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Testing the Associations Among University Students' Autonomy, Academic Resilience, and Behavioural Engagement: A Structural Equation Modelling Approach

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Annotation. This study investigated the interplay among learner autonomy (LA), academic resilience (AR), and behavioural engagement (BE) in tertiary students, focusing on how the components of LA (i.e., independence of learning (IL), study habits (SH)) and AR (i.e., self-determination (SD), adaptability (AD)) influenced BE. The findings revealed significant connections between IL, SD and BE. IL also had a reinforcing link to SD and AD. The association between IL and BE was partially mediated by AR.

Keywords: *learner autonomy, academic resilience, behavioural engagement, tertiary education.*

Introduction

Research has emphasized the importance of student engagement for better learning outputs and future employability. Proactive involvement greatly contributes to students' merits in formal education and extracurricular activities (Gorski, 2021). Wholehearted concentration in their studies also facilitates students' pursuit of further education (Wang et al., 2021). In other words, poor engagement in classroom activities, including

the dropout rate, is a factor that negatively impacts academic results. This practice is closely connected to behavioural engagement (BE), an aspect that meaningfully impacts students' performance or unfavorably drives them to playing truant and prematurely leaving schools (Fredricks et al., 2011). Therefore, there is a need for an investigation into factors constructively contributing to students' BE.

Among them, learner autonomy (LA) is worth consideration. A study by Núñez and León (2019) demonstrated that students with autonomy are more engaged in academic tasks. Other studies have subsequently verified this finding (e.g., Benlahcene et al., 2020; Han, 2021a). Academic resilience (AR) is another component linked to BE, where resilient learners immerse themselves more behaviourally in learning (Adeniji et al., 2020). As such, the associations among LA, AR and BE should be further explored.

In Vietnamese higher education, scholars have recently shifted their thoughts on students' BE (e.g., Tran, 2014; Nguyen & Do, 2018). Alarmingly, there has been a rising trend of neglect in studies among students, which is derived from various reasons. Entertainment during the first year of study and excessive time spent on peer socialisation are two telling examples. Passive absorption of technical and soft skills during school days is another manifestation of limited engagement, most likely resulting in unemployment (Nhung, 2023). As a result, Nguyen and Do's (2018) research has shown concerns over the issue. However, few studies have investigated and proposed solutions for addressing it. The current research, accordingly, aimed to explore the link between tertiary students' BE and LA, with AR serving as a mediator.

Theoretical Overview

Learner Autonomy (LA) and Its Dimensions

LA is perceived as a person's aptitude to be fully responsible for their independent learning (Holec, 1981). This is not merely about the learner's ability to work independently but also involves the capability to determine their own academic activities, such as the selection of materials and the assessment of their exclusive ways of learning. Benson (2007) scrutinized Holec's work and proposed three specific dimensions under LA: 'technical', 'psychological', and 'political'. The term 'technical' focuses on the learner's self-practice or training. Concerning 'psychological', LA is regarded as the ability to control one's own study. Moving on to 'political', it describes a condition where learners have autonomy over the content of study. A similar conceptualisation is also suggested by Ponton and Carr (2000), Reeve et al. (2008), and Sidupa (2016). Drawing from the aforementioned definitions, LA means one's own choice of what, how, when, where, and why an individual learns.

The core characteristics of LA, accordingly, facilitated different measures for this construct to be invented and revised (i.e., Guglielmino, 1977; Fisher et al., 2001; Macaskill & Taylor, 2010). Among them, the most recently updated measure consists of two subscales: 'independence of learning' (IL) and 'study habits' (SH), with acceptable internal reliability and concurrent validity (Macaskill & Taylor, 2010).

Academic Resilience (AR) and Its Dimensions

Resilience is a complex notion shaped by different components: adaptability, self-efficacy, and firmness (e.g., Yu et al., 2019; Xue, 2021). Take Xue's (2021) case as an instance. Resilience in the researcher's viewpoint refers to individuals' competencies of adapting to new situations and bouncing back against barriers; thus, increasing their confidence. In education, students with a high level of resilience are capable of overcoming learning setbacks, successfully managing school requirements and securing academic accomplishments (Brewer et al., 2019).

