Kasetsart Journal of Social Sciences 39 (2018) 197–206

Contents lists available at ScienceDirect

Kasetsart Journal of Social Sciences

journal homepage: http://www.elsevier.com/locate/kjss

An investigation of learning stressors among secondary school students: A case study in northeast Thailand

Supatida Sripongwiwat [a], Tassanee Bunterm [a, *], Keow Ngang Tang [b]

[a] Department of Curriculum and Instruction, Faculty of Education, Khon Kaen University, Khon Kaen 40002, Thailand
[b] International College, Khon Kaen University, Khon Kaen 40002, Thailand

ARTICLE INFO

Article history:
Received 13 November 2016
Received in revised form 3 March 2017
Accepted 9 June 2017
Available online 30 June 2017

Keywords:
academic stress,
learning stressors,
T3SQ

ABSTRACT

This study explored the influences of learning stressors among secondary school students in a school in northeast Thailand. It identified six different learning stressors—academic-related, interpersonal-related, intrapersonal-related, learning and teaching, teacher-related, and group social-related—and their influences on different groups of students. A series of cross-sectional surveys was administered to 925 students consisting of four student groups (177 male lower secondary, 276 female lower secondary, 105 male higher secondary, and 367 female higher secondary). Descriptive statistics (mean score and percentage) and inferential statistics (MANOVA and ANOVA) were used to examine the differences between the groups. The results indicated that there were significant differences in all six learning stressors between the lower secondary and higher secondary groups of students. Only the academic-related stressor had a significant difference between males and females. The results contribute significantly to the body of knowledge and have implications for designing appropriate instructional plans and strategies while dealing with students learning stressors.

Introduction

Stressful events are very common in educational settings, both for students and teachers. Potential stressful life events affect every student almost daily (Monteiro, Balogun, & Oratile, 2014). The need to complete many examinations and assessments, and to meet deadlines creates massive stress; this stress can have a critical impact on learning and the memory process (Joëls, Pu, Wiegert, Oitzi, & Krugers, 2006; Schwabe, Joëls, Roozendaal, Wolf, & Oitzi, 2012), which are at the heart of our educational system. The effects of stress were found to be complex, with stress having both enhancing and impairing effects on memory, depending on the specific memory process or stage that is affected by stress and the activity profile of the major physiological stress response systems (Vogel & Schwabe, 2016).

The manner in which students confront stressful events depends significantly on whether and how they perceive and react to the situations. Perhaps owing to this variability in experience, there is no single definition of stress (Monteiro et al., 2014). Humans experience stress in varying forms and degrees when they are exposed to potential threats or stressors. Their brain initiates a course of action that releases numerous transmitters, peptides, and hormones throughout their body (Joëls et al, 2006), all of which are directed at coping with the stressful situation and bringing their organism back to balance, for example homeostasis (Joëls et al., 2006; Schwabe et al., 2012).

* Corresponding author.
E-mail address: tassanee@kku.ac.th (T. Bunterm).
Peer review under responsibility of Kasetsart University.

http://dx.doi.org/10.1016/j.kjss.2017.06.002

Several experts (Grant, Compas, Thurm, McMahon, & Gipson, 2004; Tessner, Mittal, & Walker, 2011; Zimmer-Gembeck & Skinner, 2008) identified that common stressors during the adolescent period have been linked to behavior and changes in adolescent psychopathology development. While unhealthy responses develop when the demands of a stressor exceed one's coping capabilities, students vary significantly in their response to a stressful situation (Garcia, 2010). Reactions include depression and anxiety, as well as externalizing behaviors, such as aggression and antisocial acts (Zimmer-Gembeck & Skinner, 2008). It is essential that teachers minimize stressful events in the classroom as much as possible. This research finding is expected to provide a better understanding for teachers in learning about the effects of stressors on their students' academic functioning as indicated by Valente, Swanson, and Eisenberg (2012).

Additionally, basic needs must be met by providing students with a safe environment, structure, consistency, and positive relationships. In addition to creating a safe and caring environment, teachers can assist students to manage the stressful moments that inevitably come up in the school setting as mentioned by past researchers where appropriate teaching models can help to reduce stress tremendously (Bunterm et al., 2014; Rachahoon, Bunterm, Wattanathorn, & Muchimapura, 2011; Rattanawongsa, Bunterm, Wattanathorn, & Muchimapura, 2013; Vangpoomyai, Bunterm, Wattanathorn, & Muchimapura, 2012). Instead of viewing the stressed students as a disruption, stressful moments can be turned into opportunities to establish students self-calming skills.

Several researchers have shown the influence of gender on coping strategies among students, indicating that female students feel larger amounts of stress than male students (Brougham, Zail, Mendoza, & Miller, 2009). This is further supported by Misra and McKean (2000) who found females are more stressed by pressures in relation to academic situations and experience higher academic stress and anxiety than males do. Maloney, Waechter, Risko, and Fugelsang (2012) examined the reason for the difference in mathematics anxiety between males and females. Their results revealed that mathematics anxiety is negatively correlated with spatial processing ability, suggesting that females experience more mathematics anxiety than males because they are worse than males at spatial processing. Shessel (2003) examined the effect of gender as an independent variable and revealed that there is a main effect of gender with females experiencing higher levels of stress than males. In addition, there is a main effect of the task with mathematics producing higher levels of stress than spelling, and an interaction between gender and task, with females reporting a bigger difference in the stress levels of each task and males reporting little difference in the stress levels of each task. Gender affects each element in the stress process as much in the input—by determining whether a situation will be perceived as stressful—as in the output, influencing the coping responses (Matud, 2004). In short, numerous past researchers have determined that females find themselves in stressful circumstances more than males (Almeida & Kessler, 1998; McDonough & Walters, 2001).

On the other hand, past researchers have also indicated the influence of age on coping strategies among students. Birditt, Fingerman, and Almeida (2005) found that older individuals were less emotionally reactive to the interpersonal stressor. This was supported by Uchomo, Berg, Smith, Pearce, and Skinner (2006) who suggested that older individuals are less emotionally reactive to stressors than younger individuals are. These age patterns are consistent with many past studies in which older age is related to reduced stressor reactivity (Birditt, Fingerman, & Almeida, 2005; Neupert, Almeida, & Charles, 2007), reduced duration of negative emotions (Carstensen, Pasupathi, Mayr, & Nesselroade, 2000), and increased well-being (Charles, Carstensen, & McFall, 2001).

