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Stress and components of burnout among Thai postgraduate students: Factor structure, construct validity and structural model

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Abstract

This study aimed to investigated the factors relating to stress and burnout in Thai postgraduate student context by utilizing exploratory, confirmatory factor analysis and structural equation modeling technique. The sample was derived from postgraduate students in Thailand and simple random sampling was applied. There were 2 studies in this research. The first study analyzed a factor structure by using exploratory factor analysis. Self-developed 14 items rating scale questionnaires relating to stress, exhaustion and cynicism were distributed and clean 256 samples were analyzed. All 14 items were classified into 3 factors-5 items for stress, 6 items for exhaustion and 3 items for cynicism. Then newly classified 14 items with 3 factors rating scale questionnaires were distributed for the second study and clean 255 samples were analyzed. The confirmatory factor analysis results showed that 3 factors were reliable and valid. Moreover, indirect effect of stress to exhaustion through cynicism was significant as was direct effect of stress on exhaustion. This inferred that cynicism played a partial mediation role in the relationship between stress and exhaustion. Besides, the total effect of the model was significant. As per the results, even in this context, stress and cynicism could lead to exhaustion. Therefore, any educational-related workers should focus on these factors and find countermeasures to mitigate risks. Future studies should extend the results of this study by further analyzing the multi-group confirmatory factor analysis and multi-group structural equation model to test an invariance among different groups to generalize the result into a broader context.

Introduction

The desire to pursue further education especially postgraduate degree is considerable because this may result in important life changes in several aspects. By finishing a postgraduate degree, individuals will be rewarded with intellectual growth. Nevertheless, typical postgraduate studies demand high investments. Despite challenges aforementioned, previous literature exposes that a number of postgraduate students do not actually understand what postgraduate studies involve, especially for the doctorate training (Golde, 2005). Due to this

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phenomenon, many postgraduate students may be inadequately prepared for the challenges that await. Besides, postgraduate students normally face hardship, depression and stress. This phenomenon resulted in several questions. How many indicators contribute to postgraduate students' stress and burnout? Another question was: What is the causal relationship of those factors among postgraduate student in case they feel stressed and, for other reasons also, end up confronting study-related cynicism and exhaustion? The objective of this study was to acquire a better understanding of indicators and factors relating to stress and burnout among Thai postgraduate students. Moreover, there were two main aims of this study. Firstly, this study aimed to create new rating scales that were tailored-made for Thai post-graduate students within Thai society and culture contexts. Secondly, this study also aimed to explore causal relationship among those constructs derived from newly created rating scales. While many previous studies focused on the factors affecting intention to leave academia, only a few studies have focused on the entire 4 steps starting from exploratory factor analysis to structural regressions out of those indicators and factors. Besides, there are only a few studies that utilize scales that are especially made for Thai post-graduate students in Thai culture and society contexts.

Literature Review

Job Demand and Job Resource Theory

The job demands and job resources theory is a classic yet practical theory that has been reviewed for the framework of any work-related problems in several contexts (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). The theory consists of two components; job demand and job resource. Job demand refers to the demand and requirement from an organization. Members of that organization need to dedicate their time and effort into their works whereas job resource refers to the supporting context related to work. Even in cases where job demand is a negative factor, well-planned job resource could possibly mitigate this risk (Lesener, Gusy, & Wolter, 2019). In a graduate studies context, academic challenges are considered in the same way as job demand while faculty support could prove useful as job resource. Therefore, job demand and job resource theory can possibly be a main lens to view components of burnout.

Burnout and Stress

In general, burnout is a direct outcome of stress from work and this variable is quite well known from several studies that focused on a direct effect of stress from work-related activities (Maslach & Jackson, 1981). The term is also used to refer to the psychological and physical exhaustion at work within an organization. Burnout is defined as the extinction of motivation, especially where the devotion to a cause fails to deliver the desired outcomes (Freudenberger, 1974). Academic world alike, burnout is a state of exhaustion faced by students, that stems from overwhelmingly excessive demand and stress from studies, especially when the students feel so exhausted that they cannot meet academic goals and expectations (Divaris, Polychronopoulou, Taoufik, Katsaros, & Eliades, 2012; Soliemanifar & Shaabani, 2012). Apart from stress and high demand, there are several factors that also contribute to burnout such as work-family conflict and isolation (Maneechaeye, 2020).