Prince-Embury's (2008) measure of AR consists of three smaller scales, namely self-control capacity (buoyancy, self-efficacy, versatility), connection capacity (faith, backing, contentment, acceptance), and emotional responses (sympathy, restoration, suffering). In a similar vein, Sætren et al.'s (2019) scale showcases one's experiences in reality, which encompasses three dimensions: awareness of expertise, relevancy, and emotional sensibility. Inheriting these measures is the instrument revised and developed by Jardim et al. (2021). For this development, the researchers argued that the earlier scales focused mostly on the mental health issues of children and teenagers. Moreover, they tended to be complicated in terms of culmination and explanations, which makes them difficult to apply to larger populations. The modified instrument, with its application in higher education, comprises two sub-constructs: self-determination (SD) and adaptability (AD).

Behavioural Engagement (BE)

BE is a significant dimension of student engagement. In the view of Dessart et al. (2015) and Hiver et al. (2024), the term refers to students' engaged participation in school activities. Dessart et al. (2015) point out the observable aspects, namely, constructive demeanours, presence, and exertion, to stay focused on exercises or assignments. Hence, the term is a set of specific features that are perceivable and discernible. Gunuc and Kuzu (2015) developed a "student engagement" scale based on its specified features in the literature. The present research used this scale to scrutinize student BE in association with LA and AR.

Connections Between LA, AR, and BE

Research has demonstrated an inextricable connection between LA and BE. Núñez and León (2019) revealed that autonomy support can foster student engagement, which echoes those of Jang et al. (2012) and Han (2021a). They also stated that positive BE is derived from LA development. Hence, it is speculated that:

H1a: IL has a meaningful effect on BE.

H1b: SH has a positive impact on BE.

Studies conducted by Adeniji et al. (2020) and Yang and Geng (2024) proved that AR entails BE. Conversely, conducted with European immigrant students, Martin et al. (2022) reported that BE predicts AR, emphasizing the role of resilience in mitigating socio-educational obstacles. Considering these findings, we hypothesize that:

H2a: SD has a meaningful connection with BE.

H2b: AD has a positive correlation with BE.

Boosting LA is reported to increase students' AR (Salazar-Ayala et al., 2021). The capability of formulating strategies and setting a clear vision in learning greatly contributes to the growth of LA (Yu, 2023). It is; therefore, hypothesized that:

H3a: IL has a positive effect on SD.

H3b: IL has a significant effect on AD.

H4a: SH has a meaningful influence on SD

H4b: SH has a substantial influence on AD.

Adeniji et al. (2020) examined the indirect impact of AR on BE, confirming that resilient students tend to be engaged in school activities. In Polat's (2024) research, the nexus of learning readiness and student engagement in online classes was shown to be mediated by resilience. As a result, it is postulated:

H5a: AD meditates the connection between IL and BE.

H5b: SD meditates in the connection between IL and BE.

H6a: AD meditates in the link between SH and BE.

H6b: SD meditates in the link between SH and BE.

H7a: AD and SD meditate the nexus between IL and BE.

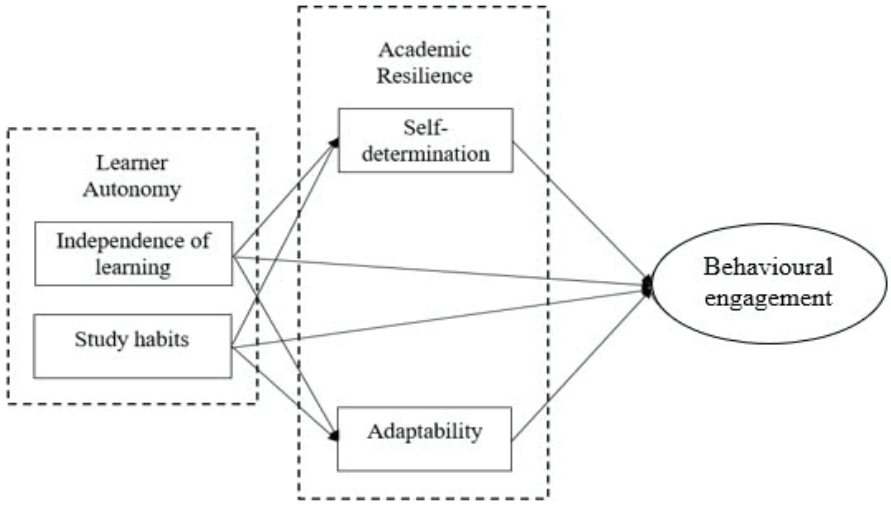
H7b: AD and SD meditate the nexus between SH and BE.

