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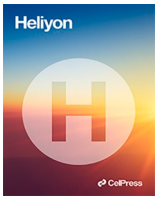

Research article

Students' beliefs, basic psychological needs, classroom participation, foreign language anxiety, and academic adjustment: A correlation study in Tashkent, Uzbekistan

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ABSTRACT

This study aimed to explore the relationships between study variables that directly and indirectly affect students' beliefs and academic adaptation. A measurement tool model was used to assess participants' 'academic adjustment' (academic motivation, academic lifestyle, academic achievement), basic psychological needs factors (autonomy, competence, relatedness), beliefs about assessment factors (benefit for learning, fairness), classroom participation, and students' FLP anxiety. Explanatory factor analysis (EFA) and confirmatory factor analysis (CFA) were employed to validate the questionnaires. The study sample consisted of 319 university students aged 17–35 years. The findings revealed significant associations among students' classroom participation, autonomy, foreign language anxiety, and relatedness. A significant indirect association with classroom participation through autonomy was also observed. Additionally, classroom participation showed significant correlations with foreign language anxiety, academic motivation, academic achievement, and perceived fairness. Academic achievement was significantly associated with academic lifestyle. Furthermore, classroom involvement was strongly associated with relatedness via foreign language classroom anxiety, and academic motivation was linked to academic lifestyle via academic performance. Academic achievement was linked to fairness via an academic lifestyle. According to the findings, the full mediation model considers all variables directly and indirectly, providing a validated model to guide higher education leaders and staff in developing programs that foster positive associations among the variables. Based on the main findings, limitations and recommendations were provided.

1. Introduction

In recent years, the landscape of higher education on a global scale has undergone a significant transformation characterized by the

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unprecedented mobility of highly educated individuals. The rapid growth of globalization and the internationalization of higher education (HE) have presented numerous challenges faced by international students, particularly those hailing from countries such as Uzbekistan. Among these challenges, international professors play a vital role in shaping the academic and cultural experiences of these students. This article explores the world of international students from Uzbekistan who embark on their educational journeys at foreign universities.

The academic trajectory of Uzbek students in foreign countries is fraught with challenges and obstacles. These include language barriers, unfamiliarity with local cultures, a lack of established relationships with advisors and professors, differences in teaching styles and curricula, feelings of isolation, and anxiety. Taken together, these factors give rise to a complex array of issues that necessitate thorough examination. Consequently, addressing these challenges is essential, as they have a significant impact on the academic success, adaptation, and overall well-being of international students. As a result, there has been a growing emphasis on investigating the factors that influence the academic performance and integration of students enrolled in foreign higher education institutions.

The successful transition to tertiary education is pivotal for the success of international students in a foreign academic environment. This process of adaptation, commonly referred to as academic adjustment, includes a range of strategies and mechanisms that students employ to navigate the intricacies of their educational journey. Academic adjustment in this study includes students' efforts to complete academic tasks, their academic achievements, and their overall satisfaction with the learning environment.

Prior research in the field has mostly focused on specific aspects of international programs, such as the experiences of students from the host university, evaluating joint programs, or exploring the pedagogical perspectives of professors involved in joint programs. However, this study aims to take a more comprehensive approach by examining the unique experiences of Uzbek students facing linguistic and academic challenges, assessment perceptions, psychological needs, and culture shocks within the academic environment of Bucheon University in Tashkent.

Uzbekistan presents an interesting landscape for international education, as there has been limited research conducted in this area, particularly in terms of collaborative programs with international universities offering programs from various countries. This highlights the need to conduct studies across different regions and contexts to provide valuable insights to decision-makers in higher education and university management.

It is expected that these insights will help identify challenges and develop programs that enhance the quality of the educational experience. Additionally, the findings of this study are likely to be particularly relevant for stakeholders within international universities in Uzbekistan. By examining the complex relationships among the variables in this study, the aim is to inform the development of programs that cater to the specific needs of international students, creating a more enriching and satisfying educational journey. Furthermore, it is anticipated that the results of this study will assist higher education management in improving the quality of education and attracting more international students to universities in Uzbekistan. Specifically, this study addresses issues related to basic psychological needs, students' beliefs about assessment, classroom participation, foreign language anxiety, and academic adjustment. These enhancements will motivate students and make them more inclined to join international universities in Uzbekistan, especially when they feel that their concerns and needs are being addressed.