The term stress originated in 1926 after a researcher noted that a research animal experienced glandular abdominal changes due to hormone injection (Fink, 2010). This particular reaction of the body toward a demand that is made on it is considered as stress. Stress is a biological response, which has a major influence on the psychological and physical state of an individual (Lazarus & Opton Jr, 1966). Indeed, stress is an everyday reality for most people. Academic world alike, postgraduate students normally face stress stemming from various academic factors. These factors act like a hormone that is injected into a research animal causing glandular abdominal changes leading to stress. Therefore, in this study, stress will be considered as an antecedent of burnout consisting of cynicism and exhaustion.

Methodology

This study was a social sciences survey research with a quantitative methodology and cross-sectional design. The population was Thai postgraduate students. Inclusion criteria and scope for the respondents was that the target sample should be current postgraduate students regardless of discipline or school type. A simple random sampling method was applied by procuring lists of post-graduate students from various institutes in Thailand and then putting those lists into a software spreadsheet to do a random pickup. Those who were picked were contacted and asked for co-operation in responding to a questionnaire. The minimum acceptable sample size for the study was

more than 200, or 10 cases per indicator, whichever was larger (Kline, 2015; Wolf, Harrington, Clark, & Miller, 2013). The analysis was separated into two studies.

The first study analyzed a factor structure by using exploratory factor analysis. Self-administered 275 survey questionnaires were distributed. Questionnaires were divided into 2 parts, demographic information and rating scales. For the rating scales, there were 14 items using 5-point Likert scale relating to stress, exhaustion and cynicism. These bilingual items were self-developed from an extensive review of related literature. All items in self-developed scales were verified by 3 specialists and IOC was calculated. All 14 items had IOC value over 0.66. 256 samples were clean by detecting outlier, eliminating duplication and imputation for missing values and these qualified for the analysis.

The second study analyzed construct validity and structural model by using confirmatory factor analysis and structural equation modeling. For the second study, self-administered 275 survey questionnaires that derived from factor structure classification results from the first study were used, and this study also used 5-point Likert scale in the questionnaire. After cleaning the dataset, 255 samples were clean and suitable for the statistical analysis. For the data analysis, clean and qualified data were put into a statistical analysis process. The entire analysis process was entirely completed by R (R Core Team, 2020).

Results and Discussion

First Study: Exploratory Factor Analysis (EFA)

The analysis results were separated into 2 sections consisting of descriptive and inferential statistics. For an Exploratory Factor Analysis (EFA), clean samples from 256 correspondences were put into the analysis. For the descriptive statistics of discrete data, almost half of the sample were female (58.1%), and currently training in Arts or Social Sciences (52.1%).

For the descriptive statistics of continuous data, mean age of samples was 33.02 years with standard deviation of 6.81, average work experience was 7.11 years with standard deviation of 6.47 and average current academic year was 2.94 years with standard deviation of 1.52. In accordance with table 1, descriptive statistics for questionnaire items are described.

The very first step of Exploratory Factor Analysis (EFA) was a statistical preliminary assumption check to see whether the data were really suitable for EFA. In this case, Kaiser-Meyer-Olkin Factor Adequacy indicating Minimum Sampling Adequacy (MSA), Bartlett's Test of Sphericity and Cronbach's Alpha were analyzed. Overall KMO from all items was 0.93 and KMO for each item ranged from 0.88 to 0.95. Cut-off value for KMO was 0.5 or above. Bartlett's Test of Sphericity Chi-squared was 2,100.2 with 91 degree of freedom and these were significant at $p < .00$. Cronbach's Alpha for all 14 items was 0.92 and cut-off value for Cronbach's Alpha was 0.7 or above (Dziuban & Shirkey, 1974).

