Academic motivation and academic satisfaction: a moderated mediation model of academic engagement and academic self-efficacy

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Abstract

Purpose – This study aims to investigate the conditional indirect effect of academic self-efficacy in the interplay between academic motivation and academic satisfaction through academic engagement among university students.

Design/methodology/approach – A cross-sectional study was performed on 1,638 Vietnamese university students (31.9% males and 68.1% females) aged 16 to 36 (Mean = 20.06, SD = 1.428). The participants filled out a questionnaire with the Vietnam versions of the General Self-Efficacy Scale, Academic Motivation Scale, Academic Life Satisfaction Scale and Academic Engagement Scale. Model 4 and Model 7 in the PROCESS macro were used for the mediation analysis and the moderated mediation analysis.

Findings – Results showed that the indirect effect of academic engagement on the academic motivation-academic satisfaction link was significant. Furthermore, academic self-efficacy moderated this indirect effect. The indirect effect was stronger among students with high academic self-efficacy and weaker among students with low academic self-efficacy.

Originality/value – This study's findings contribute to educational research on academic satisfaction and can be used by institutions of higher education and educators to enhance academic satisfaction among university students.

Keywords Academic motivation, Academic engagement, Academic self-efficacy, Academic satisfaction, University students

Paper type Research paper

1. Introduction

Academic satisfaction (AS) is defined as the expected satisfaction in one's school life by fulfilling one's essential academic goals or aspirations (Kumar *et al.*, 2006). AS plays an important role in schools; it is both an important indicator of student happiness and a measure of the success and effectiveness of each school's training (Nogueira *et al.*, 2019). Furthermore, the transition from high school to university has caused university students to encounter many difficulties when adapting to new environments and new learning methods. These difficulties can affect students' health and AS. This can become a reason why many students drop out after the first year at many Vietnamese universities. Therefore, AS affects a university's competitive advantage, its ability to retain students and its motivation to pursue

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continuing education (Chau and Cheung, 2018). AS was found to be related to academic motivation (AM) (Chau and Cheung, 2018; Koç and Pepe, 2018; Kryshko *et al.*, 2022), academic engagement (AE) (McIlveen *et al.*, 2013; Urquijo *et al.*, 2016) and academic self-efficacy (ASE) (Azila-Gbettor *et al.*, 2022; Koca *et al.*, 2023). Research on factors affecting student AS has important implications for educational administrators, researchers and teachers. It can be the basis for educational managers, teachers and researchers to propose measures to improve student AS from related factors to increase efficiency and the competitive advantage of the university as well as create motivation for students to continue their education.

AM refers to the driving force behind behaviors that are related to academic functioning and success in some way (Usher and Morris, 2012). As noted by Feng *et al.* (2013), motivated students typically achieve more desirable outcomes due to the extra effort they devote to classroom tasks and activities. So, improving students' motivation and engagement has always been the primary concern of all teachers. In the literature, many studies focus on the relationships between AM and AS among university students (Atasever *et al.*, 2023; Bolatov *et al.*, 2022; Güdül *et al.*, 2021), between AM and AE (Xiong *et al.*, 2015; Yin and Wang, 2016), between AE and AS (El-Sayad *et al.*, 2021; Huaman *et al.*, 2022; Shin, 2019), and between ASE and AE (Abdulwahhab and Hashim, 2020; Zhen *et al.*, 2017). In China, AE was found to mediate the relationship between AM and AS among university students (Chau and Cheung, 2018). In Spain, Froment and de-Besa Gutiérrez (2022) found that AS mediated the relationship between AE and AM in a sample of students. In Italy, it was found that the number of friends at the university moderated the relationship between AM and AS (Morelli *et al.*, 2023). Other research also revealed that academic support mediates the relationship between ASE and AE (Robayo-Tamayo *et al.*, 2020). In Vietnam, there are studies focusing on reporting the levels of AM (Nguyễn Ngọc Quang *et al.*, 2017), ASE (Nguyễn Thiên An *et al.*, 2020) and AS (Nguyễn Thị Hà *et al.*, 2022) in university students; research on the relationship between these pairs of relationships has received little attention. We have not found any studies investigating the conditional indirect effect of ASE in the interplay between AM and AS through AE among university students. Aiming to fill gaps in the literature, this study focused on investigating the mediating role of AE and the moderating role of ASE in the indirect effect of AM on AS among Vietnamese university students.