In summary, this research seeks to explore the multifaceted dynamics of academic adjustment, psychological needs, and assessment perceptions among international undergraduate students in Uzbekistan. By addressing these crucial aspects, this study aims to bridge a significant gap in the current knowledge and serve as a valuable resource for university administrators, policymakers, and educators dedicated to enhancing the educational experiences of international students.

1.1. Hypotheses of the studies

The following are the specific hypotheses for the current research:

H1. The benefit of learning has a positive relationship with classroom participation.

H2. There is a positive relationship between the benefit of learning and autonomy.

H3. There is a significant relationship between the benefit of learning and foreign language anxiety.

H4. There is a positive relationship between the benefit of learning and relatedness.

H5. There is a significant relationship between classroom participation and foreign language anxiety.

H6. There is a positive relationship between academic motivation and academic achievement.

H7. There is a relationship between academic motivation and fairness.

H8. There is a significant relationship between academic achievement and academic lifestyle.

H9. There is an indirect relationship between the benefit of learning and classroom participation through autonomy.

H10. There is an indirect relationship between classroom participation and relatedness through foreign language classroom anxiety.

H11. There is an indirect relationship between academic motivation and academic lifestyle through academic achievement.

H12. There is an indirect relationship between academic achievement and fairness through academic lifestyle.

Table 1
Research sample characteristics.

Variable		N. of students	Percentage (%)	M	SD
Gender	Male	83	26.9		
	Female	226	73.1	1.730	0.443
Age	Less than 20	119	37.3	1.859	0.766
	20–25	126	39.5		
	26 and above	74	23.2		
Grade	1st	92	29.8		
	2nd	108	35.0	2.056	0.803
	3rd	109	35.3		

Note: M = Mean; SD= Standard Deviation.

2. Literature review

The term "adjustment" refers to the set of behaviors displayed by an individual in response to the social, psychological, and physical demands imposed by their environment [1]. The environment plays a crucial role in shaping this adjustment, particularly in an academic context [2]. Academic adjustment includes various factors that influence how individuals interact with their environment, their academic success, and their overall life satisfaction [3].

Academic adjustment includes crucial components such as the desire to learn, taking action to meet academic expectations, having clear academic goals, and experiencing satisfaction with the academic environment [4]. Involvement in school activities and adapting to the academic life of college students are critical determinants of success. A study by Goudih, Abdallah, and Benraghda showed a positive correlation between student engagement and college adjustment [5], emphasizing that active participation in class can lead to successful academic balancing. Additionally, social support is identified as a vital element in achieving academic adjustment, particularly for students transitioning to foreign academic environments, such as Uzbek students [6].

Uzbek students face specific adjustment challenges when transitioning to foreign academic settings [7]. These challenges can include academic difficulties resulting from language barriers or a lack of English proficiency, issues in forming friendships with peers and faculty, and adapting to new teaching methods and curriculum differences. However, while language-related difficulties can affect academic learning, the data suggest that they are not the sole hindrance to academic success [8].

This study also examines the distinction between surface learning and deep learning methods. Surface learning, often associated with rote memorization, involves reproducing and recalling information without a thorough understanding of the content [9]. On the other hand, deep learning focuses on a comprehensive understanding of the material, integration with prior knowledge, organization of concepts, and self-assessment [10]. The use of deep learning methods is associated with greater academic performance than surface learning approaches [11].

This study sheds light on the limited understanding of the fundamental psychological needs of Uzbek students and their contributions to deep learning processes and learning strategies. Different factors, such as the characteristics of student groups, can result in variations in learning styles across different fields. This study proposes the concept of basic psychological needs, which serve as motivating forces for student engagement in the classroom according to self-determination theory [12]. These psychological needs include autonomy, competence, and relatedness, and meeting these needs is associated with improved student engagement and positive educational outcomes.

Moreover, the study examines the influence of students' beliefs about assessment on their learning. It emphasizes that students' perceptions of assessments can influence their learning strategies and outcomes. When assessments are perceived as valuable and meaningful, students are more likely to employ deep learning methods and achieve better academic performance. Additionally, this study investigated foreign language classroom anxiety and its effects on classroom participation. Language anxiety and a lack of confidence can impede students' participation in class, leading to adjustment difficulties, stress, and anxiety in academic environments.