Table 1 Item description, descriptive statistics for items, Skewness and Kurtosis

$N = 256$

Items	*M*	*SD*	Skew	Kur
1. I have a sleeping problem including insomnia, light sleeping or too much sleep.	3.00	1.06	-0.66	-0.87
2. I have less concentration.	2.93	0.97	-0.46	-0.86
3. I feel irritated, restless and agitated.	3.06	0.98	-0.63	-0.78
4. I feel so bored that I do not want to do anything.	3.22	0.92	-0.89	-0.26
5. I do not want to meet people.	2.57	1.12	-0.07	-1.37
6. I am worried that I would not be able to complete my studies.	3.11	1.49	-0.15	-1.38
7. I have stress from workload and work submission time limits.	3.78	1.33	-0.81	-0.58
8. I often have to force myself to write a thesis.	3.89	1.31	-0.85	-0.56
9. My educational workloads are too much.	3.43	1.19	-0.38	-0.71
10. Graduate studies are too stressful for me.	3.24	1.31	-0.21	-1.05
11. In my spare time, I am always worried about thesis.	3.75	1.26	-0.72	-0.61
12. I have a hard time finding meaning or importance in my studies.	3.07	1.36	-0.07	-1.20
13. I have not been stimulated or motivated by my studies.	2.97	1.40	0.09	-1.28
14. I lost interest in my thesis.	2.94	1.43	0.14	-1.30

The suitable number of components would be extracted from all 14 items. In this study, Velicer's Minimum Average Partial (MAP) and Lowest Bayesian Information Criterion (BIC) were used to extract components from those. According to table 2, Number of components suggested by Velicer's MAP indicated 3 components as the lowest MAP was 0.28. Chi-squared was 92.3 with 52 degree of freedom and these were significant at $p < .00$. Moreover, RMSEA and SRMR were 0.057 and 0.026 respectively, both were less than 0.08. These indicated that 3 components were suitable from this analysis. Furthermore, lowest BIC method suggested 3 components as the lowest BIC was -196 at 3 components (Zwick & Velicer, 1982).

In accordance with figure 1 shown below, scree plot derived from Parallel Analysis (PA) portrayed that the suitable number of components was 3 seeing that there were 3 eigen values from factor analysis (FA) actual data (triangle with solid line) that were higher than eigen values from simulated and resampled data (lower dotted line). To elaborate, this study focused on factor analysis (FA), not Principal Component (PC) as the next analysis step would be an oblique rotation. Oblique rotation allowed certain relationship among indicators and this was suitable for confirmatory factor analysis and structural regressions later on (Watkins, 2006).

Since 3 component extraction techniques were consistent, it could be concluded that the suitable number of components for this study were 3 components.

Table 2 Velicer's Minimum Average Partial (MAP) and Lowest BIC Method

Number of Component	MAP	*df*	χ^2	*p*	RMSEA	SRMR	BIC
1	0.032	77	415.0	0.000***	0.133	0.078	-12
2	0.028	64	207.6	0.000***	0.096	0.048	-147
3	0.028	52	92.3	0.000***	0.057	0.026	-196
4	0.037	41	57.7	0.000***	0.042	0.018	-170
5	0.050	31	38.0	0.000***	0.033	0.014	-134
6	0.066	22	20.6	0.000***	0.000	0.010	-101
7	0.088	14	9.5	0.000***	0.000	0.006	-68
8	0.120	7	3.7	0.000***	0.000	0.004	-35

Note: ***$p < .000$.