1.1 AM and AS

AM is identified as a factor that affects students' AS. There are three types of AM: intrinsic motivation, extrinsic motivation and amotivation (Leal *et al.*, 2013). It has been found that students with low AM may be associated with low AS (Atasever *et al.*, 2023; Bolatov *et al.*, 2022; Güdül *et al.*, 2021). Atasever *et al.* (2023) have revealed that there is a positive and significant relationship between intrinsic and extrinsic motivation and AS among Turkish university students. Similar findings were also found in other samples of Turkish university students (Güdül *et al.*, 2021) and Chinese (Chau and Cheung, 2018), Chilean (Vergara-Morales *et al.*, 2019) and Kazakhstani (Bolatov *et al.*, 2022) university students. According to Self-determination theory, students with high intrinsic motivation often conduct learning activities because learning itself makes them feel interested and satisfied (Leal *et al.*, 2013; Martin *et al.*, 2017). Indeed, research also reveals that intrinsic motivation is related to enjoyment and satisfaction (Peters *et al.*, 2012). Students with high extrinsic motivation tend to focus on getting better grades and receiving rewards and acceptance from their peers (Adamma *et al.*, 2018). That also means that extrinsic motivation can also lead to good academic achievement and satisfy students' needs. Meanwhile, AS represents students' positive mood towards their learning (Chau and Cheung, 2018) such as enjoyment and satisfaction. It can be said that motivational factors facilitate the development of the well-being and AS of students (Vergara-Morales *et al.*, 2019).

1.2 AE as a mediator

Lawson and Lawson (2013) defined AE as students' physical and psychological investments toward acquiring, comprehending and mastering the knowledge, content and information teachers strive to convey. Furthermore, as a desired learning behavior, students' AE is connected with their' active, persistent, flexible, goal-directed, constructive and focused interactions with the learning environment (Peng, 2021). In the literature, it was found that AE was associated with AM and AS among university students.

First, AM and AE are identified as two positive academic behaviors that are related to students' academic success (Martin *et al.*, 2017). Students who are highly motivated to learn often know why they are studying and what they need to learn (Chau and Cheung, 2018). Furthermore, the sense of enjoyment that highly motivated students experience in learning activities encourages students to persevere through difficulties in pursuit of their goals (Martin *et al.*, 2017; Peng, 2021; Zhen *et al.*, 2017). Indeed, previous studies have identified a positive correlation between AM and AE (Xiong *et al.*, 2015; Yin and Wang, 2016). For example, research on a sample of university students in Pennsylvania, USA, has shown a close connection between AM and AE (Xiong *et al.*, 2015). Other researchers also have similar comments about this relationship (Saeed and Zyngier, 2012; Yin and Wang, 2016). Second, AE was found to be positively associated with AS in the university student sample (El-Sayad *et al.*, 2021; Huaman *et al.*, 2022; Shin, 2019). For example, research on a sample of university students in Peru reported that AE was positively and moderately related to AS (Huaman *et al.*, 2022). Similar findings were found in university student samples in Egypt (El-Sayad *et al.*, 2021) and Korea (Shin, 2019). These results may support the idea that university students who experience a pleasurable state of being immersed in their studies are more satisfied with their academic experience (Safarzaie *et al.*, 2017). Furthermore, students who actively participate in learning activities are likely to achieve higher grades, make academic progress, and thus be academically successful (Peng, 2021). Experiencing positive emotions resulting from high scores, progress and academic success can increase students' AM. Likewise, the ability to take on studies as a positive challenge, to enjoy the activities involved and to persist when faced with setbacks or difficulties leads the student to a greater sense of well-being, better performance and greater satisfaction within the academic sphere (Urquijo *et al.*, 2016; Wach *et al.*, 2016). Finally, AE was found to mediate the relationship between AM and AS among university students in Macao (Chau and Cheung, 2018).