The above research review indicates that current stressful events are very common and have different stress impacts based on gender and age across all the subjects in the educational setting. Using this line of reasoning, this study was designed to explore gender and levels of study differences in students learning stressors. The questions researchers seek to address are: (i) Is there a significant difference in learning stressors between males and females? and (ii) Is there a significant difference in learning stressors between lower and higher secondary school students?

Method

Research Design and Samples

The research employed a cross-sectional survey design using a questionnaire as the method to collect quantitative data. The research school was a typical extra-large school located in northeast Thailand, comprising 65 classes for all six grades with an average number of 35–46 students per class, giving a total of 2,942 students (male = 1,160; lower secondary level = 1,568) in 2013. Yamane's (1973, p. 727) formula was utilized to calculate the sample size, the least sample size for the population of 2,942 is 332. Owing to the focus of this study being on the lower and higher secondary subgroups, the least sample size for the 1,568 lower secondary and 1,374 higher secondary populations was 319 and 310, respectively, giving a total sample of 629. In order to avoid excessive disturbance to the routine operation of the school being studied, the researchers randomly selected four classes from each grade, giving a total of not less than 420 samples for each level of study. A total of 925 samples (282 males and 643 females) from Grades 7 to 12 were selected using a lottery method of selection. All the selected samples were then classified into four groups according to their gender and level of study as indicated in Table 1.

Table 1 presents the principal demographic characteristics of the groups. There were representatives of all the different grade groups, although the total number of samples from each grade was rather similar, the differences between male and female students were significant, perhaps because of the nature of Thai society whereby the number of females is always more than males. In fact, the school administrators had purposely distributed an equal number of male and female students to each class during the class streaming process at the beginning of the academic year.

Table 1
Study sample characteristics according to gender and level of education

Level	Grade	Male	Female	Total
Lower secondary	7	70	99	169
	8	49	71	120
	9	58	106	164
	Subtotal	177	276	453
Higher secondary	10	36	85	121
	11	29	131	160
	12	40	151	191
	Subtotal	105	367	472
	Total	282	643	925

Instruments and Pilot Test

The survey questionnaire instrument named the Thailand Secondary School Stressor Questionnaire (T3SQ) was adapted and translated from English to the Thai language to ensure that the samples were clear about the statements. The T3SQ was adapted from the Secondary Student Stressor Questionnaire (3SQ) which was developed by Yusoff (2011, 2016) used the 3SQ to measure medical student stressors based on the five theories—the person-environment fit model, the demand-support-constraint model, the stress-appraisal-coping model, the job-strain model, and the effort-reward model. The factorial analysis findings of Yusoff (2011, 2015) indicated that the stressors of each model can be classified into: academic stressors social stressors and group activity stressors, teaching and learning stressors, drive/desire stressors related to motivation to learn medicine, and academic stressors, interpersonal stressors, and social stressors, respectively.

Since the T3SQ was designed by researchers by adapting the general concepts from Yusoff's (2011) 3SQ, T3SQ was directed to the same theory base. T3SQ was made up of 45 items indicating six types of stressors: academic related stressor (ARS), intrapersonal related stressor (IntraRS), interpersonal related stressors (InterRS), learning and teaching related stressors (LTRS), teacher related stressors (TRS), and group social-related stressors (GSRS). In order to measure the respondents responses toward their intensity of stress, a range of 0–5 was applied: 0 = no stress, 1 = causing lowest stress, 2 = causing mild stress, 3 = causing moderate stress, 4 = causing high stress, and 5 = causing highest stress.

The number of items in the six groups of stressors were: ARS (10), InterRS (13), IntraRS (7), LTRS (6), TRS (3), and GSRS (6). The T3SQ was piloted for validity and reliability. Two approaches were used to validate this translation into the T3SQ, namely linguistic validation, where three language experts investigated the equivalence of concepts in T3SQ from the original 3SQ and cultural validation, where researchers mapped the concepts to the target culture. For example, going from Malaysian to Thai culture, the appropriateness of wording and potential misinterpretation due to different ways of thinking, were tested using 10 students who were not the samples. The coefficient alphas for each of the stressor ARS, IntraRS, InterRS, LTRS, TRS, and GSRS were 0.814, 0.705, 0.850, 0.774, 0.613, and 0.638, respectively. Hence, Cronbachs alpha for all the 45-items of T3SQ was 0.936, indicating a good internal consistency.

Data Collection and Data Analysis

Samples were requested to respond to all the items in the T3SQ instrument. Data were collected during their self-study sessions in the regular classroom. After researchers had given a brief explanation, samples were given 30 min to self-rate their own levels of the six groups of the stressor.

Wilks lambda, a direct measure of the proportion of variance in the combination of dependent variables that is unaccounted for the group variable (Everitt & Dunn, 1991), was used to test whether there were differences between the means of identified groups of subjects on a combination of dependent variables. However, if there are some violated assumptions such as the covariance matrices of the dependent variables were not equal across the group (Boxs M was significant) then that implies a Type I error should be considered, and thus, Pillai's trace, which is the most robust (Olson 1976) was used instead. Furthermore, if Levene's Test of Equality of Error Variances showed differences of error variance across groups, the nonparametric test was used instead for that variable.

Results

The results of this study are presented in accordance with the research questions indicated above. The findings are presented in two parts as descriptive and inferential. The initial findings highlight the mean score and standard error of each group of stressors from the different student groups (males versus females and lower secondary versus higher secondary). This is followed by evaluating the

Table 2
Mean score and standard error of each stressor for the two different groups

Stressor	No. of items	Level of study				Gender				Total	
		Lower secondary		Higher Secondary		Male		Female			
		n = 453		n = 472		n = 282		n = 643		n = 925	
		$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
ARS	10	28.75	0.33	32.97	0.32	29.38	0.44	32.97	0.32	30.90	0.24
InterRS	13	25.95	0.49	25.28	0.48	26.41	0.60	25.25	0.42	25.61	0.34
IntraRS	7	17.95	0.28	19.95	0.27	17.99	0.36	19.40	0.23	18.97	0.20
LTRS	6	12.55	0.26	13.48	0.26	13.26	0.32	12.92	0.22	13.02	0.18
TRS	3	5.93	0.13	7.01	0.13	6.35	0.17	6.54	0.11	6.48	0.09
GSRS	6	12.24	0.22	13.24	0.22	12.75	0.28	12.76	0.18	12.75	0.15
T3QS	45	103.37	1.42	111.92	1.37	106.14	1.80	108.43	1.20	107.73	1.00

differences between these two groups on the overall, as well as on each group of the stressor. Finally, the differences in each item of each stressor of the two groups of the student are measured. Table 2 shows the mean score and standard error of each stressor.