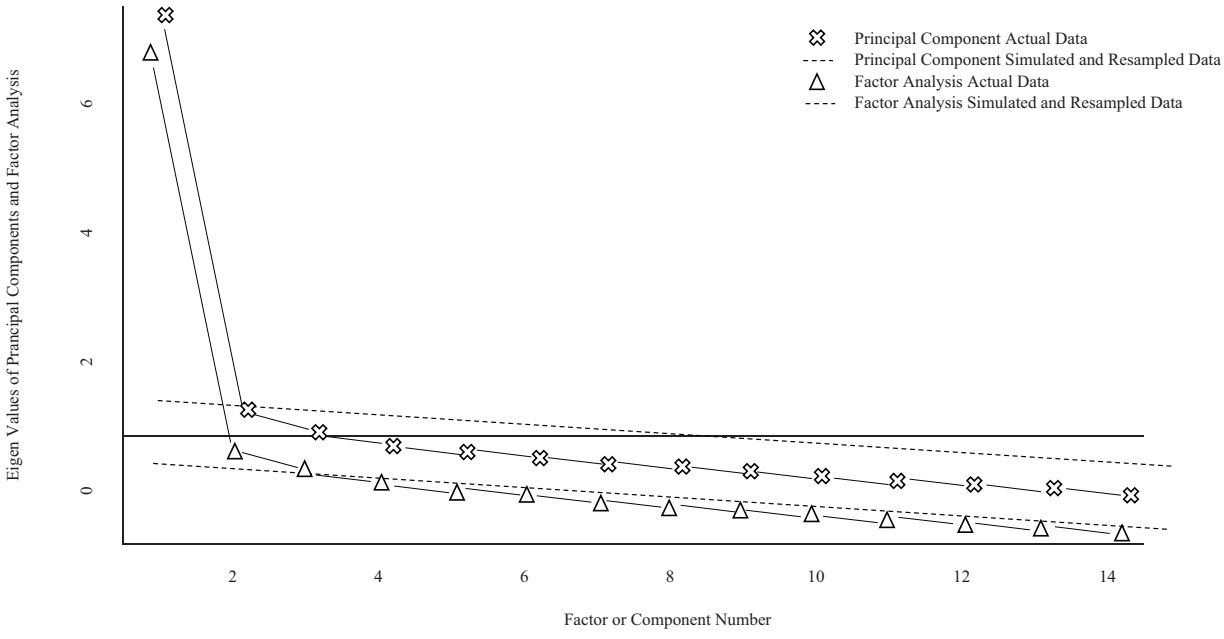

Figure 1 Parallel Analysis: Scree Plot

In order to extend the analysis to confirmatory factor analysis (CFA) and structural equation modeling (SEM), factor axes would be rotated in an oblique manner with maximum likelihood estimation and direct oblimin method as oblique rotation with maximum likelihood estimation and direct oblimin method allowed certain relationship among items which would be close to empirical data (Jennrich, 1973). As per table 3, the result of the analysis is shown. The first factor was named as "Postgraduate Student Stress". The second factor was named as "Postgraduate Student Exhaustion". The third factor was named as "Postgraduate Student Cynicism". All factor loadings were more than 0.32 and there were no cross loadings in any items. Common variance or Communality (h^2) was the amount of variance that was shared among a set of items ranging from 0 to 1 and items that were highly correlated would share a high amount of variance. Unique variance (u^2) was any portion of variance that was not common. In this study, Communalities ranged from 0.47 to 0.79. The highest Communality was 0.79. This indicated that this item was described by 3 factors in 79 percent of variance and there was 21 percent of variance that could not be explained. The results are shown in Table 3.

Second Study: Confirmatory Factor Analysis and Structural Model

After the first study result derived from Exploratory Factor Analysis, postgraduate student stress and burnout questionnaires consisting of 3 factors (Stress, Exhaustion and Cynicism) with 14 indicators including 5 items for stress, 6 items for exhaustion and 3 items for cynicism, were distributed to targeted samples with the same inclusion criteria as the first study. Clean data from 255 samples were put into an analysis including confirmatory factor analysis and structure equation modelling.

In order to measure model fitness to empirical data, several model fit statistics would be introduced. Presumption of model fit indices and criterion are described as follows. Chi-squared test should not be statistically significant. Relative Chi-square should be less than 5. Goodness-of-Fit Index (GFI), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI) should be more than 0.90. Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR) should be less than 0.08 (Bagozzi & Yi, 1988; Browne & Cudeck, 1993; Hair, Black, Babin, & Anderson, 2013).