1.3 ASE as a moderator

Self-efficacy is confidence in solving problems or completing tasks; it is a major factor in one's decisions, behaviors, willingness and determination (Bandura, 1997). ASE refers to the belief in achieving the duties related to students' roles (Hayat *et al.*, 2020). On the one hand, ASE was also identified as a factor that promotes student engagement. Previous researchers have suggested that students with high ASE tend to have a higher level of engagement in learning (Abdulwahhab and Hashim, 2020; Zhen *et al.*, 2017). Students who experience a greater sense of ASE will be more likely to put forth an effort and be persistent in the presence of learning challenges (Wright *et al.*, 2013). Thus, greater engagement through behavioral manifestations is necessary to attain specific academic goals. On the other hand, in a higher education context, ASE was positively linked to AM (Lin *et al.*, 2022; Malkoç and Kesen Mutlu, 2018; Taheri-Kharameh *et al.*, 2018). ASE is also a robust means of motivation, affects the intrinsic motivation of students and improves their intrinsic motivation (Alivernini and Lucidi, 2011). The belief in an individual's ability is important in the formation of motivation and in driving them to finish tasks; conversely, if students lack confidence in their own abilities, they will lose motivation to learn and fail academically (Taheri-Kharameh *et al.*, 2018). Additionally, high AM may increase AE in students, which has been frequently demonstrated in the

literature (Saeed and Zyngier, 2012; Xiong *et al.*, 2015; Yin and Wang, 2016). Therefore, it is reasonable for us to assume that students with both high AM and high ASE have high levels of AE; conversely, students with low concurrent AM and low ASE have low AE.

1.4 Purpose of this study

Chau and Cheung (2018) established a structural model of the relationship between AM, AE and AS with tourism and hospitality education among university students in China and recommended that future research could be expanded to include other areas or disciplines. The current study extends the conceptual model of Chau and Cheung (2018) to examine factors influencing AS among Vietnamese university students. The variables AM, ASE, AE and AS were all incorporated into the study's conceptual framework (see Figure 1). The purpose of this study is to investigate the impact of AM on AS as well as the conditional indirect effects of AE and ASE in this relationship among university students in Vietnam. Based on previous findings, this study proposes the following three hypotheses:

H1. AM would be positively related to AS.

H2. AE would be mediate the association between AM and AS.

H3. ASE would be moderate the indirect relationship between AM and AS through AE.

2. Methods

2.1 Procedure and sample

This research was conducted with the permission of a large university located in central Vietnam. Data were collected from December 2022 to January 2023. The sample size was determined according to Slovin's formula with $N = 73{,}459$, $e = 0.03$ and $n \geq 1{,}095$ students. The presidents of eleven universities gave permission to the researchers to conduct the survey on students. All participants voluntarily agreed to participate in the study. The study also received the approval and support of academic advisors at the universities where the study participants were located.

The data collection process takes place in a 5-step sequence: Step 1: Contact and request help from eleven universities. Step 2: Through the principals, the research team had a direct meeting with the academic advisors and asked for their help. Step 3: The research team and academic advisors schedule meetings with students in two ways. Step 4: At the meeting with students, the research team announced the purpose, content and method of participating in the survey and asked for the students' help. The research team also informed students that all information students provide in the survey is for research purposes only and is confidential. Participation in the study is completely voluntary. Step 5: Students who volunteer to participate in the study complete an informed consent form and conduct a survey lasting 15–20 min. A total of 1,800 students were invited to the survey, but only 1,680 students voluntarily completed the questionnaire. The number of valid questionnaires was 1,638, accounting for 97.5%.