Multivariate analysis of variance (MANOVA) was used to examine the difference between levels of study. Boxs M statistic (20.764) was not significant (p = .482). Using an alpha level of .05, the researchers found that the MANOVA test was significant, Pillais trace = 0.140, $F(6,918) = 24.96$, $p = .000$, partial $\acute{\eta}^2 = 0.140$. This indicates that there were significant differences among students in the lower and higher secondary levels. Approximately 14 percent of the multivariate variance of the dependent variables was associated with the level of study factor. Levenes Test of Equality of Error Variances was examined and showed that the variance of each variable was equal across the groups. Since the MANOVA was significant, the researchers examined the univariate ANOVA results. Follow-up univariate ANOVA indicated five groups of stressors—ARS, IntraRS, LTRS, TRS, and GSRS—were significantly different for students with different grade levels, with $F(1,923) = 84.44$ ($p = .000$, $\acute{\eta}^2 = 0.084$), $F(1,923) = 26.59$ ($p = .000$, $\acute{\eta}^2 = 0.028$), $F(1,923) = 6.589$ ($p = .010$, $\acute{\eta}^2 = 0.007$), $F(1,923) = 33.639$ ($p = .000$, $\acute{\eta}^2 = 0.035$), and $F(1,923) = 10.584$ ($p = .001$, $\acute{\eta}^2 = 0.011$), respectively.

The MANOVA was also used to examine the difference between males and females. Boxs M statistic (35.190) was significant (p = .029) indicating that there were significant differences between males and females in the covariance matrices. This might cause an increased possibility of Type I error, so the level of significance in this study was set at .001. Levene's Test showed the variance of each variable was equal across the groups. Using an alpha level of .001, the researchers found that the MANOVA test was significant, Pillai's trace = 0.051, $F(6,918) = 8.23$, p = .000, partial $\acute{\eta}^2 = 0.051$. This indicated that there were significant differences between males and females. Follow-up univariate ANOVA results indicated that only one factor—ARS—had a significant difference between males and females, with $F(1,923) = 17.979$ ($p = .000$, $\acute{\eta}^2 = 0.019$). For further utilization in helping students, the researchers examined the pattern of responses in each factor using frequency analysis and MANOVA.

Academic-Related Stressors

There were 10 items in this ARS factor: (i) ARS1: final examination; (ii) ARS2: getting behind in the revision schedule; (iii) ARS3: too much content to learn; (iv) ARS4: difficult to understand learning content; (v) ARS5: getting poor marks; (vi) ARS6: tests too frequent; (vii) ARS7: lack of time to do revision; (viii) ARS8: competitive learning environment; (ix) ARS9: unfair assessment grading systems, and (x) ARS10: learning schedule too packed. The researchers studied the pattern of responses from the students according to gender and the level of study. The total percentages of males (n = 282) and females (n = 613) reported as not caused stress, caused high stress, and caused the highest stress in each item in the ARS factor are shown in Table 3, and the percentages of lower (n = 453) and higher (n = 472) secondary levels of student reported as not caused stress, caused high stress, and caused the highest stress in each item in ARS factor are shown in Table 4.

The three highest percentages of high and highest stress for males were ARS4 (41.49%), ARS3 (40.07%), and ARS5 (34.04%), respectively, while the three highest percentages of high and highest stress for females were ARS1 (63.14%), ARS5 (56.14%), and ARS4 (51.48%), respectively. Table 3 shows that more than 30 percent of males and females reported high and highest stress in six and eight items, respectively, in this factor. On the other hand, the three highest percentages of high and highest stress of lower secondary school students were ARS1 (46.14%), ARS3 (41.28%), and ARS5 (39.07%), respectively, while the three highest percentages of high and highest stress of higher secondary school students were ARS1 (70.13%), ARS5 (65.04%), and ARS4 (58.69%), respectively. Table 4 shows that more than 30 percent of lower and higher secondary school students reported high and highest stress in five and eight items in this factor, respectively.

The differences in ARS between groups (lower secondary versus higher secondary and males versus females) were examined using MANOVA. Box's M statistics of both groups were significant (p = .000) indicating that there were significant differences in the covariance matrices, so the level of significance was set at .001. The researchers found that the MANOVA tests of difference for lower

Table 3
ARS factor report by item (males versus females)

Item	Male (%)				Female (%)			
	0	4	5	4 + 5	0	4	5	4 + 5
ARS1	1.77	28.37	19.15	33.69	1.09	42.61	20.53	63.14
ARS2	10.28	13.83	5.32	24.82	10.58	17.11	3.58	20.68
ARS3	2.13	29.43	10.99	40.07	2.33	36.24	12.13	48.37
ARS4	2.13	26.24	10.64	41.49	0.31	37.64	13.84	51.48
ARS5	1.06	28.37	15.25	34.04	0.62	31.88	24.26	56.14
ARS6	3.55	21.63	5.67	28.37	3.89	28.62	9.64	38.26
ARS7	3.90	20.21	6.74	30.14	4.51	26.28	9.18	35.46
ARS8	4.61	24.11	9.93	30.50	3.42	34.21	13.53	47.74
ARS9	17.38	9.93	6.38	19.15	14.46	16.17	8.86	25.04
ARS10	9.22	17.38	9.22	17.38	7.93	24.26	9.33	33.59

0 = not caused stress; 4 = caused high stress; 5 = caused highest stress

Table 4
ARS factor report by item (lower secondary versus higher secondary)