The Hypothesised Model

The current framework is hypothesized based on the discussed relationships between the three constructs, namely, LA, AR, and BE. First, it is theorized that IL and SH (LA) have significant influences on BE. Next, SD and AD (AR) presumably have positive influences on BE. Third, it is presumed that IL and SH have positive impacts

on AR. Finally, it is speculated that SD and AD mediate the connection of IL and SH with BE in academic activities. Figure 1 below illustrates these intricate nexuses.

Figure 1
The Hypothesised Model



Methodology

Research Design

This quantitative study employed a cross-sectional correlational integrated design using a survey questionnaire as a primary instrument for data collection. This design allows for the examination of the links between multiple variables using data collected at a specific point in time (Mann, 2003). The present study was intended to explore the associations among tertiary students' LA, AR, and BE in their learning.

Participants

The present study included 549 participants, who were selected via convenience sampling. There were 257 (46.8%) males and 292 females (53.2%), with ages ranging from 18 to 24. Most of the participants were first-, second-, and third-year students, who together accounted for more than 90% of the participants. The remaining participants were in their fourth, fifth, and sixth years of study. The participants came from different universities in Vietnam, including public (N = 39, 7.1%) and predominantly private (N = 510, 92.9%) institutions. They were pursuing degrees in three primary fields of study, namely Natural sciences (N = 298, 54.3%), Social sciences and humanities (N = 196, 35.7%), and Health sciences (N = 55, 10%).

Instruments

As mentioned earlier, the questionnaire was employed to gather data for the present study. It was adapted from various well-established sources in the relevant literature and encompasses two distinct sections. The first section was for gathering the participants' demographic information. Section two comprises the adapted LA, BE, and AR measures, all of which are constructed by 32 items. These items are rated based on a 5-point Likert scale, in which 1 denotes "strongly disagree" and 5 represents "strongly agree". Detailed information about these measures is presented below.

The LA scale used in this research includes two factors: IL (6 items) and SH (6 items) (Macaskill & Taylor, 2010). One example item is '*I enjoy finding information about new topics on my own*'. According to the results of the scale test, one item in the former and two in the latter were deleted as their item-total correlations were lower than 0.3 (Nurosis, 1994). Consequently, the IL subscale included five items ($\alpha = 0.83$), and the SH comprised four items ($\alpha = 0.73$).

The AR scale is composed of two factors: SD (5 items) and AD (5 items) (Jardim et al., 2021). However, one item was deliberately removed to fit the context of the current research ('*I feel comfortable with my body*'). Hence, the adapted instrument encompassed nine items in total: SD (4 items) and AD (5 items). A sample item is '*I manage to minimise the negative effects of difficulties*'. The reliability coefficient of the first factor was 0.69. Nunnally and Bernstein (1994) suggest that a reliability coefficient is expected to reach a minimum of 0.7 to ensure sufficient reliability; however, values slightly below this threshold can still be considered acceptable. Therefore, following this proposition, this subscale was retained for use in the present paper. For the second factor, the Cronbach's alpha value was 0.8.

For the examination of learning engagement, the present research utilized the BE scale from Gunuc and Kuzu (2015). It encompasses ten items, with one stating '*I try to do my best regarding my responsibilities in group work*'. The reliability value of this questionnaire was 0.85, indicating its high reliability.