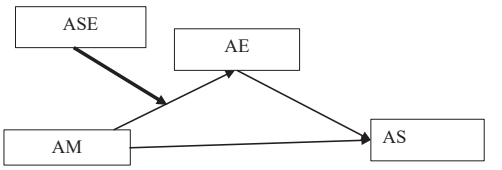

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Figure1.
Hypothetical model

With a cross-sectional study design, this study used convenient sampling with 1,638 students from 10 universities in Vietnam (universities spread in three regions: the Northern region, the Central region and the Southern region) as research objects. Participants' ages ranged from 16 to 36 (Mean = 20.06, SD = 1.428). The sample shows that, regarding gender, 522 males accounted for 31.9% of the sample, and 1,116 females accounted for 68.1%. By grade level, students in the first, second, third and fourth years make up 6.3, 36.2, 25.3 and 32.2% of the total.

2.2 Instruments

AM: The 28-item Academic Motivation Scale (AMS) (Vallerand *et al.*, 1992) was used to measure AM among university students. The scale comprises seven components (i.e. intrinsic motivation to know and learn; intrinsic motivation toward achievement and accomplishment; intrinsic motivation to experience stimulation; extrinsic motivation identified; extrinsic motivation introjected regulation; extrinsic motivation external regulation; and amotivation) (Vallerand *et al.*, 1992). Items (e.g. "Because I think that a college education will help me better prepare for the career I have chosen") are rated on a four-point scale from 1 (not true at all) to 7 (very true). The range of total scores varies from 28 to 196, and higher scores indicate higher AM among respondents. The AMS in the Vietnamese context has met the requirements for validity and reliability; subscales had adequate internal consistency with α values of 0.80–0.86 and could be used in research with Vietnamese university students on AM itself and its relationships with other psychological constructs (Nguyen and Nguyen, 2019). In this study, the Cronbach's alpha value was 0.968.

AE: The 5-item Academic Engagement Scale (AES) (Handelsman *et al.*, 2005) was used to measure AE among university students. A sample item was "making sure to study on a regular basic". Participants need to choose the degree to which they agree with the content of each item on a five-point scale, ranging from 1 (not at all characteristic of me) to 5 (very characteristic of me) (Handelsman *et al.*, 2005). The total score for the AES runs from 5 to 25, with a higher score indicating greater engagement. This scale has been adapted by us on a sample of 103 university students, showing that the scale has good reliability and validity (all items had a corrected item-total correlation range of 0.597–0.755, $\alpha = 0.857$; $x^2/df = 1.359$; $GFI = 0.979$, $CFI = 0.994$, $NFI = 0.978$, $TLI = 0.985$, $RMSEA = 0.059$). In this study, the scale showed strong reliability ($\alpha = 0.867$).

ASE: The 10-item General Self-Efficacy Scale (GSE) (Schwarzer and Jerusalem, 1995) was used to assess ASE among university students. Items (e.g. "I can always manage to solve difficult problems if I try hard enough") are rated on a four-point scale from 1 (not at all true) to 4 (exactly true). The total score is determined by adding the sum of all the items. The total score for the GSE runs from 10 to 40, with a higher score indicating greater self-efficacy. The scale has a Vietnamese version and was used on a sample of Vietnamese university students (Nguyễn Thiên An *et al.*, 2020; Tường and Trường, 2021). Studies in Vietnam show that the reliability and validity of the scale are good (Đặng Nguyễn Thiên An *et al.*, 2020; Tường and Trường, 2021). In this study, the Cronbach's alpha reliability was 0.894.

