income	Laipasu P. (2009) ¹⁵ , Thailand	Have enough money and have money left over (N=204)	N/A	N/A	Low (N=17) 8.33%	measured the stress level by Suanprung Stress test-20 (total score=100)	Students whose parents have not enough money have a Significant higher stress than those whose parents have not enough money, have enough money, and have enough money and have money left over at 0.05 level	
					Moderate (N=75) 36.76%			
					High (N=93) 45.59%			
		Have enough money (N=157)	N/A	N/A	Severe (N=19) 9.31%			
					Low (N=8) 5.10%			
					Moderate (N=50) 31.85%			
		Have not enough money (N=30)	N/A	N/A	High (N=71) 45.22%			
					Severe (N=28) 17.83%			
					Low (N=1) 3.33%			
		Have not enough money and have some debts (N=26)	N/A	N/A	Moderate (N=15) 50.00%			
					High (N=8) 26.67%			
					Severe (N=6) 20.00%			
			Low (N=1) 3.85%					
			Moderate (N=4) 15.38%					
			High (N=8) 30.77%					
Students' program	Techabowornkiat P. (2018) ¹⁴ , Thailand	Science-mathematics (N=132)	2.915	0.498	N/A	measured by their own test rating stress level from 1 to 5	Significant at 0.05 level	
		English-mathematics (N=31)	3.086	0.475	N/A			
		Foreign language (N=48)	2.918	0.503	N/A			
		English-mathematics A.	2.73	0.492	N/A			

		(N=43)						
	Prabu S. (2015) ¹⁷ , India	Science (N=127)	98.11	31.96	N/A		measured by the academic stress scale from R.Balaji Rao which consists 40 items and each has 5 alternative choices score from 0 to 4. The total score is 160.	Not significant
		Arts (N=123)	94.43	30.18	N/A			
Parents' education	Ponpichai W. (2018) ¹² , Thailand	Bachelor's degree	48.71	12.45	N/A		measured the stress level by Suanprung Stress test-20 (total score=100)	Not significant
		Above bachelor's degree	47.82	12.54	N/A			
	Prabu S. (2015) ¹⁷ , India	Literate (N=102)	97.76	33.67	N/A		measured by the academic stress scale from R.Balaji Rao which consists 40 items and each has 5 alternative choices score from 0 to 4. The total score is 160.	Not significant
		Illiterate (N=148)	96.24	31.36	N/A			

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