Data Collection Procedure

Following convenience sampling, the data were collected over two weeks at various Vietnamese universities. Specifically, the researchers sent an online survey link to different groups of participants via Zalo, a Vietnam-based social platform. To reach a larger sample of population representatives, the research team collaborated with some colleagues at different universities for their support in data collection by asking them to share the link with their institutions' students. Prior to completing the questionnaire, participants were informed that their responses would be kept strictly anonymous. Consequently, 549 responses were gathered and regarded as valid for data analyses.

Data Analyses

Explanatory Factor Analysis (EFA) was executed to elucidate the associations among the factors and their loadings, thereby uncovering the latent structure among the observed variables in the conceptual framework (Hair et al., 2014). After this step, Confirmatory Factor Analysis (CFA) was computed to appraise the measurement model and verify the distinctiveness of the variables. Subsequently, Structural Equation Modeling (SEM) was performed. This method allows researchers to test theoretical models by examining both observed and latent variables simultaneously, providing a comprehensive understanding of the underlying structures (Mueller & Hancock, 2018). The structural model was meticulously evaluated using a suite of goodness-of-fit indices. Specifically, a χ^2/df value below 3 suggests good model fit (Bryant & Satorra, 2012), while RMSEA and SRMR ≤ 0.08, along with CFI, NFI, TLI, and GFI ≥ 0.90, indicate acceptable fit (Byrne, 2010).

Results

Exploratory Factor Analysis

To evaluate the adequacy of the sample for factor analysis, the Kaiser-Meyer-Olkin (KMO) test, a key component in EFA, was computed. It was found that the KMO value was 0.827, exceeding the recommended threshold of 0.5 (Tabachnick & Fidell, 2001). This result indicated strong correlations among the items and justified the application of factor analysis. Bartlett's test further supported the appropriateness of the data for factor analysis by demonstrating significant associations among the variables ($p < 0.001$). Besides, Varimax Kaiser Normalization was applied as a rotation method, resulting in the extraction of four principal components, each with eigenvalues exceeding 1.0 and collectively explaining 65.41% of the total variance. However, six items from the LA and AR scales were eliminated due to their significant cross-loadings (Deniz & Kazu, 2024). The remaining twelve variables were loaded into four factors. Specifically, the two dimensions of LA, namely IL and SH, emerged as distinct factors affecting students' BE, each containing three items. Similarly, regarding AR, items belonging to this scale were loaded into two factors, which were the predetermined dimensions of SD and AD, with the former consisting of two items and the latter having four items. As a whole, the outputs from EFA resulted in four factors being extracted to fit the factorial model, including IL (3 items), SH (3 items), SD (2 items), and AD (4 items), as seen in Table 1. The Cronbach's alpha coefficients were 0.76, 0.78, 0.70, and 0.71, respectively.

Table 1

Rotated Component Matrix[a]

Observed variable	Factor			
	1	2	3	4
IL6	.793			
IL2	.778			
IL3	.768			
SH7		.814		
SH10		.787		
SH8		.769		
AD7			.792	
AD6			.728	
AD8			.724	
AD3			.677	
SD2				.836
SD5				.828

Measurement Model Assessment

The CFA results indicated that the measurement model exhibited a good fit to the sample data with $\chi^2 = 128.827$, df = 48, $\chi^2/df = 2.684$, GFI = 0.961, CFI = 0.957, TLI = 0.941, NFI = 0.934, RMSEA = 0.055, and SRMR = 0.049. The standardized factor loadings are strong, with most loadings close to or above 0.70, demonstrating robust interconnectedness between the observed variables and their respective latent constructs. Overall, the CFA results indicated that the theoretical framework adequately captured the underlying structure of IL, SH, SD, and AD among the participants.

In addition, composite reliability (CR) and average variance extracted (AVE) were calculated to check for the convergent validity of each dimension. The results revealed that the four factors demonstrated satisfactory convergent validity, with the values of CR exceeding the proposed construct reliability cut-off of 0.60 (Fornell & Larcker, 1981). The AVE values for the two factors of IL and SD surpassed the recommended threshold of 0.50, while these values for the two remaining factors of SH and AD were just below 0.50. Fornell and Larcker (1981) established criteria for confirming convergent validity, stating that an AVE value below 0.50 is acceptable as long as the CR value is above 0.60 for all constructs. As the CR values for the four constructs ranged from 0.71 to 0.78, with all the AVE values greater than 0.4, the discriminant validity of the measurement model was acceptably established. The results of convergent and discriminant validity are illustrated in Table 2.