Confirmatory factor analysis of the measurement model was analysed. This included a measurement validation of the model on each latent. According to measurement model fit indices, the model was considered moderate fit with empirical data as most model fit indices met the criteria except for Chi-squared test as this index was normally sensitive to big sample size. Therefore, no model modification was required.

As per table 4, confirmatory factor analysis estimated and standardized coefficients, Cronbach's Alpha for reliability, Composite Reliability, convergent validity and discriminant validity were portrayed. All estimated and standardized coefficients were statistically significant.

Table 3 Factors Classification with Factor Loadings, Communalities and Unique

Factors Name	Item No.	Indicators Name	F1	F2	F3	h^2	u^2
Postgraduate Student Stress	3	Stress 1: Restlessness (STR1)	0.95			0.79	0.21
	2	Stress 2: Less Concentration (STR2)	0.71			0.62	0.38
	4	Stress 3: Feeling Bored (STR3)	0.61			0.63	0.37
	1	Stress 4: Sleeping Problem (STR4)	0.58			0.52	0.48
	5	Stress 5: Social Isolation (STR5)	0.56			0.47	0.53
Postgraduate Student Exhaustion	8	Exhaustion 1: Academic Toleration (EXH1)		0.79		0.52	0.48
	11	Exhaustion 2: Academic Worries (EXH2)		0.76		0.64	0.36
	7	Exhaustion 3: Academic Deadlines (EXH3)		0.64		0.58	0.42
	10	Exhaustion 4: Academic Pressure (EXH4)		0.56		0.58	0.42
	9	Exhaustion 5: Academic Workloads (EXH5)		0.52		0.54	0.46
	6	Exhaustion 6: Academic Goal Concern (EXH6)		0.42		0.49	0.51
Postgraduate Student Cynicism	13	Cynicism 1: Lack of Academic Motivation (CYN1)			0.91	0.78	0.22
	14	Cynicism 2: Lack of Academic Interest (CYN2)			0.74	0.63	0.37
	12	Cynicism 3: Lack of Academic Purpose (CYN3)			0.68	0.68	0.32

Note: Tucker Lewis Index of Factoring Reliability (TLI) = 0.966, Root Mean Square of Residual (RMSR) = 0.03, Root Mean Square of Error Approximation (RMSEA) = 0.056 with 90 % CI [0.035–0.072], Bayesian Information Criterion (BIC) = -197.41.

Table 4 3-Factor Confirmatory Factor Analysis Model Fit Indices

3-Factor CFA	χ^2	*df*	*p*	χ^2/df	CFI	TLI	GFI	RMSEA	SRMR
	194.944	74	.000***	2.634	0.940	0.926	0.900	0.080	0.050

Note: ***$p < .000$.

The reliability coefficient of Cronbach's Alpha was calculated to estimate the reliability of internal consistency among questionnaire scales. Composite Reliability (CR) was calculated to check measurement factors' reliability. Standard presumption of minimum threshold for Cronbach's Alpha and Composite Reliability was 0.70 or above. Convergent validity referred to the extent to which observed variables of a construct had converged or shared a certain level of proportion of variance in common. Convergent validity could be analysed through factor loadings and Average Variance Extracted (AVE). Standard presumption of minimum threshold for factor loadings and Average Variance Extracted was 0.50 or above. Discriminant validity referred to the extent to which observed variables of a construct is discriminating from others. The presumptions were that the AVE should be more than Maximum Shared Variance (MSV) and Average Shared Variance (ASV) (Fornell & Larcker, 1981). The results are shown in Table 5 and Figure 2.

It could be seen from Table 5 and Figure 2 that scales in the model had been reliable and valid convergently and discriminately, and portrayed measurement model visualization.