Item	Lower secondary (%)				Higher secondary (%)			
	0	4	5	4 + 5	0	4	5	4 + 5
ARS1	1.77	32.45	13.69	46.14	0.85	43.86	26.27	70.13
ARS2	10.82	13.25	4.42	17.66	10.17	18.86	3.81	22.67
ARS3	2.65	31.79	9.49	41.28	1.91	36.44	13.98	50.42
ARS4	1.10	26.93	7.95	34.88	0.64	41.10	17.58	58.69
ARS5	1.10	24.06	15.01	39.07	0.42	37.29	27.75	65.04
ARS6	5.74	20.53	3.75	24.28	1.91	32.20	12.92	45.13
ARS7	4.86	22.52	5.30	27.81	3.81	26.27	11.44	37.71
ARS8	4.86	28.04	7.51	35.54	2.75	34.11	17.16	51.27
ARS9	18.54	12.80	7.06	19.87	12.29	15.68	9.11	24.79
ARS10	11.48	18.54	7.06	25.61	5.30	25.64	11.44	37.08

0 = not caused stress; 4 = caused high stress; 5 = caused highest stress

secondary versus higher secondary and males versus females were significant, with Pillais trace = 0.137, $F(10,914) = 14.503$, p = .000, partial $\acute{\eta}^2 = 0.137$, and Pillais trace = 0.039, $F(10,914) = 3.723$, p = .000, partial $\acute{\eta}^2 = 0.039$, respectively. The follow-up univariate The ANOVA results of these lower secondary versus higher secondary and males versus females are shown in Table 5. There were nine items showing a difference between lower and higher secondary school students, while there were only four items showing significant differences between males and females at the .001 level.

Interpersonal-Related Stressors

There were 13 items in this InterRS factor: (i) InterRS1: too many assignments given by teachers; (ii) InterRS2: inappropriate assignments given by teachers; (iii) InterRS3: conflict with peers; (iv) InterRS4: verbal or physical abuse by peers; (v) InterRS5: verbal or physical abuse by teachers; (vi) InterRS6: verbal or physical abuse by family; (vii) InterRS7: conflict with family; (viii) InterRS8: conflict with teachers; (ix) InterRS9: unwillingness to go to school; (x) InterRS10: family desire to stop schooling; (xi) InterRS11: interruptions by others during learning; (xii) InterRS12: crowded classroom, and (xiii) InterRS13: do not like friends inappropriate behavior. The total percentages of males (n = 282) and females (n = 613) reported with not caused stress, caused high stress, and caused the highest stress in each item of the InterRS factor are shown in Table 6, and the percentages of lower (n = 453) and higher (n = 472) secondary levels of student reported with not caused stress, caused high stress, and caused the highest stress in each item in InterRS factor are shown in Table 7.

The two highest percentages of high and highest stress for the four groups of students were: InterRS1 (males = 34.75%, females = 53.65%, lower secondary = 42.83%, and higher secondary = 58.05%) and InterRS2 (males = 20.57%, females = 33.90%, lower secondary = 27.37%, and higher secondary = 33.90%).

The differences in InterRS between groups (lower secondary versus higher secondary and males versus females) were examined using MANOVA. Boxs M statistics of both groups (lower secondary versus higher secondary [116.118] and males versus females [116.798]) were significant ($p = .049$; $p = .47$), respectively, indicating that there were significant differences in the covariance matrices, so the level of significance was set at .001. The researchers found that the MANOVA tests of difference for lower secondary versus higher secondary and males versus females were significant, with Pillais trace = 0.082, $F(13,911) = 6.261$, p = .000, partial $\acute{\eta}2 = 0.082$, and Pillai's trace = 0.039, $F(13,911) = 2.862$, p = .000, partial $\acute{\eta}2 = 0.039$, respectively. The follow-up univariate ANOVA results of these lower secondary versus higher secondary and males versus females are shown in Table 8. There were three items showing differences between lower and higher secondary school students. However, there was no item showing a significant difference between males and females.

Table 5
Univariate test of items in ARS (males versus females and lower secondary versus higher secondary)

Dependent variable	Lower secondary versus Higher secondary			Males versus Females		
	$F(1, 923)$	p	Partial $\acute{\eta}^2$	$F(1, 923)$	p	Partial $\acute{\eta}^2$
ARS1	57.474	.000	0.059	17.526	.000	0.019
ARS2	3.828	.051	0.004	.173	.677	0.000
ARS3	20.732	.000	0.022	6.075	.014	0.007
ARS4	70.021	.000	0.071	19.607	.000	0.021
ARS5	64.607	.000	0.065	18.221	.000	0.019
ARS6	81.171	.000	0.081	8.997	.003	0.010
ARS7	14.152	.000	0.015	1.578	.209	0.002
ARS8	39.534	.000	0.041	11.826	.001	0.013
ARS9	10.284	.001	0.011	5.211	.023	0.006
ARS10	23.907	.000	0.025	2.088	.149	0.002

Table 6
InterRS factor report by item (males versus females)

Item	Male (%)				Female (%)			
	0	4	5	4 + 5	0	4	5	4 + 5
InterRS1	1.42	23.05	20.57	34.75	0.93	35.15	18.51	53.65
InterRS2	9.22	17.38	11.70	20.57	7.00	21.93	9.49	31.42
InterRS3	15.60	6.38	3.19	10.99	17.42	6.38	3.27	9.64
InterRS4	20.21	7.80	4.61	12.77	26.59	6.69	3.89	10.58
InterRS5	15.96	6.03	4.96	6.74	20.06	6.53	4.67	11.20
InterRS6	13.12	6.38	0.71	7.45	14.46	6.69	4.51	11.20
InterRS7	29.08	3.55	1.06	4.96	28.46	5.75	2.33	8.09
InterRS8	34.04	3.90	1.42	4.96	39.35	4.04	1.40	5.44
InterRS9	32.62	1.42	1.06	4.61	41.06	2.18	0.93	3.11
InterRS10	50.00	4.26	3.19	10.28	66.72	3.89	3.73	7.62
InterRS11	10.99	8.87	6.03	17.02	13.22	8.09	3.42	11.51
InterRS12	20.21	12.06	8.16	20.57	27.99	8.86	5.75	14.62
InterRS13	8.51	15.60	8.51	15.60	6.22	13.22	8.24	21.46

0 = not caused stress; 4 = caused high stress; 5 = caused highest stress

Table 7
InterRS factor report by item (lower secondary versus higher secondary)