Table 2

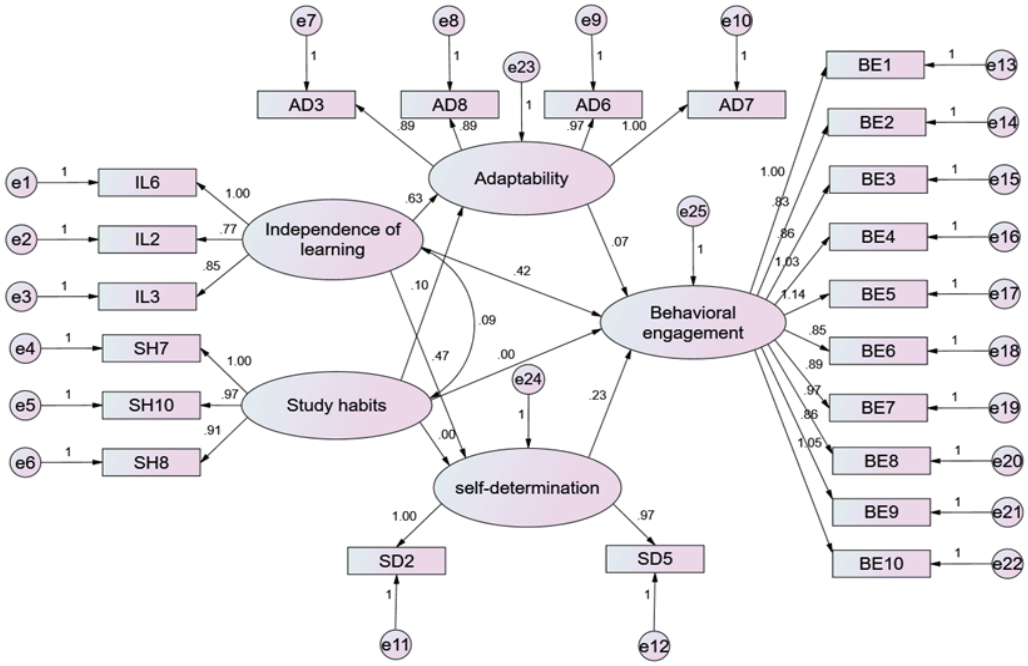
Measurement Assessment Results

Constructs	Factor loadings	Cronbach's alpha	CR	AVE
IL		0.76	0.766	0.522
IL6	.793			
IL2	.778			
IL3	.768			
SH		0.78	0.712	0.455
SH7	.814			
SH10	.787			
SH8	.769			
AD		0.71	0.781	0.473
AD7	.792			
AD6	.728			
AD8	.724			
AD3	.677			
SD		0.70	0.713	0.554
SD2	.836			
SD5	.828			

Structural Model Assessment

In order to evaluate the model fit, SEM was run. The results revealed a good moel fit as most of the fit indexes were within the recommended criteria: $\chi^2 = 494.720$, df = 187, $\chi^2/df = 2.646$, GFI = 0.928, CFI = 0.928, TLI = 0.912, RMSEA = 0.055, and SRMR = 0.060. Although the NFI value of 0.891 was slightly below the threshold of 0.90, it was still considered acceptable as it fell within the benchmarks of 0.5 to 1.0, with values closer to 1.0 indicating a better fit (Arham et al., 2022; Lohmöller, 1989). Therefore, the model fit was acceptable. Overall, it could be concluded that the model adequately represents the associations among the studied variables. Figure 2 depicts the structural assessment based on the SEM outputs.