AS: The 5-item Academic Life Satisfaction Scale (ALSS) (Schmitt *et al.*, 2008) was used to measure AS among university students. Items (e.g. "All in all, I am satisfied with the education I can get in this school") are rated on a five-point scale from 1 (strongly disagree) to 5 (strongly agree). The Vietnamese version of the scale on a sample of university students has good reliability and validity (Nguyễn Thị Hà *et al.*, 2022). In this study, the Cronbach's alpha reliability was 0.928.

2.3 Data analysis

This study used SPSS V20.0, Amos 20.0 and Process Macro V3.5 (integrated in SPSS) to analyze the data. With SPSS software, we tested the reliability of the four scales and the

validity of the AE scale and performed descriptive statistical analysis. With AMOS software, we conducted confirmatory factor analysis. With PROCESS Macro software, we use Model 4 for mediation analysis and Model 7 for moderated mediation analysis (Hayes, 2012). In Models, the AS score was the dependent variable, the AM score was the independent variable, AE was the mediator variable, ASE was the moderator variable and the demographic information (age, gender) of students were control variables. Finally, the study used the bias-corrected nonparametric percentile Bootstrap method to examine the confidence interval (CI) and confirm whether the mediating and moderating effects were significant (Bolin and Hayes, 2014). The mediating effect is significant when the CI of the indirect effect from AM to AS via AE does not contain 0. The moderating effect is significant when the CI of the AM*ASE interaction term does not contain 0.

3. Findings

3.1 Correlation analysis

In this study, descriptive statistics, including Pearson correlations, mean and standard deviations among study variables, are shown in Table 1. AM was found to be positively correlated with AE and AS. AE was found to be positively correlated with ASE and AS. ASE was found to be positively correlated with AS. Additionally, we found that there were gender differences in AM and ASE. There were age differences in AM, ASE and AE. Therefore, gender and age were identified as control variables in the mediation model and the moderated mediation model.

3.2 Mediation analysis

The results of the mediation analysis are presented in Table 2. According to Table 2, all three direct effects from AM to AE ($\beta = 0.426$, $p < 0.001$), from AE to AS ($\beta = 0.170$, $p < 0.001$) and from AM to AS ($\beta = 0.296$, $p < 0.001$) were significant. In addition, the indirect effect from AM to AS through AE is also significant ($\beta = 0.009$, 95% CI = [0.006, 0.012]). Therefore, AE partially mediated the relationship between AM and AS among university students (see Figure 2).

3.3 Moderated mediation analysis

The results of the moderated mediation analysis are presented in Table 3. According to Table 3, the AM*ASE interaction term was significant ($\beta = 0.002$, 95% CI = [0.0001; 0.002]), indicating ASE moderated the effects of AM on AE among university students. The simple slopes indicated that the association between AM and AE was weaker with a low level of ASE

Table 1.
Pearson correlations, mean and standard deviations among study variables

	M ± SD	AM	AE	ASE	AS	Gender
(1) AM	135.944 ± 31.358	1				
(2) AE	17.439 ± 3.944	0.429**	1			
(3) ASE	30.374 ± 4.386	0.269**	0.369**	1		
(4) AS	19.413 ± 3.832	0.368**	0.296**	0.289**	1	
(5) Gender	1.68 ± 0.466	0.053*	−0.003	−0.117**	0.019	1
(6) Age	20.06 ± 1.428	0.064**	0.091**	0.112**	0.010	−0.147**

Note(s): *$p < 0.05$; **$p < 0.01$; AM: academic motivation; AE: academic engagement; AS: academic satisfaction; ASE: academic self-efficacy
Source(s): Author's own creation