Item	Lower secondary (%)				Higher secondary (%)			
	0	4	5	4 + 5	0	4	5	4 + 5
InterRS1	1.10	29.14	13.69	42.83	1.06	33.69	24.36	58.05
InterRS2	9.49	19.43	7.95	27.37	5.93	21.61	12.29	33.90
InterRS3	14.37	8.17	3.09	11.26	19.07	4.66	3.39	8.05
InterRS4	18.76	8.83	4.42	13.25	30.30	5.30	3.81	9.11
InterRS5	15.89	7.28	4.86	12.14	21.61	5.51	4.66	10.17
InterRS6	12.14	6.40	3.75	10.15	15.89	6.78	2.97	9.75
InterRS7	28.48	5.30	1.99	7.28	28.81	4.87	1.91	6.78
InterRS8	37.53	3.75	1.55	5.30	37.92	4.24	1.27	5.51
InterRS9	37.97	1.77	0.66	2.43	38.98	2.12	1.27	3.39
InterRS10	57.62	3.53	4.42	7.95	65.47	4.45	2.75	7.20
InterRS11	9.05	8.83	6.18	15.01	15.89	7.84	2.33	10.17
InterRS12	24.94	9.40	5.96	15.45	26.27	10.17	6.99	17.16
InterRS13	6.40	16.34	7.73	24.06	7.42	11.65	8.90	20.55

0 = not caused stress; 4 = caused high stress; 5 = caused highest stress

Table 8
Univariate test of items in InterRS (males versus females and lower secondary versus higher secondary)

Dependent variable	Lower secondary versus Higher secondary			Males versus Females		
	$F(1, 923)$	p	Partial $\dot{\eta}^2$	$F(1, 923)$	p	Partial $\dot{\eta}^2$
InterRS1	28.006	.000	0.029	2.848	.092	0.003
InterRS2	13.154	.000	0.014	2.666	.103	0.003
InterRS3	5.078	.024	0.005	2.530	.112	0.003
InterRS4	21.158	.000	0.022	6.054	.014	0.007
InterRS5	3.763	.053	0.004	4.625	.032	0.005
InterRS6	1.568	.211	0.002	0.958	.328	0.001
InterRS7	.002	.965	0.000	0.410	.522	0.000
InterRS8	.004	.952	0.000	0.550	.459	0.001
InterRS9	.005	.942	0.000	2.999	.084	0.003
InterRS10	3.040	.082	0.003	4.737	.030	0.005
InterRS11	7.938	.005	0.009	3.053	.081	0.003
InterRS12	.636	.425	0.001	7.340	.007	0.008
InterRS13	1.342	.247	0.001	0.634	.426	0.001

Intrapersonal-Related Stressors

There were seven items in this IntraRS factor: (i) IntraRS1: high self-expectation; (ii) IntraRS2: high expectation from other people; (iii) IntraRS3: feeling of incompetence; (iv) IntraRS4: talking of personal problems with peers; (v) IntraRS5: studying for the sake of family; (vi) IntraRS6: negative thinking of own-self, and (vii) IntraRS7: afraid of the possibility of not getting a place in further study. Table 9 shows that more than 30 percent of females reported high and highest stress in three of these items in this factor. Table 10 shows that more than 30 percent of lower and higher secondary school students reported high and highest stress in three and four items in this factor.

The differences in IntraRS between groups (lower secondary versus higher secondary and males versus females) were examined using MANOVA. Boxs M statistics of both groups (lower secondary versus higher secondary [57.115] and males versus females [57.604]) were significant ($p = 0.001$), indicating that there were significant differences in the covariance matrices, so the level of significance was set at .001. The researchers found that the MANOVA tests of difference for lower secondary versus higher secondary and males versus females were significant, with Pillai's trace = 0.076, $F(7,917) = 10.781$, p = .000, partial $\dot{\eta}^2 = 0.076$, and Pillai's trace = 0.099, $F(7,917) = 14.328$, p = .000, partial $\dot{\eta}^2 = 0.099$, respectively. The follow-up univariate ANOVA results of these lower secondary versus higher secondary and males versus females are shown in

Table 9
IntraRS factor report by item (males versus females)

Item	Male (%)				Female (%)			
	0	4	5	4 + 5	0	4	5	4 + 5
IntraRS1	5.32	21.28	8.16	29.08	2.49	27.99	11.82	39.81
IntraRS2	10.28	18.09	7.80	23.05	6.07	20.06	9.02	29.08
IntraRS3	13.83	14.54	4.96	16.31	8.55	15.71	7.47	23.17
IntraRS4	16.67	6.74	1.77	23.05	26.13	4.98	2.49	7.47
IntraRS5	17.73	15.25	16.31	21.28	27.68	14.15	17.42	31.57
IntraRS6	18.79	12.41	6.03	42.55	13.84	13.84	10.11	23.95
IntraRS7	7.80	24.47	30.14	24.47	2.49	19.91	55.83	75.74

0 = not caused stress; 4 = caused high stress; 5 = caused highest stress

Table 10
IntraRS factor report by item (lower secondary versus higher secondary)

Item	Lower secondary (%)				Higher secondary (%)			
	0	4	5	4 + 5	0	4	5	4 + 5
IntraRS1	3.31	22.08	9.71	31.79	3.39	29.66	11.65	41.31
IntraRS2	8.39	15.01	6.84	21.84	6.36	23.73	10.38	34.11
IntraRS3	11.92	13.69	3.97	17.66	8.47	16.95	9.32	26.27
IntraRS4	22.30	5.96	1.77	7.73	24.15	5.08	2.75	7.84
IntraRS5	25.61	13.47	18.54	32.01	23.73	15.47	15.68	31.14
IntraRS6	16.78	11.70	7.95	19.65	13.98	15.04	9.75	24.79
IntraRS7	6.18	22.74	36.20	58.94	2.12	19.92	59.32	79.24

0 = not caused stress; 4 = caused high stress; 5 = caused highest stress

Table 11
Univariate test of items in IntraRS (males versus females and lower secondary versus higher secondary)

Dependent variable	Lower secondary versus Higher secondary			Males versus Females		
	$F(1, 923)$	p	partial η^2	$F(1, 923)$	P	partial η^2
IntraRS1	8.724	.003	0.009	15.056	.000	0.016
IntraRS2	17.254	.000	0.018	3.164	.076	0.003
IntraRS3	21.745	.000	0.023	7.451	.006	0.008
IntraRS4	0.103	.748	0.000	7.890	.005	0.008
IntraRS5	0.164	.686	0.000	3.067	.080	0.003
IntraRS6	10.671	.001	0.011	15.364	.000	0.016
IntraRS7	58.574	.000	0.060	59.873	.000	0.061

Table 11. Four items (IntraRS2, IntraRS3, IntraRS6, and IntraRS7) showed differences between lower and higher secondary school students while three items (IntraRS1, IntraRS6, and IntraRS7) showed significant differences between males and females.