Figure 2
The Structural Assessment



Hypothesis Tests

The results from SEM showed that IL (SRβ = 0.578, p < 0.001) and SD (SRβ = 0.273, p < 0.001) positively influenced BE, with the former exerting a stronger effect. Therefore, H1a and H2a were supported. Conversely, SH (SRβ = 0.008, p = 0.845) and AD (SRβ = 0.086, p = 0.194) did not significantly affect BE. Thus, H1b and H2b were not supported. Regarding SD and AD as dependent variables, the results showed that both IL (SRβ = 0.672, p < 0.001) and SH (SRβ = 0.135, p < 0.01) have significant impacts on AD and that while IL (SRβ = 0.541, p < 0.001) demonstrated a strong positive impact on SD, there was no significant interaction between SH and this endogenous construct (SRβ = 0.002, p = 0.976). Hence, H3a, H3b, and H4b were supported, whereas H4a was rejected.

To test the mediating effects of SD and AD as two indicators of resilience on the nexus between each of the dimensions of LA (i.e., IL and SH) and BE, the bootstrap method was used. In this study, 5000 bootstrap samples, together with 95% bias-corrected confidence intervals, were computed for the mediation analysis. It was found that there was an indirect effect of IL on BE through SD (SRβ = 0.108, p < 0.001),

whereas AD (SRβ = 0.042, p = 0.269) did not play a significant mediating role in the nexus between these two constructs. Thus, H5b was corroborated, whereas H5a was rejected. In addition, there was no significant indirect link between SH and BE when either AD (SRβ = 0.007, p = 0.178) or SD (SRβ = 0.00, p = 0.945) acted as a mediator. As a result, both H6a and H6b were not supported. The results also indicated that SD and AD as a whole significantly mediated the link between IL and BE (SRβ = 0.150, p < 0.01). Therefore, H7a was supported. In contrast, the indirect effects of SH on BE through SD and AD were insignificant (SrRβ = 0.007, p = 0.534). As such, H7b was rejected. Table 3 displays the results of the hypothesis testing.

Table 3

Hypothesis Testing Results

Hypotheses	Hypothesized paths	SRβ	P	Results
H1a	IL → BE	0.578	***	Supported
H1b	SH → BE	0.008	0.845	Not supported
H2a	SD → BE	0.273	***	Supported
H2b	AD → BE	0.086	0.194	Not supported
H3a	IL → SD	0.541	***	Supported
H3b	IL → AD	0.672	***	Supported
H4a	SH → SD	0.002	0.976	Not supported
H4b	SH → AD	0.135	**	Supported
H5a	IL → AD → BE	0.042	0.269	Not supported
H5b	IL → SD → BE	0.108	***	Supported
H6a	SH → AD → BE	0.007	0.178	Not supported
H6b	SH → SD → BE	0.000	0.945	Not supported
H7a	IL → AR → BE	0.150	**	Supported
H7b	SH → AR → BE	0.007	0.534	Not supported

Discussion

The present research aims to find out the potential interconnections among LA, AR, and BE, thereby proposing a conceptual model for future research. They will be addressed in detail in the following order: the links between (1) LA and BE, (2) AR and BE, (3) LA and AR, and (4) the role of AR in the nexus between LA and BE.

Although SH was statistically shown to have no meaningful connection with BE (SRβ = 0.008, p > 0.001), IL and BE were revealed to be inextricably connected (SRβ = 0.578, p < 0.001). Hence, students' ability to learn independently plays a pivotal role in boosting their engagement in scholastic tasks. This current finding is in line with

that of previous research (e.g., Benlahcene et al., 2020; Han, 2021a). Owing to teacher support, LA can be augmented, leading to the enhancement of BE. As for the tie between AR and BE, the present research revealed that while AD was not connected with BE ($SR\beta = 0.086$, $p > 0.001$), the other component, SD, had a considerable effect on BE ($SR\beta = 0.273$, $p < 0.001$). As such, it can be concluded that students who are resilient and determined when faced with obstacles are proven to be more proactively involved in their learning process (Romano et al., 2021; Sun & Liu, 2023). The interconnectedness among IL, SD and AD was confirmed in this research ($SR\beta = 0.541$, $p < 0.001$; $SR\beta = 0.672$, $p < 0.001$, respectively). This echoes the findings of Salazar-Ayala et al. (2021), and Yu (2023). With a clear purpose for self-study, students are likely to be more persistent. Regarding the mediating role of AR in the connection between LA and BE, our research revealed that there was an indirect effect of IL on BE via AR ($SR\beta = 0.150$, $p < 0.01$). In the literature, some studies have paid attention to this type of impact (Adeniji et al., 2020; Polat, 2024). Notably, in these two studies, while the former was conducted in online classes, the latter focused on a different independent variable, family function. Therefore, this specific finding is expected to make a significant contribution to the related literature regarding these intricate interrelations.