In summary, this study aimed to investigate the relationships among academic adjustment, basic psychological needs, beliefs about assessment, classroom participation, and foreign language classroom anxiety among Uzbekistani students. This research seeks to offer recommendations for program development and further exploration of these factors in this specific context, contributing to a better understanding of academic adjustment and its determinants.

3. Method

The present research aimed to assess students' beliefs and academic adaptation using learning scales and subsequently examined the relationship between students' beliefs and academic adaptation at Bucheon University in Tashkent, a foreign university in Uzbekistan.

3.1. Research design

The selected research design employed a quantitative approach to assess scales of academic adjustment, student beliefs, and

academic adaptation to determine the factors influencing academic adjustment (academic motivation, academic lifestyle, and academic achievement), basic psychological needs (autonomy, competence, and relatedness), beliefs about assessment (benefit for learning and fairness), classroom participation, and students' FLA. This study utilized correlational research to examine the relationships between these variables using correlational statistics [13]. The studies included several hypotheses, each analysed using an appropriate statistical method.

3.2. Participants

The study took place at Bucheon University in Tashkent, Uzbekistan, and specifically focused on the 1st, 2nd, and 3rd levels, as detailed in Table 1. The sample consisted of undergraduate students from various degree programs, including business management, Korean, and preschool departments. The participants represented 11 different nationalities, such as Armenian, Azerbaijani, Korean, Russian, Karakalpak, Kazakh, Uzbek, Turkmen, Tatar, and Tajik. A total of 319 students (83 males, 26.9 %; 226 females, 73.1 %) participated in the study. The participants were categorized into three age groups: 119 were less than 20 years old (37.3 %), 126 were between 20 and 25 years old (39.5 %), and 74 were 26 years old or older (23.2 %). Furthermore, the participants were divided into three groups: 92 at the 1st level (29.8 %), 108 at the 2nd level (35 %), and 109 at the 3rd level (35.3 %). The sample selection employed a random sampling technique, with 100 students used for pilot testing. The academic year for the study was 2021–2022.

The sample was randomly selected from the target population. Therefore, the "target population" refers to the entire group of subjects in which the researcher is interested. The necessary parameters for estimating the sample size were determined. Statistical descriptive inferential analysis allowed researchers to infer information about the target population with a high degree of confidence based on the results obtained from the sample. Bucheon University, an international university in Uzbekistan, was chosen for the study due to the affiliation of one of the authors with the institution and the support received from university management. The study focused on undergraduate students in the business management program, selecting participants from three different levels (first, second, and third), as shown in Table 1.

3.3. Research instrument

The instrument utilized in this study was developed based on a comprehensive review of relevant educational literature and previous research. Key sources informing the design of the instrument included studies on academic adjustment [14], beliefs about assessment [15], basic psychological needs [16], classroom participation [17], and foreign language classroom anxiety [18]. The validation and development of the instrument involved the following three stages: expert examination, pilot testing, and final application. Initially, five professionals and specialists reviewed the instrument to assess its surface validity. Subsequently, a pilot test was conducted with a sample of 100 students to validate the opinions of these experts. To measure the responses to the research tool items, a five-point Likert scale (strongly disagree, disagree, neutral, agree, strongly agree) was used.

The initial version of the questionnaire consisted of 71 items organized into 12 factors: a student academic adjustment scale (comprising Academic Motivation, Academic Achievement, and Academic Lifestyle), a basic psychological needs scale (including Benefit for Learning, Authenticity, Consistency with Learning Objectives, and Fairness), beliefs about assessment scales (including Autonomy, Competence, and Relatedness), a foreign language classroom anxiety scale, and a classroom participation survey. However, two factors, namely, Consistency with Learning Objectives and Authenticity, were subsequently removed based on construct validity and reliability analyses using exploratory and confirmatory factor analysis. Consequently, the current instrument comprised 10 factors. Specifically, the student academic adjustment scale comprised nine items, the basic psychological needs scale (BPNS) consisted of 20 items, the beliefs about assessment scale included 25 items, the foreign language classroom anxiety scale (FLCAS) featured eight items, and the classroom participation survey contained nine items.

