Nexus Between Academic Self-Efficacy and Student Engagement: The Mediating Role of Academic Stress

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Abstract. The key purpose of this study was to reveal the mediating mechanism that is potentially established by academic stress on the path between academic self-efficacy and student engagement. Four hundred paper-based self-administered questionnaires were disseminated to undergraduate students at a private university in Malaysia. There was a total of 342 (85.5%) valid and usable surveys retrieved. Data was analysed through Partial Least Square-Structural Equation Modelling. The findings showed that academic self-efficacy effectively alleviates academic stress and improves student engagement. In contrast, the rise of academic stress leads to a decline in the level of student engagement. The result also revealed that academic stress partially mediated the pathway linking academic self-efficacy to student engagement. As such, the university's senior management can devise strategies in a manner that is beneficial in improving student engagement and reducing academic stress. Academic staff can play their roles to foster students' academic self-efficacy by providing guidance, encouragement, and regular feedback.

Keywords: Academic self-efficacy, Academic stress, Student engagement, University

1 Introduction

Previous studies generally recognized that academic stress is prevalent among undergraduate students [1-2]. The belief that individuals who can graduate with flying colours will have better chances of finding a better career in the future is among the factors that induce pressure on students [2]. There are also rising societal expectations on the quality of graduates to meet the demands of the competitive landscape encountered by various industries. Besides, the extant literature showed that academic stress worsens the mental health of students [3-4]. Malaysian university students were found to have poorer mental health as compared to the

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United Kingdom [4]. As such, there is a need to develop students with personal characteristics that are capable of handling academic stress and avoiding undesirable consequences. Academic expectations, heavy schoolwork/coursework and examination requirements are common causes of academic stress [5]. In short, students will be overwhelmed by stress if he or she is not able to cope with ongoing academic demands which can severely affect student engagement [6-8].

Low student engagement needs serious attention as it is found to be a precursor of a lower student retention rate. Specifically, [9] clearly demonstrated a close link between student engagement and retention in higher education institutions. Moreover, student engagement has been reported as one of the key determinants of academic achievement [10]. Engaged students tend to be more optimistic, devote extra effort, and pay greater concentration in class than disengaged students [11].

In relation to the above discussion, developing university students' academic self-efficacy is essential for the formation of student engagement and enables them to effectively manage academic stress [11-12]. More importantly, [13] noted that various self-efficacy studies have indicated that furnishing students with knowledge and skills alone is inadequate to effectively motivate and engage them in their study or the learning process. As such, the development of academic self-efficacy is crucial in boosting students' belief that they own the capability of taking the necessary course of action to achieve the targeted academic outcome [14]. Efficacious students will view academic demands as challenges instead of as major obstacles. On the other hand, perceived stress tends to hinder effective student engagement [15]. Therefore, enhancing student's self-efficacy helps to shape engaged students that would eventually result in positive outcomes such as achieving good grades and reducing the tendencies of dropouts [16].

Despite it is relatively established that academic self-efficacy is essential in reducing academic stress and fostering student engagement. Surprisingly, the investigation on the extent to which academic self-efficacy explains student engagement indirectly via academic stress remains unclear. In response to the insufficiency of knowledge in this area, this study seeks to analyse the influence of academic self-efficacy on student engagement and academic stress, as well as test the potential mediating function of academic stress in this relationship.

2 Literature Review

2.1 Student Engagement

Student engagement mainly resolves around the dynamic interaction between efforts and time invested by students, alongside the initiatives taken by institutions, aiming at enhancing learning outcomes and performance [17]. On the other hand, [18] explains student engagement as the extent to which the students put their effort, time and energy into the coursework and learning process in their institution.

Three components of student engagement that are commonly described in the literature include (i) behavioural engagement (e.g., attendance, attention, participation and interaction in the class); (ii) affective engagement (e.g., emotional reaction of students towards classroom activities, their classmates and teachers); and

(iii) cognitive engagement (e.g., the willingness of the student to go beyond the learning requirement or the syllabus) [19-21]. The study by [22] indicated that engaged students are more willing to accept challenges and perform well academically than disengaged students. Further, [10] showed that academic self-efficacy promotes academic performance directly and indirectly through positive emotion and meta-cognitive learning. Other precursors of student engagement include individual psychological capital [23], teacher's written feedback [24], use of education technology [19], and teacher support [25].