Learning and Teaching-Related Stressors

There were six items in this LTRS factor: (i) LTRS1: lack of motivation to learn; (ii) LTRS2: lack of guidance and supervision from teachers; (iii) LTRS3: lack of feedback from teachers; (iv) LTRS4: uncertainty of what expected from me; (v) LTRS5: lack of recognition of work done, and (vi) LTRS6: giving wrong answer in class. The two highest percentages of high and highest stress of all groups were LTRS4 and LTRS5, respectively, as indicated in Table 12 and Table 13.

The differences in LTRS between groups (lower secondary versus higher secondary and males versus females) were examined using MANOVA. Box's M statistics of both

Table 12
LTRS factor report by item (males versus females)

Item	Male (%)				Female (%)			
	0	4	5	4 + 5	0	4	5	4 + 5
LTRS1	16.67	9.93	3.55	11.35	19.60	9.02	4.35	13.37
LTRS2	26.95	4.61	1.42	8.51	31.26	3.73	0.78	4.51
LTRS3	21.28	7.09	3.90	12.41	18.97	9.80	3.58	13.37
LTRS4	11.70	12.77	5.32	22.70	13.84	14.77	7.31	22.08
LTRS5	6.03	15.60	9.93	18.79	5.91	16.33	8.09	24.42
LTRS6	6.74	8.87	3.19	8.87	7.00	10.58	1.56	12.13

0 = not caused stress; 4 = caused high stress; 5 = caused highest stress

Table 13
LTRS factor report by item (lower secondary versus higher secondary)

Item	Lower secondary (%)				Higher secondary (%)			
	0	4	5	4 + 5	0	4	5	4 + 5
LTRS1	18.32	8.17	2.65	10.82	19.07	10.38	5.51	15.89
LTRS2	33.33	3.75	0.88	4.64	26.69	4.24	1.06	5.30
LTRS3	21.63	8.61	2.65	11.26	17.80	9.32	4.66	13.98
LTRS4	14.79	12.14	5.30	17.44	11.65	16.10	8.05	24.15
LTRS5	5.74	15.67	9.05	24.72	6.14	16.53	8.26	24.79
LTRS6	7.28	8.83	1.55	10.38	6.57	11.23	2.54	13.77

0 = not caused stress; 4 = caused high stress; 5 = caused highest stress

Table 14
Univariate test of items in LTRS (lower secondary versus higher secondary)

Dependent variable	Lower secondary versus Higher secondary		
	$F(1, 923)$	p	Partial $\acute{\eta}^2$
LTRS1	3.920	.048	0.004
LTRS2	2.971	.085	0.003
LTRS3	0.946	.331	0.001
LTRS4	11.300	.001	0.012
LTRS5	0.045	.832	0.000
LTRS6	7.876	.005	0.008

groups (lower secondary versus higher secondary [31.957] was not significant ($p = .062$) but males versus females [39.176]) was significant ($p = .010$). The researchers found that the MANOVA test of difference lower secondary versus higher secondary was significant, with Pillai's trace = 0.025, $F(6,918) = 3.986$, p = .001, partial $\acute{\eta}^2 = 0.025$. However, the MANOVA test of the difference between males versus females was not significant ($p = .154$). The follow-up univariate ANOVA results of lower secondary versus higher secondary are shown in Table 14. Three items (LTRS1, LTRS4, and LTRS6) showed differences between lower and higher secondary school students.

Teacher-Related Stressors

There were three items in this TRS factor: (i) TRS1: unable to answer questions from teachers; (ii) TRS2: teachers lack teaching skills, and (iii) TRS3: insufficient reading material. The highest percentage of high and highest stress of the four groups of students was TRS1 with 30 percent of higher secondary students reporting that TRS1 caused them high and highest stress (see Tables 15 and 16).

The differences in TRS between groups (lower secondary versus higher secondary males versus females) were examined using MANOVA (see Table 16). The Boxs M results of both groups (lower secondary versus higher secondary [Box's M = 6.229, $p = .400$] and males versus females [Box's M = 10.200, $p = .118$]) were not significant. The MANOVA tests of difference between lower secondary versus higher secondary and males versus females were significant, with Pillai's trace = 0.044, $F(3,921) = 14.053$, $p = .000$, partial $\acute{\eta}^2 = 0.044$, and Pillai's trace = 0.013, $F(3,921) = 4.012$, p = .008, partial $\acute{\eta}^2 = 0.013$, respectively. The follow-up univariate ANOVA results of these lower secondary versus higher secondary and males versus females are shown in Table 17. All three items showed differences between lower and higher secondary school students while only TRS1 showed a significant difference between males and females (see Table 17).

Group Social-Related Stressors

There were six items in this GSRS factor: (i) GSRS1: having to participate in group discussions; (ii) GSRS2: having to participate in class presentations; (iii) GSRS3:

Table 15
TRS factor report by item (males versus females)

Item	Male (%)				Female (%)			
	0	4	5	4 + 5	0	4	5	4 + 5
TRS1	4.61	16.31	6.74	19.50	2.33	17.42	8.09	25.51
TRS2	29.08	3.19	3.19	6.03	30.33	8.09	1.56	9.64
TRS3	18.09	8.87	2.84	8.87	20.22	7.31	2.33	9.64

0 = not caused stress; 4 = caused high stress; 5 = caused highest stress

Table 16
TRS factor report by item (lower secondary versus higher secondary)

Item	Lower secondary (%)				Higher secondary (%)			
	0	4	5	4 + 5	0	4	5	4 + 5
TRS1	3.31	13.25	3.97	17.22	2.75	20.76	11.23	31.99
TRS2	36.20	4.19	2.43	6.62	23.94	8.90	1.69	10.59
TRS3	22.30	5.74	2.43	8.17	16.95	9.75	2.54	12.29

0 = not caused stress; 4 = caused high stress; 5 = caused highest stress

Table 17
Univariate test of items in TRS (males versus females and lower secondary versus higher secondary)

Dependent variable	Lower secondary versus Higher secondary			Males versus Females		
	$F(1, 923)$	p	Partial η^2	$F(1, 923)$	p	Partial η^2
TRS1	30.836	.000	0.032	8.377	.004	0.009
TRS2	18.411	.000	0.020	0.312	.577	0.000
TRS3	11.666	.001	0.012	0.919	.338	0.001

lack of free time with family and friends; (iv) GSRS4: answering friends' questions; (v) GSRS5: family desire to continue schooling, and (vii) GSRS6: arriving late at school. Tables 18 and 19 shows that all the high and highest stress percentage levels were below 20 percent.