	β	SE	95% CI
Direct effect			
AM ➔ AE	0.426***	0.003	[0.048, 0.059]
Gender ➔ AE	−0.016	0.019	[−0.510, 0.238]
Age ➔ AE	0.062**	0.062	[0.048, 0.292]
AM ➔ AS	0.296***	0.003	[0.030, 0.042]
AE ➔ AS	0.170***	0.025	[0.117, 0.214]
Gender ➔ AS	0.001	0.189	[−0.363, 0.380]
Age ➔ AS	−0.025	0.062	[−0.188, 0.055]
Indirect effect			
AM ➔ AE ➔ AS	0.009	0.002	[0.006, 0.012]
Total effect			
AM ➔ AS	0.045	0.003	[0.040, 0.051]

Note(s): ***$p < 0.001$, CI: Confidence interval; AM: academic motivation; AE: academic engagement; AS: academic satisfaction; ASE: academic self-efficacy
Source(s): Author's own creation

Table 2.
The direct and indirect effects of AM on AS

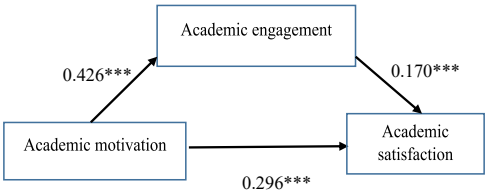

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Figure 2.
AE as a mediator in the association between AM and AS

(β = 0.037, 95% CI = [0.030; 0.044]); meanwhile, this association was stronger among students with a high level of ASE (β = 0.050, 95% CI = [0.044; 0.057]).

In addition, the direct effects from AM to AS (β = 0.036, $p < 0.001$) and AE to AS (β = 0.117, $p < 0.001$) were significant. However, the direct effect from AM to AE was not significant (β = −0.002, 95% CI = [−0.029; 0.024]). The indirect effect from AM to AS through AE was weaker among students with a low level of ASE (β = 0.006, 95% CI = [0.004; 0.009]); meanwhile, the indirect effect was stronger among students with a high level of ASE (β = 0.008, 95% CI = [0.005; 0.012]). Figure 3 presents the association between AM and AE at different values of ASE. According to Figure 3, students with high ASE (M + 1SD = 34.76) and high AM levels had the highest levels of AE. At the same time, students with low levels of ASE (M - 1SD = 25.98) and low AM had the lowest levels of AE. More importantly, the index of moderated mediation was significant (β = 0.002, 95% CI = [0.0001; 0.0005]). These results indicated that ASE moderated the indirect effect of AM on AS through AE.

4. Discussion

This study explored the effects of AM on AS among university students in Vietnam. It also ascertained the indirect effect of AE and the conditional indirect effect of ASE in the relationship between AM and AS. Highlights of this study include:

In line with hypothesis 1, this study found that AM directly increased AE in college students. This finding was consistent with previous findings in samples of university students in Turkey (Atasever *et al.*, 2023; Güdül *et al.*, 2021), China (Chau and Cheung, 2018),

Variables	β	*SE*	95% CI
Outcome variable (AE)			
AM ➡ AE	−0.002	0.014	[−0.029; 0.024]
ASE ➡ AE	0.050	0.059	[−0.065; 0.166]
AM * ASE	0.002***	0.001	[0.0001; 0.002]
Gender	0.208	0.185	[−0.154; 0.570]
Age	0.096	0.060	[−0.022; 0.213]
Conditional effects of the focal predictor at values of the moderator			
Low ASE	0.037***	0.004	[0.030; 0.044]
High ASE	0.050***	0.003	[0.044; 0.057]
Outcome variable (AS)			
AM ➡ AS	0.036***	0.003	[0.030; 0.042]
AE ➡ AS	0.165***	0.025	[0.117, 0.214]
Gender ➡ AS	0.009	0.189	[−0.363; 0.380]
Age ➡ AS	−0.067	0.062	[−0.188; 0.055]
Conditional indirect effect at different values of ASE			
Low ASE	0.006	0.001	[0.004; 0.009]
High ASE	0.008	0.002	[0.005; 0.012]
Index of moderated mediation			
	0.0002	0.0001	[0.0001; 0.0005]