2.2 Academic self-efficacy and academic stress

According to [26], self-efficacy signifies an individual's confidence or belief in his/her capability to successfully execute a particular task. Self-efficacy reflects the ways an individual thinks, feels and behaves [27]. The social cognitive theory introduced by [14] stresses that learning by observing a role model who completes a task successfully helps to evoke positive emotions and allows a person to acquire skills and problem-solving approaches, hence useful in nurturing self-efficacy. There are tendencies that individuals who possess a greater degree of self-efficacy will obtain better achievement and experience enhanced personal well-being [14]. [27] posited that individuals with higher academic self-efficacy will treat difficult tasks as challenges to be mastered instead of threats that would eventually lead to stress.

Viewing from the realm of education, academic self-efficacy indicates students' inclination to believe that they can perform and learn effectively at a certain level [28-29]. A few empirical findings [30-33] demonstrated an adverse relationship between academic self-efficacy and academic stress. In short, prior studies lend support that individual with higher academic self-efficacy is better at handling challenges and hence experience lower academic stress, and vice versa. The above reviews generally revealed that students who are equipped with academic self-efficacy are less exposed to academic stress, which is reflected in the following hypothesis:

H_1: Academic self-efficacy is negatively related to academic stress.

Generally, the positive impacts of general self-efficacy or its context-specific, academic self-efficacy were supported in the literature [12-36]. In a study among Romanian undergraduates, [37] Maricuțoiua and Sulea (2019) demonstrated an interesting finding as they found the rise of students' self-efficacy belief is the only reason that enhances student engagement during the trimester. Academic self-efficacy enables one to better overcome the challenges that they encounter in their study. Hence, the relationship between academic self-efficacy and student engagement is hypothesized to be positively related.

H_2: Academic self-efficacy is positively related to student engagement.

2.3 Academic Stress and Student Engagement

Stress can be explained as a physical and emotional reaction that harms mankind and mainly happens when the requirement is hard to achieve [38]. According to [5], stress can be identified with symptoms such as anxiety and irascible. Academic stress occurs due to the heightened academic demands, such as meeting assignment submission due date, tests or examination is around the corner yet not much time left for preparation [5-39].

A certain degree of stress can be a source of motivation but if one feels overwhelmed by stress and cannot cope with it, the consequences can be more damaging as it increases the tendency of depression which can be a long-lasting illness [40]. Generally, overloaded schoolwork or coursework distracts students from completing the tasks given. Empirically, academic stress was found to adversely affect students' academic performance [41] and cause deteriorating effects on mental health, physical health, and sleep quality [4-42].

A recent study by [43] further supports that stress reduces student engagement while peer academic support is a useful resource that can mitigate such disruptive consequences. In a similar vein, other authors [15-45] demonstrated that academic stress and student engagement relate negatively. In light of the review, we proposed:

H_3: Academic stress is negatively related to student engagement.

2.4 The Mediation Effect of Academic Stress

Referring to the Conservation of Resources (COR) theory of [46] that explains the circumstances an individual is confronted with stress and an individual's motivation in maintaining his or her current resources and pursuing new resources, academic self-efficacy might be an important element influencing academic stress and student engagement. Academic self-efficacy is regarded as a personal resource that would potentially reduce the negative implications that result from academic stress. This is because a student who possesses higher academic self-efficacy is inclined to treat difficult or challenging tasks as opportunities for mastery rather than as intimidating threats [27]. Previous empirical studies generally support that academic self-efficacy could alleviate academic stress [27-31] and improve student engagement in their learning process [47].

On the other hand, academic stress results in the loss of resources since it depletes students' cognitive and emotional resources. Academic stress was found to be a hindrance to student engagement [32]. Students with high academic self-efficacy can utilise their personal resources to prevent further resource loss and engage in their studies. Thus, the path between academic self-efficacy and student engagement is believed would be mediated by academic stress. Taken together, we form a hypothesis as follows:

H_4: Academic stress mediates the relationship between academic self-efficacy and student engagement.

2.5 Conceptual Framework

Figure 1 illustrates the conceptual framework of the present study, which builds from the prominent theories, namely the social cognitive theory [27] and the Conversation of Resources (COR) theory [46]. Self-efficacy is a key concept that has been highlighted in social cognitive theory [27], it detects the ability of an individual in handling obstacles and striving for task accomplishments. From the lens of social cognitive theory [27], one who possesses a high level of self-efficacy will demonstrate greater persistence, devote more effort, and take necessary actions to deal with the demanding environment. Consistent with this notion, students with low academic self-efficacy tend to feel doubtful of their ability and view academic demands as threatening, thus they are prone to stress. Meanwhile, based on the notion of COR theory [46], individuals with greater resources are more capable of gaining additional resources and less likely to suffer from resource loss, in contrast to those who have no or limited resources. Hence, high academic self-efficacy students are expected to handle academic stress more effectively and engage in the learning process and academic activities. Conversely, students who lack academic self-efficacy, which is a stable personal resource are likely to experience more stress that can drain his/her emotionally and cognitively and impede student engagement.