Table 18
GSRS factor report by item (males versus females)

Item	Male (%)				Female (%)			
	0	4	5	4 + 5	0	4	5	4 + 5
GSRS1	6.74	14.18	2.13	17.02	4.98	14.00	3.11	17.11
GSRS2	10.28	12.41	2.84	17.02	6.07	13.53	4.67	18.20
GSRS3	18.44	10.28	4.61	12.06	22.86	9.18	3.73	12.91
GSRS4	7.80	11.70	1.77	15.60	6.22	9.49	2.33	11.82
GSRS5	43.97	6.38	3.90	10.28	51.17	6.22	4.20	10.42
GSRS6	26.24	7.45	3.90	7.45	24.88	8.55	2.64	11.20

0 = not caused stress; 4 = caused high stress; 5 = caused highest stress

Table 19
GSRS factor report by item (lower secondary versus higher secondary)

Item	Lower secondary (%)				Higher secondary (%)			
	0	4	5	4 + 5	0	4	5	4 + 5
GSRS1	6.40	12.14	2.87	15.01	4.66	15.89	2.75	18.64
GSRS2	7.73	12.58	3.53	16.11	6.99	13.77	4.66	18.43
GSRS3	24.50	7.73	2.65	10.38	18.64	11.23	5.30	16.53
GSRS4	8.17	6.62	1.55	8.17	5.30	13.56	2.75	16.31
GSRS5	49.45	5.96	3.09	9.05	48.52	6.57	5.08	11.65
GSRS6	27.81	8.39	3.09	11.48	22.88	8.05	2.97	11.02

0 = not caused stress; 4 = caused high stress; 5 = caused highest stress

The differences in GSRS between groups (lower secondary versus higher secondary and males versus females) were examined using MANOVA. The Box's M results of both groups (lower secondary versus higher secondary [Box's M = 26.418, $p = .198$] and males versus females [Box's M = 32.591, $p = .054$]) were not significant. The MANOVA test of difference for lower secondary versus higher secondary was significant, with Pillai's trace = 0.026, $F(6,918) = 4.116$, $p = .000$, partial $\eta^2 = 0.044$, However, the MANOVA test of difference was not significant between males versus females (p = .63). The follow-up univariate ANOVA results of the lower secondary versus higher secondary showed significant differences between lower and higher secondary school students in GSRS1, GSRS2, and GSRS4 at the .05 level.

Discussion and Conclusion

Stress has far-reaching consequences on the ability to learn and remember by secondary school students, with major implications for educational settings. Considering that learning stressors are universal in education and even in secondary school students, as has been reported in this study, understanding the effects of stress on learning by students is very important because for the secondary school student, an optimized education is critical for the individual, laying the foundation of later career success and socioeconomic status. In addition, the Thai educational system will be highly relevant for society as a whole, and in building and instructing the next generation, if teachers are able to understand the learning stressors and manipulate them appropriately.

The results of the current study provided some support for gender and level of study differences in the rating of stressors. Overall, the results of the study provided mixed support for past research findings (Brougham et al., 2009; Maloney et al., 2012; Misra & McKean, 2000; Shessel, 2003). In accordance with past research findings, our results showed similar outcomes for females in comparison to males, with higher overall levels of stress in females ($\bar{X} = 108.43$) than males ($\bar{X} = 106.14$). However, contrary to past research findings (Birditt et al., 2005; Carstensen et al., 2000; Charles et al., 2001; Neupert et al., 2007; Uchino, Berg, Smith, Pearce, Skinner, 2006) reporting older individuals having a lower stress level compared to younger individuals, the current results showed that higher secondary students had a higher stress level ($\bar{X} = 111.92$) compared to lower secondary students ($\bar{X} = 103.37$).

Although all six learning stressors had significant differences in all the groups of students, except for the learning and teaching related stressor (LTRS), the most items were in the academic-related stressor (ARS). This implies that students were stressed with their final examination, had too much content to learn, found it difficult to understand learning content, had too many assignments

given by teachers, got poor marks, found they were tested too frequently, lacked time to do the revision, and considered the learning schedule was too packed. Furthermore, the higher secondary group was found to be more stressed compared to the lower secondary group which suggested that they may face difficulty in understanding subjects which are definitely harder and have greater content to be learned than for the lower secondary group.

Schwabe and Wolf (2010) showed that learning under stress can have detrimental effects on subsequent memory performance and one possible explanation seems to be that stress acted as a distractor during encoding, diverting attention from the learning material. This is supported by past research (Bunterm et al., 2014; Rachahoon et al., 2011; Rattanawongsa et al., 2013; Vangpoomyai et al., 2012) who found that an appropriate teaching model is able to reduce the stress of students effectively. Since the findings indicate females were more stressed compared to males, teachers are encouraged to utilize appropriate teaching models. Hence, our findings may have important implications for educational and professional settings in Thai secondary classroom instruction. Moreover, the researchers point to necessary extensions of current theories on stress and memory, particularly in the neurocognitive-based teaching method.

Conflict of Interest

There is no conflict of interest.

Acknowledgments

This work was supported by the Higher Education Research Promotion and National Research University Project of Thailand (54601), Office of the Higher Education Commission, through the Cluster of Research to Enhance the Quality of Basic Education.

References

Almeida, D. M., & Kessler, R. C. (1998). Everyday stressors and gender differences in daily distress. *Journal of Personality and Social Psychology, 75*, 670–680.

Birditt, K. S., Fingerman, K. L., & Almeida, D. M. (2005). Age differences in exposure and reactions to interpersonal tensions: A daily diary study. *Psychology and Aging, 20*, 330–340.

Brougham, R. R., Zail, C. M., Mendoza, C. M., & Miller, J. R. (2009). Stress, sex differences, and coping strategies among college students. *Current Psychology, 28*(2), 85–97.