Implications and Limitations

Given that the IL dimension, alongside AR, was shown to have positive correlations with BE, some pedagogical proposals can be recommended to develop BE in academic tasks. First and foremost, students' engagement in general and their behaviour can be enhanced if they are capable of learning independently. In this respect, lecturers and teachers can play a supporting role in fostering students' autonomy (Chen, 2020).

In addition, the students in the current research were revealed to actively engage in their learning through their AR. That is, enhancing resilience means improving active participation in school activities (Salazar-Ayala et al., 2021). If these practices are performed successfully, concerns about students' disengagement in classroom tasks can be solved.

Regarding the limitation, the current study adopts the quantitative approach, which is focused on the numerical data. Hence, it cannot gain more insights into why the phenomenon under investigation occurs. This limitation points to the need for further investigations delving into the interplay among the studied constructs using a mixed-methods approach, where both quantitative and qualitative data are collected.

Conclusion

The present study investigated the interplay of LA and BE, with AR acting as a mediator in this connection. The results showed that both LA and AR, particularly through their respective dimensions of IL and SD, were meaningful predictors of BE. Besides, AR and its dimension of SD were found to be significant mediators in the relationship between IL and BE. Thus, to increase students' BE, their autonomous learning and resilience, especially SD, should be enhanced.

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Universiteto studentų autonomijos, akademinio atsparumo ir elgesio sąsajų testavimas: struktūrinių lygčių modeliavimo metodas

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Santrauka

Šiuo tyrimu buvo siekiama ištirti besimokančiojo autonomijos (angl. *LA*), akademinio atsparumo (angl. *AR*) ir aukštųjų mokyklų studentų elgesio (angl. *BE*) ryšį. Konkrečiai buvo nagrinėjama, kokią įtaką studentų elgesiui turi mokymosi savarankiškumas (angl. *IL*) ir mokymosi įpročiai (angl. *SH*), kaip besimokančiojo autonomijos sudedamosios dalys, kartu su apsisprendimu (angl. *SD*) ir gebėjimu prisitaikyti (angl. *AD*), kaip akademinio atsparumo aspektais. Šiame tyrime taip pat buvo nagrinėjamas tarpinis besimokančiojo autonomijos ir aukštųjų mokyklų elgesio sąsajos akademinio atsparumo vaidmuo. Naudojant internetinį klausimyną, duomenys surinkti iš įvairių Vietnamo universitetų. Tyrime dalyvavo 549 studentai. Remiantis koreliaciniu modeliu, surinktiems duomenims analizuoti taikytas struktūrinių lygčių modeliavimo metodas. Tyrimo rezultatai parodė, kad mokymosi savarankiškumas ir apsisprendimas turėjo reikšmingą poveikį aukštųjų mokyklų studentų elgesiui, o mokymosi įpročiai ir gebėjimas prisitaikyti neturėjo reikšmingo poveikio. Be to, mokymosi savarankiškumas buvo teigiamai susijęs ir su apsisprendimu, ir su gebėjimu prisitaikyti. Nors mokymosi įpročiai buvo susiję su apsisprendimu, vis dėlto apsisprendimas neturėjo reikšmingo ryšio su gebėjimu prisitaikyti. Be to, koreliacinių ryšių analizė atskleidė, kad akademinis atsparumas iš dalies veikia mokymosi savarankiškumą ir studentų elgesio tarpusavio ryšį. Vis dėlto akademinis atsparumas nepadėjo nustatyti mokymosi įpročių ir studentų elgesio ryšio.

Esminiai žodžiai: *besimokančiojo autonomija, akademinis atsparumas, elgesys, aukštųjų mokyklų studentai.*

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