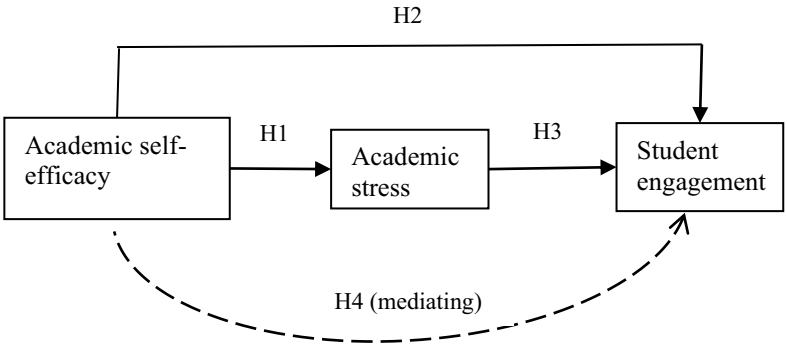


Fig 1. Research Model

3 Research Methodology

3.1 Sample and Research Procedure

The primary target of the current study was undergraduate students from the

Kampar campus of a Malaysian private university. The self-administered questionnaires were personally disseminated to the target respondents together with a cover letter in which the purposes and contact details of the researchers were disclosed. In an attempt to reduce common method variance, clear instruction was given in the questionnaire and respondents were ensured that the survey was anonymous, and the data gathered was for academic use only. In addition, this study obtained ethical approval from the university before the distribution of the questionnaire.

Quota sampling was used in this study whereby the number of respondents drawn for each faculty and institution was based on the proportion to the population of the undergraduate students in the Kampar campus of the university. Among 400 questionnaires distributed, 353 questionnaires were returned but 11 questionnaires were discarded due to incompleteness, therefore 342 final responses were collected from the respondents, and the effective response rate was 85.5%.

The average age of the participants was 21.1 years old. Among the 342 respondents, 199 (58.19%) respondents were female whereas 143 (41.81%) were male. Most of the respondents were from the Faculty of Business and Finance which accounted for 168 (49%) respondents while there were only 7 (2%) students from the Institute of Chinese Study participated in the study. Number of respondents from Faculty of Arts and Social Science, Faculty of Engineering and Green Technology, Faculty of Information and Communication Technology and Faculty of Science were 65 (19%), 20 (6%), 38 (11%), and 44 (13%), respectively.

3.2 Measurement

Academic self-efficacy comprises of 10 items, adopted from [48]. A sample item includes "I am confident that I will achieve the goals that I set for myself."

Student engagement was adapted from [21] and comprised of 15 items. A minor modification was made by replacing "my school" with "my university". We evaluated three dimensions (i.e., affective, cognitive and behavioral) of student engagement, with five items for each dimension. Sample items include "I am distracted in the classroom" (behavioral), "My university is a place where I make friends easily" (affective), and "I review my notes regularly, even if a test is not coming up" (cognitive).

The participants indicate their level of agreeableness on each item of the above two constructs on a 5-point Likert scale.

Academic stress was measured using a scale formulated by [49]. There are eight items in total and a scale ranging from "1 = never to 4 = always" has been used. The respondents rated the extent to which they feel stress due to academic requirements, such as examination, class workload, language difficulties, etc.

4 Data Analysis

Data entry and descriptive statistic was conducted via IBM SPSS version 25 statistical software. Meanwhile, we tested the hypotheses of the study using SmartPLS 3.0 [50] in which Partial Least Squares-Structural Equation Modelling was the main analysis approach. The following parts provide the details of the results for the measurement model and structural model.

4.1 Assessment of Measurement Model

Construct validity tests need to be performed to ensure convergent validity and discriminant validity of the measurement model [51]. Student engagement was assessed as a reflective-reflective higher-order construct.