Table 3. Moderated mediation analysis

Note(s): ***$p < 0.001$; CI: Confidence interval; AM: academic motivation; AE: academic engagement; AS: academic satisfaction; ASE: academic self-efficacy
Source(s): Author's own creation

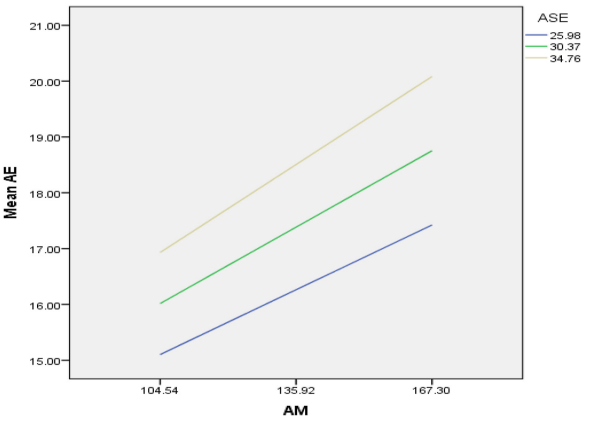

Figure 3. The association between AM and AE at different values of ASE

Source(s): Author's own creation

Chile (Vergara-Morales *et al.*, 2019) and Kazakhstan (Bolatov *et al.*, 2022). According to self-determination theory, the feeling of enjoyment and satisfaction when students conduct learning activities driven by high learning motivation can increase students' feelings of learning satisfaction (Leal *et al.*, 2013; Martin *et al.*, 2017). The students who had motivations at a high level had higher psychological need satisfaction and AS as well (Güdül *et al.*, 2021). Building and developing AM plays an important role in creating happiness and AS among

university students (Vergara-Morales *et al.*, 2019). So, the universities should consider the student's AM an essential factor because of its impact on their AS.

In line with hypothesis 2, this study found that AE partially mediates the association between AM and AS among university students. The result is consistent with the findings of Chau and Cheung (2018) on Chinese university students. This result implies that students with high AM have increased AE; then, high levels of AE promote their AS. These results are consistent with previous findings that AM has a positive impact on AE (Saeed and Zyngier, 2012; Xiong *et al.*, 2015; Yin and Wang, 2016) and AE has a positive impact on AS (El-Sayad *et al.*, 2021; Huaman *et al.*, 2022; Shin, 2019) among university students. Based on previous studies (Martin *et al.*, 2017; Peng, 2021; Zhen *et al.*, 2017), we explain this indirect relationship as follows: Positive moods (enjoyment and satisfaction) in highly motivated students at the beginning of learning activities encourage them to actively interact, do homework and persevere in overcoming difficulties to achieve learning goals. These manifestations demonstrate that learning motivation promotes the level of learning participation. In turn, active engagement in learning can increase AS through experiencing positive emotions resulting from achieving good grades, making academic progress and achieving academic success. Therefore, our findings showed that AE becomes an important mechanism in the link between AM and AS in students. However, compared with the direct effect from AM to AS, the indirect effect from AM to AS through AE was smaller. This result implies that to enhance students' AS, measures aimed at enhancing AM should be prioritized over measures that enhance AE.