Table 5 Measurement Model, Reliability, Convergent and Discriminant Validity

Construct	Estimated	Standard	α	CR	AVE	MSV	ASV
Post-Graduate Student Stress							
STR1	1.000	0.637					
STR2	0.995	0.727					
STR3	1.190	0.883	0.855	0.857	0.548	0.533	0.406
STR4	1.239	0.837					
STR5	1.061	0.644					
Post-Graduate Student Exhaustion							
EXH1	1.000	0.783					
EXH2	1.083	0.834					
EXH3	0.942	0.722	0.875	0.874	0.538	0.532	0.525
EXH4	0.985	0.646					
EXH5	1.038	0.753					
EXH6	0.903	0.681					
Post-Graduate Student Cynicism							
CYN1	1.000	0.783					
CYN2	0.362	0.881	0.858	0.863	0.679	0.518	0.399
CYN3	0.730	0.805					

Note: STR = Stress, EXH = Exhaustion, CYN = Cynicism.

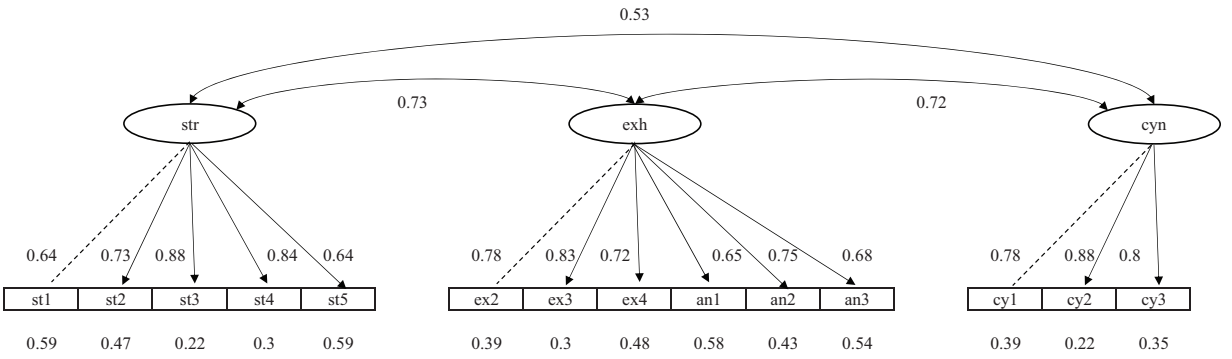

Figure 2 Measurement Model of Stress, Cynicism and Exhaustion (Standardized)

Structural Equation Modeling

According to an extensive review of related literature, antecedent and determinant of exhaustion were stress and cynicism (Aquino, Lee, Spawn, & Bishop-Royse, 2018; Devine & Hunter, 2016; Hunter & Devine, 2016; Swords & Ellis, 2017). In accordance with the previous studies, two hypotheses were developed for the second study. First, stress had a direct effect on exhaustion. Second, cynicism played a mediation role in the relationship between stress and exhaustion.

After the process of confirmatory factor analysis, structural equation model was fitted. The amount of variability of exhaustion was determined by cynicism and stress by 69.0 percent and the amount of variability of cynicism was determined by stress by 28.3 percent. The results of the analysis and model fit indices indicated that the structural model fit the empirical data, according to Table 6 and Figure 3 and model fit indices shown below.

Model Paths Analysis

The analysis of path coefficient showed results of direct effect, indirect effect and total effect of the structural model, according to table 5. All coefficients both estimated and standard, were statistically significant. Indirect effect of stress to exhaustion through cynicism was significant and direct effect of stress on exhaustion was significant. These could be seen from the 95 percent confident interval for each path, that the interval did not include 0, indicating a statistical significance by range estimation. This also inferred that cynicism played a partial mediation role in the relationship between stress and exhaustion (Hayes, 2017). Furthermore, the total effect of the model was also significant. Thereby, both hypotheses in second study were totally supported.

Items Assessing Postgraduate Student Stress, Cynicism and Exhaustion

According to factor structure analysis with a test of construct validity, the results of that analysis came out as items assessing Postgraduate Student Stress, Cynicism and Exhaustion. There were 5 items for Postgraduate Student Stress, 6 items for Postgraduate Student Exhaustion and 3 items for Postgraduate Student Cynicism. This can be seen from Table 8.