Table 1. Measurement Model

Construct	Items	Loadings	Average variance extracted	Composite reliability
Academic Self-Efficacy	AcSE1	0.775	0.574	0.923
	AcSE2	0.715		
	AcSE3	0.732		
	AcSE4	0.804		
	AcSE5	0.840		
	AcSE6	0.791		
	AcSE7	0.797		
	AcSE8	0.579		
	AcSE10	0.752		
Behavioural engagement (First-order construct)	SEB3	0.759	0.556	0.790
	SEB4	0.733		
	SEB5	0.745		
Affective engagement (First-order construct)	SEE6	0.718	0.578	0.845
	SEE7	0.834		
	SEE8	0.700		
	SEE9	0.782		
Cognitive engagement (First-order construct)	SEC11	0.609	0.518	0.842
	SEC12	0.717		
	SEC13	0.679		
	SEC14	0.776		
	SEC15	0.802		
Student engagement (Second-order construct)	Behavioural engagement	0.746	0.546	0.783
	Affective engagement	0.757		
	Cognitive engagement	0.712		
Academic Stress	AcS1	0.769	0.653	0.937
	AcS2	0.558		
	AcS3	0.830		
	AcS4	0.840		

AcS5	0.816
AcS6	0.878
AcS7	0.858
AcS8	0.868

Note. SEB1, SEB2, SEB3, SEB4, SEB5, SEB6, SEE6 and SEE10 are reversed-scored items. AcSE9, SEB1, SEB2, and SEC10 were removed due to low factor loadings.

Table 1 presents the indicator loadings, Composite Reliability (CR), and Average Variance Extracted (AVE) of each construct. Aside from AcSE9, SEB1, SEB2, and SEC10, other items were retained as their loadings were beyond 0.708, as specified by [51]. However, AcSE8, SEE8, SEC11, SEC13, and AcS2 that own loadings below 0.708 were still retained. This is because the minimum required value for AVE, 0.5 was achieved [52]. In the meantime, none of the CR values of the major constructs fall below 0.7, hence it is concluded that the convergent validity and reliability requirement of the constructs have been met.

Table 2. Discriminant Validity using Fornell and Lacker's Criterion

	Academic Self-Efficacy	Student Engagement	Academic Stress
Academic Self-Efficacy	**0.757**		
Student Engagement	0.742	**0.710**	
Academic Stress	-0.245	-0.357	**0.808**

Note. Bold fonts represent the squared root of AVE.

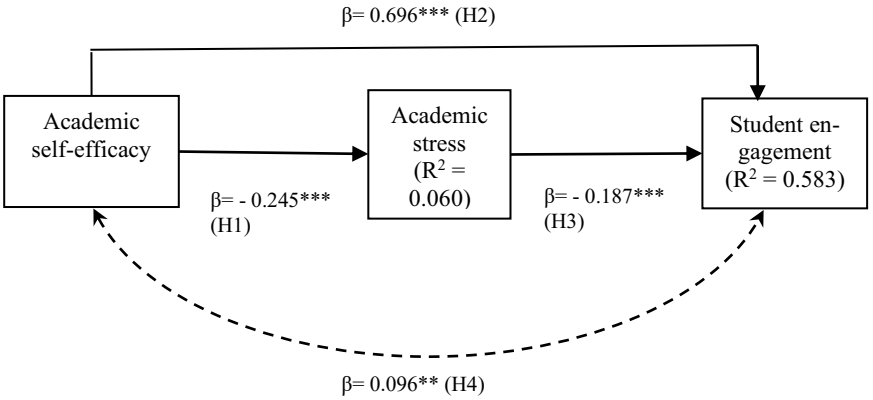
The constructs for the present research model exhibit sufficient discriminant validity as specified by [53] in which the squared root of AVEs surpass all the correlation values among variables (see Table 2).

Table 3. Heterotrait-Monotrait Ratio of Correlations

	Academic Self-Efficacy	Student Engagement	Academic Stress
Academic Self-Efficacy			
Student Engagement	0.781		
Academic Stress	0.248	0.393	

Heterotrait-Monotrait (HTMT) ratio is presented in Table 3. Discriminant validity is evident as the construct's values are below the required threshold value of $HTMT_{.85}$ [54].

4.2 Assessment of Structural Model



Note. *** p<0.001, **p<0.01; dotted line represents a mediating hypothesis

Fig 2. Summary of Results from Structural Model Assessment

Figure 1 shows the path coefficient and R^2 value of the model. R^2 of 0.583 indicates that 58.3% of the variation in student engagement was explained by academic self-efficacy and academic stress. Only 6% of the variation in academic stress was explained by academic self-efficacy.