In line with hypothesis 3, this study found that ASE moderates the indirect link between AM and AS through AE among university students. Our findings showed that the impact of AM on AS through AE increased when students had high levels of ASE; meanwhile, this indirect effect reduced when students had low levels of ASE. According to previous studies, students with high levels of AM and/or high ASE demonstrate high levels of engagement in academic activities (Abdulwahhab and Hashim, 2020; Saeed and Zyngier, 2012; Xiong *et al.*, 2015; Yin and Wang, 2016; Zhen *et al.*, 2017). AM encourages students to participate in academic activities because they are interested in learning and enjoy the learning process (Adamma *et al.*, 2018). AM drives students to perform academic activities to satisfy their needs, which gives rise to positivity and determines the trend of that positivity. AM is required for AE; nevertheless, successful engagement may help students feel driven in the future. In addition, once students' ASE has been inspired by its priming effects on strategy usage, learning efforts and persistence, it will inevitably benefit learning engagement (Zhen *et al.*, 2017). It is also worth noting that students with high levels of ASE were found to be associated with high AM (Lin *et al.*, 2022; Malkoç and Kesen Mutlu, 2018; Taheri-Kharameh *et al.*, 2018). According to literature, students in the high-scored ASE are more advantaged in their learning experience, which motivates them toward good cohesion and interpersonal support and enhances their motivation (Lin *et al.*, 2022; Malkoç and Kesen Mutlu, 2018; Taheri-Kharameh *et al.*, 2018). Thus, there may exist an interaction term between ASE and AM in a higher education context. Because of the above evidence, students who are simultaneously high in AM and high in ASE have high levels of AE, but students who are simultaneously low in AM and low in ASE have low levels of AE (see Figure 3). Thus, in addition to AM and AE, ASE is also a factor in promoting AS in students. Therefore, to enhance AS, measures to enhance ASE should also be focused on.

Recently, AM was found to promote the increase in AS with hospitality and tourism education through enhancing AE in Chinese university students (Chau and Cheung, 2018). Our study found similar results to the study of Chau and Cheung (2018) on a sample of university students in Vietnam, which few previous studies have investigated. More importantly, this study found for the first time the moderated mediating effects of ASE and AE in the association between AM and AS in college students, which has never been found in

previous studies. These evidences showed that this study has important theoretical significance. It provides new insights into the pathways and conditions of the impact of AM on AS among university students. In addition, our sample included students in many different majors, while Chau and Cheung's (2018) study focused only on hospitality and tourism students. This implies that our research results are more generalizable. In our study, the importance of AM, AE and ASE for academic life satisfaction has been confirmed. Regarding practical significance, this study provides suggestions for higher education institution and educators on measures to improve AS in students. According to this study, enhancing AM, AE and ASE for students may be helpful in improving their AS. To improve AM, ASE and AE among university students, our recommendations for educators include: (1) establish relationships with students and build on their strengths; (2) enhance academic support; (3) create opportunities for students to have autonomy over learning content, learning methods and assessment methods; (4) use active teaching methods (case-based learning, simulation, self-assessment using video typing, cooperative learning, peer assessment and learning contract); (5) leverage social media; (6) help students set and track goals; (7) using psychodrama techniques, (8) live modeling techniques through group counseling, (9) utilizing learning analytics (10) increasing interaction and using collaborative learning approaches. These measures have also been shown to be useful in improving AM and AE (Jasmi and Hin, 2014; Lee, 2012; Ramzan *et al.*, 2023; Robayo-Tamayo *et al.*, 2020; Saeedi *et al.*, 2021; Tanner, 2013) and ASE (Hulukati *et al.*, 2022; Karaoglan Yilmaz, 2022; Permana and Suwarjo, 2022) among students. Higher education institutions and educators in Vietnam can consider using the measures mentioned above to improve AS among students.

We found that the study had some limitations. First, the study used a cross-sectional design, making it impossible to infer a causal relationship between AM, ASE, AE and AS. Therefore, a longitudinally designed study may be needed to determine the direction of the above relationships. Second, due to time constraints and research costs, we used a convenience sampling method. This sampling method has the disadvantage that it cannot determine sampling error and cannot draw conclusions about the population from the sample results. Therefore, stratified sampling methods should be considered for future studies. Third, the prevalence of male and female students in our sample is unbalanced, which may affect the determination of control variables in the mediation and moderated mediation models. Therefore, future research needs to ensure a balanced sample by gender. Finally, the study data were collected using the student self-report method. Therefore, the self-reported results depend on the participants' responses, memory and recall. Future research might consider using self-report in combination with other methods.

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