Table 6 Structural Equation Model Fit Indices

Structural Model	χ^2	*df*	*p*	χ^2/df	CFI	TLI	GFI	RMSEA	SRMR
	194.944	74	.000***	2.634	0.940	0.926	0.900	0.080	0.050

Note: ***$p < .000$.

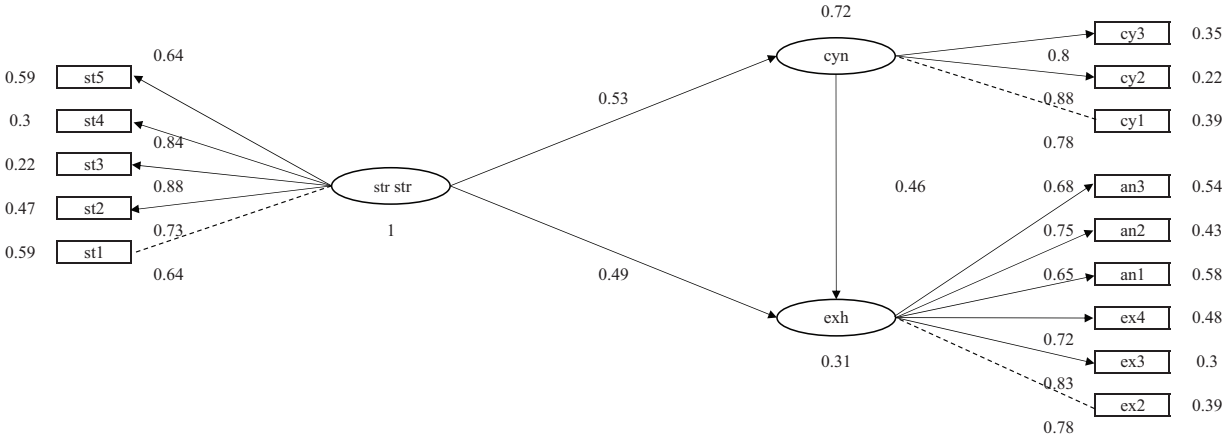

Figure 3 Structural Model of Stress, Cynicism and Exhaustion (Standardized) (Exhaustion $R^2 = 0.690$, Cynicism $R^2 = 0.283$)

Table 7 Model Paths Analysis, Direct Effect, Indirect Effect and Total Effect

Model Paths Analysis		R^2	Est	Standard	*SE*	*Z*	Lower CI	Upper CI
EXH on	STR	0.61	0.435	0.319	0.049	8.884	0.339	0.531
	CYN		0.510	0.538	0.034	14.996	0.443	0.577
CYN on	STR	0.41	0.917	0.637	0.049	18.691	0.821	1.013
Direct Effect			0.435	0.319	0.049	8.884	0.339	0.531
Indirect Effect			0.468	0.343	0.040	11.697	0.389	0.549
Total Effect			0.902	0.661	0.045	19.938	0.814	0.991