Table 4. Results of Structural Model Analysis

H	Path	Path Co.	Std. Error	t-values	p-values	Inner VIF	Effect Size	Decision
H_1	Academic self-efficacy → Academic Stress	-0.245	0.053	4.644	0.0001	1.000	0.064	Supported
H_2	Academic Self-efficacy → Student Engagement	0.696	0.036	19.254	0.0001	1.064	1.093	Supported
H_3	Academic Stress → Student Engagement	-0.187	0.042	4.463	0.0001	1.064	0.078	Supported

Notes: H = Hypothesis, Path Co. = Path Coefficient, Std. Error = Standard Error

Table 4 summarises the findings on the direct effect of the variables in which all hypotheses are well supported. Specifically, academic self-efficacy is negatively related to academic stress ($\beta = -0.245$, $p < 0.001$), academic self-efficacy has a significant positive influence on student engagement ($\beta = 0.696$, $p < 0.001$), and academic stress has a significant negative impact on student engagement ($\beta = -0.187$, $p < 0.001$). Referring to the path coefficients in Table 4, it is noticeable that among the relationships, academic self-efficacy emerged to be the most influential construct toward student engagement.

According to [55], Variance Inflation Factor (VIF) value that is above or equal to 5 indicates a potential collinearity issue. In this study, all the Inner VIF values for the variables are below 5, which means there is no multicollinearity problem in the study.

In terms of the level of effect size (f^2), [56] suggests that predictors with f^2 values of 0.35 represent a substantial effect on an endogenous variable, whereas 0.15 denotes a medium effect while 0.02 suggests a small effect. As presented in Table 4, the f^2 value of 1.093 indicates the relative impact of academic self-efficacy on student engagement is strong, while f^2 values of 0.064 and 0.078, each represent a small effect size of academic self-efficacy on academic stress and academic stress on student engagement, respectively.

Table 5. Predictive Relevance

	SSO	SSE	Q^2 (= 1- SSE/SSO)
Academic Self-Efficacy	3,087.000	3,087.000	
Academic Stress	2,744.000	2,654.132	0.033
Student Engagement	4,116.000	2,987.070	0.274

Table 5 demonstrates the predictive relevance (Q^2) of the model that analysed using the blindfolding procedure. Both the Q^2 for academic stress ($Q^2 = 0.033$) and student engagement ($Q^2 = 0.274$) are above zero [51-57], providing a confidence on the predictive relevance of the present model.

Table 6. Hypothesis Testing on Mediation

H	Relationship	Path Co.	SE	t-values	p-values	Confidence Interval LL	Confidence Interval UL	Decision
H_4	Academic Self-Efficacy ➔ Academic Stress ➔ Student Engagement	0.096	0.018	2.608	0.009	0.020	0.088	Supported

Notes: H = Hypothesis, Path Co. = Path Coefficient, SE = Standard Error

Table 6 shows the hypothesis testing on mediation where bootstrapping analysis has been performed via Smart PLS 3.0. The indirect effect with $\beta = 0.096$ is significant at t-values of 2.608 and p-values of 0.009. Moreover, the 95% Boot Confidence Interval Bias Corrected: [LL = 0.020, UL = 0.088] does not contain zero in between these values, implying the support for a significant mediation effect [58]. In other words, academic stress explains student engagement indirectly through academic self-efficacy.

[59] study suggests that partial mediation occurs when both the direct effect and indirect effect in the model are significant. Additionally, partial mediation can be categorised as complementary or competitive partial mediation [59]. As the direct effect, H_3 ($p = 0.0001$) and indirect effect, H_4 ($p = 0.009$) are significant and both

are in positive directions, thus indicating the existence of complementary partial mediation.

5 Conclusion and Discussion

Our result uncovered that improved academic self-efficacy contributes to a reduction in academic stress among the students, which was consistent with past studies [27-31]. Generally, academic self-efficacy affects students' decisions, emotional responses and resistance to challenges. Hence, a student with higher academic self-efficacy would act and behave in a calmer way in dealing with the tasks given, which consequently leads to lower academic stress as there is an absence of anxiety, tension and worry [31].

Next, compatible with the empirical studies of [15], [32] and [43], the current findings revealed that student engagement is negatively influenced by academic stress. In accordance to [44], students who were distracted by multiple tasks given would experience higher levels of academic stress as they could not focus or concentrate in dealing with only a single task, thus leading to lower engagement [32].