Bunterm, T., Lee, K., Ng, L. K. J., Srikoon, S., Vangpoomyai, P., Rattanavongsa, J., et al. (2014). Do different levels of inquiry lead to different learning outcomes? A comparison between guided and structured inquiry. *International Journal of Science Education, 36*(12), 1937–1959. http://dx.doi.org/10.1080/09500693.2014.886347.

Carstensen, L. L., Pasupathi, M., Mayr, U., & Nesselroade, J. R. (2000). Emotional experience in everyday life across the adult life span. *Journal of Personality and Social Psychology, 79*, 644–655.

Charles, S. T., Carstensen, L. L., & McFall, R. M. (2001). Problem-solving in the nursing home environment: Age and experience differences in emotional reactions and responses. *Journal of Clinical Geropsychology, 7*, 319–330.

Everitt, B. S., & Dunn, G. (1991). *Applied multivariate data analysis*. London, UK: Edward Arnold.

Garcia, C. (2010). Conceptualization and measurement of coping during adolescence: A review of literature. *Journal of Nursing Scholarship, 42*, 166–185.

Grant, K. E., Compas, B. E., Thurm, A. E., McMahon, S. D., & Gipson, P. Y. (2004). Stressors and child and adolescent psychopathology: Measurement issues and prospective effects. *Journal of Clinical Child and Adolescent Psychology, 33*, 412–425.

Joëls, M., Pu, Z. W., Wiegert, O., Oitzi, M. S., & Krugers, H. J. (2006). Learning under stress: How does it work? *Trends in Cognitive Sciences, 10*(4), 152–158.

Maloney, E. A., Waechter, S., Risko, E. F., & Fugelsang, J. A. (2012). Reducing the sex difference in math anxiety: The role of spatial processing ability. *Learning and Individual Differences, 22*(3), 380–384.

Matud, M. P. (2004). Gender differences in stress and coping styles. *Personality and Individual Differences, 37*, 1401–1405.

McDonough, P., & Walters, W. (2001). Gender and health: Reassessing patterns and explanations. *Social Science & Medicine, 52*, 547–559.

Misra, R., & McKean, M. (2000). College students' academic stress and its relation to their anxiety, time management, and leisure satisfaction. *American Journal of Health Studies, 16*(1), 41–51.

Monteiro, N. M., Balogun, S. K., & Oratile, K. N. (2014). Managing stress: The influence of gender, age and emotion regulation on coping among university students in Botswana. *International Journal of Adolescence and Youth, 19*(2), 153–173. http://dx.doi.org/10.1080/2673843.2014.908784.

Neupert, S. D., Almeida, D. M., & Charles, S. T. (2007). Age differences in reactivity to daily stressors: The role of personal control. *Journal of Gerontology: Psychological Sciences, 62B*(4), 216–225.

Olson, C. L. (1976). On choosing a test statistic in multivariate analysis. *Psychological Bulletin, 83*, 579–586.

Rachahoon, K., Bunterm, T., Wattanathorn, J., & Muchimapura, S. (2011). The effect of the open inquiry learning activity on the stress level, learning outcomes, and multiple intelligences. *North-Eastern Thai Journal of Neuroscience, 6*(4), 34–48. [in Thai]

Rattanawongsa, J., Bunterm, T., Wattanathorn, J., & Muchimapura, S. (2013). Effects of open inquiry learning approach on stress levels, working memory, critical thinking and high school physics learning outcomes. *European Journal of Social Sciences, 36*(4), 553–564.

Schwabe, L., Joëls, M., Roozendaal, B., Wolf, O. T., & Oitzi, M. S. (2012). Stress effects on memory: An update and integration. *Neuroscience & Biobehavioral Reviews, 36*(7), 1740–1749.

Schwabe, L., & Wolf, O. T. (2010). *Learning under stress impairs memory formation*.

Shessel, M. (2003). Stress: Verbal and non-verbal performance tasks. *The Huron University College Journal of Learning and Motivation, 41*(1), 247–261.

Tessner, K. D., Mittal, V., & Walker, E. F. (2011). Longitudinal study of stressful life events and daily stressors among adolescents at high risk of psychotic disorders. *Schizophrenia Bulletin, 37*, 432–441.

Uchino, B. N., Berg, C. A., Smith, T. W., Pearce, G., & Skinner, M. (2006). Age-related differences in ambulatory blood pressure during daily stress. Evidence for greater blood pressure reactivity with age. *Psychology and Aging, 21*, 231–239.

Valiente, C., Swanson, J., & Eisenberg, N. (2012). Linking students' emotions and academic achievement: When and why emotions matter. *Child Development Perspectives, 6*(2), 129–135. http://dx.doi.org/10.1111/j.1750-8606.2011.00192x.

Vangpoomyai, P., Bunterm, T., Wattanathorn, J., & Muchimapura, S. (2012). Effects of open inquiry learning approach on stress level, working memory, problem solving ability, and physics learning outcomes of Mathayomsuksa IV students. *North-Eastern Thai Journal of Neuroscience, 7*(2), 32–47. [in Thai]

Vogel, S., & Schwabe, L. (2016). Learning and memory under stress: Implications for the classroom. *Nature Partner Journals Science of Learning, 1*, 16011. http://dx.doi.org/10.1038/npjscilearn.2016.11.

Yamane, T. (1973). *Statistics: An introductory analysis* (2nd ed.). New York, NY: Harper and Row.

Yusoff, M. S. B. (2011). The validity and reliability of secondary school stressor questionnaire (3SQ) in identifying stressor among adolescents in secondary school. *International Medical Journal, 18*(2), 99–105.

Yusoff, M. S. B. (2015). Psychometric properties of the secondary school stressor questionnaire among adolescents at five secondary schools. *Journal of Taibah University Medical Sciences, 10*(2), 159–168.

Yusoff, M. S. B. (2016). The medical student stressor questionnaire: A valid screening tool to discover sources of stress of medical students. *Paper presented at the innovative practices in higher education expo 2016 (I-PHEX 2016), Kuala Lumpur, Malaysia, 10 August 2016*.

Zimmer-Gembeck, M. J., & Skinner, E. A. (2008). Adolescents coping with stress: Development and diversity. *Prevention Researcher, 15*, 3–7.