Table 8 Items Assessing Postgraduate Student Stress, Cynicism and Exhaustion

Factor Name	Indicator Name	Indicators	α
Postgraduate Student Stress	1. Restlessness	I feel irritated, restless and agitated. มีความหงุดหงิด หรือ กระวนกระวาย หรือ ร้าวุ่นใจ	0.855
	2. Less Concentration	I have less concentration. มีสมาธิจดจ่อกับสิ่งต่างๆ ได้น้อยลง	
	3. Feeling Bored	I feel so bored that I do not want to do anything. รู้สึกเบื่อ หรือ เซ็ง จนไม่อยากทำสิ่งใด	
	4. Sleeping Problem	I have a sleeping problem including insomnia, light sleeping or too much sleep. มีปัญหาการนอน นอนไม่หลับ หรือ หลับๆ ตื่นๆ หรือ นอนมากจนเกินไป	
	5. Social Isolation	I do not want to meet people. รู้สึกว่าไม่อยากพบปะผู้คน	
Postgraduate Student Exhaustion	1. Academic Toleration	I often have to force myself to write a thesis. ฉันมักจะต้องบังคับตัวเองให้เขียนวิทยานิพนธ์	0.875
	2. Academic Worries	In my spare time, I am always worried about thesis. ในเวลาว่าง ฉันมักจะกังวลถึงเรื่องวิทยานิพนธ์อยู่เสมอ	
	3. Academic Deadlines	I have stress from workload and work submission time limits. ฉันมีความเครียดจากภาระงานและขีดจำกัดด้านเวลาในการส่งงาน	
	4. Academic Pressure	Graduate studies are too stressful for me. การศึกษาระดับบัณฑิตศึกษานั้นเครียดมากเกินไปสำหรับฉัน	
	5. Academic Workloads	My educational workloads are too much. ภาระงานด้านการศึกษาของฉันมีมากเกินไป	
	6. Academic Goal Concern	I am worried that I would not be able to complete my studies. ฉันกังวลว่าฉันจะไม่สามารถศึกษาจนจบหลักสูตรได้	
Postgraduate Student Cynicism	1. Lack of Academic Motivation	I have not been stimulated or motivated by my studies. ฉันไม่ได้รับแรงกระตุ้นหรือแรงจูงใจจากการศึกษาของฉัน	0.858
	2. Lack of Academic Interest	I lost interest in my thesis. ฉันรู้สึกหมดความสนใจในวิทยานิพนธ์ของฉัน	
	3. Lack of Academic Purpose	I have a hard time finding meaning or importance in my studies. ฉันมีความลำบากในการค้นหาความหมายหรือความสำคัญในการศึกษาของฉัน	

Conclusion and Recommendation

According to the analysis results from both studies, the objective was met. The result showed that all 14 indicators shared some relationship relating to stress, exhaustion and cynicism and were categorized into 3 latent factors with an acceptable internal consistency reliability and construct validity. These findings were interpreted the same way as previous studies but in different contexts (Aypay, 2011; García-Izquierdo & Ríos-Rísquez, 2012). Moreover, the result from the structural equation modeling and model paths analysis revealed a significant indirect effect or mediation role of cynicism on relationship between stress and exhaustion. This implied that stress which stemmed from postgraduate studies not only led to exhaustion but was also mediated

by cynicism. As it was hypothesized earlier in the second study, stress and stress together with cynicism led to exhaustion. These findings were interpreted the same way as previous study but in different culture (Cornér, Löfström, & Pyhältö, 2017). Besides, according to the analysis results stated above, even in Thai society and culture, stress arising from the challenge of postgraduate study is still considered as the main antecedent of exhaustion in academic life. Prolonged exhaustion is chronic and this can trigger an intention to leave academia rendering those previous investments useless (Aquino et al., 2018). Moreover, cynicism significantly plays a mediation role among stress and exhaustion relationship, according to the analysis results. This portrays that cynicism factors such as lack of motivation, interest and purpose significantly affect Thai postgraduate student quality of life during their training. These 3 negative constructs are now confirmed to have the same negative effect in Thai postgraduate students as any other contexts in previous studies. Therefore, any concerning educational parties in Thailand should focus on these negative factors carefully and find any countermeasures to mitigate those risks. For example, adequate support and care mentoring could prove useful (Danielsen, Samdal, Hetland, & Wold, 2009). This study also contributed to an academic world with 14 items rating scales.

Even if this study focused on the development of stress-and-burnout related rating scale and scrutinized construct validity and causal relationship among those factors, there still were several limitations. Firstly, this study only tested for the construct validity and causal relationship in postgraduate students. Future study could possibly expand the result of this study by further analyzing the multi-group paradigm to test an invariance measurement and causal relationship among different groups such as master and doctorate students so as to generalize the results into broader context. Secondly, this study is quantitative. There might be some insights regarding stress and burnout among Thai postgraduate students that mathematics cannot answer. Thereby, future research should focus on a qualitative method and use qualitive technique to delve deep down for a richer result.

Conflict of Interest

There is no conflict of interest.

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