Further, academic self-efficacy was found to be a valuable personal attribute in stimulating student engagement, which is aligned with earlier findings [34-44]. This is because student with self-confidence in completing the tasks given is more likely to give a try and seek for answers to satisfy his or her curiosity. Thus, he or she is willing to try to understand and figure out ways or alternatives for the tasks given or challenges encountered.

Lastly, our evaluation revealed that academic stress partially mediated the effect between academic self-efficacy and student engagement. Based on the ground of social-cognitive theory [14], self-efficacy is regarded as a positive personal characteristic that can reduce an individual's stress level. Moreover, a high self-efficacy individual has better emotional control which is beneficial in reducing stress [60]. Individuals who are low in self-efficacy, when perceive some kind of stimulus as a threat, their emotional reaction would be intensified and consequently leads to stress [60].

Aside from that, COR theory explains an individual's motivation in maintaining his or her resources and the reaction when one is confronted with stress [46]. The loss of resources such as academic self-efficacy would possibly cause a negative impact on student engagement as an individual would encounter with stress when resources are lost [46-61]. Under stressful conditions, it is hard for an individual to concentrate thus leading to a lower engagement [44]. Besides, self-efficacy has generally been acknowledged as an effective personal resource that not only mitigates the adverse impact of stress directly but also explains job outcomes (e.g., job burnout) indirectly through stress [62].

Implications

Theoretical implications

From the theoretical perspective, the significant mediating effect of the hypothesised relationship denotes that academic self-efficacy is a key element in minimizing the experience of academic stress among students, thus help in fostering student engagement. Specifically, the positive link between academic self-efficacy and student engagement, can be indirect, operating through academic stress. Based on our best knowledge, past studies have not revealed the mediating mechanism among the variables in our study, especially in the Malaysian higher education context. Prior studies mainly established the mediating effect of academic stress between perfectionism and academic burnout [63] as well as between academic self-efficacy and academic burnout [64] which is based on a sample of Korean adolescents. Hence, this study provides some additional insights into the existing education-related literature.

Besides, with a substantial effect size as shown in the statistical result, this study confirmed the vital role of academic self-efficacy on student engagement. The knowledge is valuable to the education literature as empirical investigations that treat academic self-efficacy as an antecedent of academic performance are more prevalent thus far [41-65]. Taking note of the social-cognitive theory [27] and COR theory [46], our study further established that high academic self-efficacy is a personal resource that enables one to be less susceptible to academic stress and portrays greater student engagement than those who are low in academic self-efficacy as they are persistent and expend greater efforts even there are obstacles that they have to deal with.

5.1 Managerial Implication

This study contributes to a few managerial implications. This study found that academic self-efficacy is the most influential variable that explains student engagement. Hence, developing academic self-efficacy should get the most attention from the university. Academic self-efficacy enhancement could be achieved by upgrading the learning environment and education system such as modifying the structure plan from challenging to moderately challenging tasks and encouraging proper use of strategies. Additionally, the senior management of the university and respective faculties can devise strategies that are beneficial in improving and optimising student experience, and learning outcomes which would eventually result in better academic achievement while achieving a sound reputation for the university. Specific learning strategies should be imparted to students to enhance the development of academic self-efficacy.

[34] suggest optimal attention be given to student's psychological condition in the learning process which could be one of the alternatives for improving academic self-efficacy. Referring to [14] basic tenets in developing one's self-efficacy, academic staff can help students in setting specific and realistic academic-related goals as well as provide clear guidelines to them. Students' academic self-efficacy can be broadened when they successfully complete the assignments or activities assigned to them. Besides, academic staff can play their role in improving students' academic self-efficacy by providing regular feedback and encouragement (i.e., improving social persuasion). Next, academic staff can utilise the concept of vicarious experiences by selecting a credible and enthusiastic student as a role

model that can be a source of learning for other students [13]. Lastly, relevant talks or training programmes can be organised by the university so that students can learn how to manage stress and anxiety, thus improving their emotional and psychological states.

5.2 Limitations and Future Research

We acknowledge the limitations of this study. First, the sampling location of the present study was confined only to the main campus of the selected private university in Malaysia. Hence, future researchers can extend the scope of the study and increase the sample size by involving undergraduates from different universities. Second, future research can extend the current model by evaluating the dimensions of student engagement (affective, behavioural and cognitive engagement). Third, the employment of a cross-sectional study would not fully reflect the behaviour of undergraduate students over a period. As such, a longitudinal approach is suggested to be employed as it validates the causality relationship over an extended period. Next, aside from a quantitative technique, future research can be carried out using a qualitative technique or mixed methods to extend the present knowledge on the subject matter.

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