During the analysis process, the researchers tested 12 factors. However, based on item loading and standard loading across different factors, it was determined that consistency with learning objectives and authenticity should be excluded. This decision was supported by statistical analyses and previous studies, leading to their exclusion from the final version of the instrument.

3.4. Procedures

The participants in the study were provided with a questionnaire to complete. To ensure a better understanding of the questionnaire, the students had the option to translate it from English into Uzbek and Russian. The survey was distributed to undergraduate students enrolled at Bucheon University in Tashkent to obtain an appropriate sample size for the study. The researcher sought assistance from other teachers and staff members to successfully interview students who met the criteria for the target sample. The lecturers and helpers helped distribute the questionnaire to the appropriate university students. Multiple attempts were made to reach the desired study population to ensure that every eligible student had the opportunity to participate if desired. A total of 540 undergraduate students agreed to participate in the study. The final sample was registered to prevent any missing results, including questionnaires that were completed and returned by the students. To access the questionnaire, students were required to read background material on the study and provide consent to participate.

3.5. Data collection

The students convened at their university in December, February, and March 2021. Prior to the meetings, preparations were made,

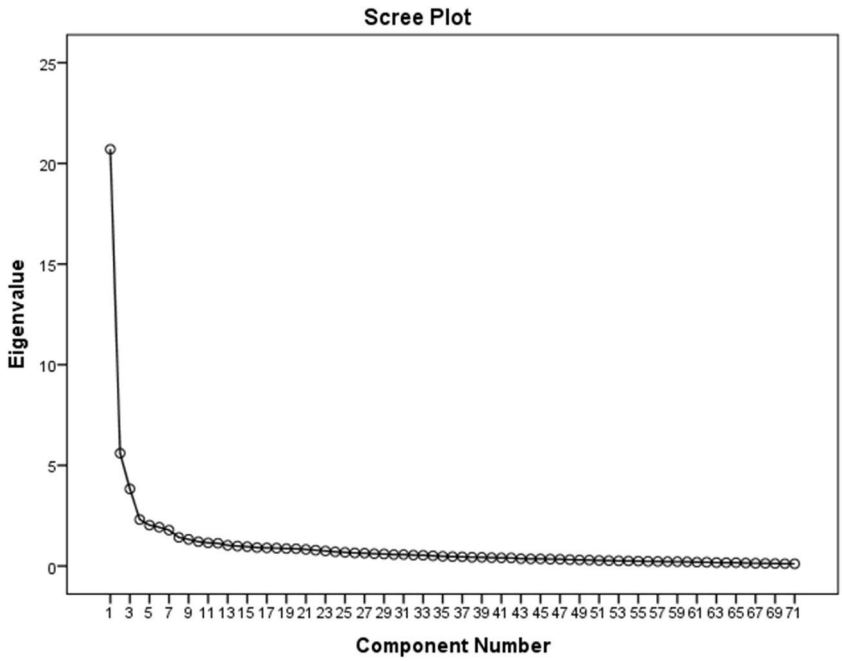

Fig. 1. Scree plot of the study instruments.

and requests were sent to the principal and dean of Bucheon University in Tashkent, Uzbekistan. The consent letter was also sent to Bucheon University in Tashkent. Efforts were made to arrange face-to-face meetings with the university principal and dean to facilitate the pilot test. All participants provided written consent in advance, and the study was also approved by the Shaanxi Normal University Ethical Review Board. Precautions were taken to minimize sample errors. Therefore, a random sample of sufficient size was selected, taking into account the complexity of the population rather than the proportion of the sampled research population, which was more relevant. While a larger sample size reduces the risk of biased results, diminishing returns may occur when the sample size exceeds a certain threshold, which must be balanced with the resources available to the researcher. Thus, as the sample size increases, the sampling error rate decreases and can be statistically estimated. However, the research population consisted of no more than 400 students from the Foreign University of Bucheon in Tashkent, Uzbekistan, specifically from the 1st, 2nd, and 3rd grades. In this case, a statistical equation was not utilized. Nonetheless, the sample size was considered sufficient to produce valid results for the overall research population.

3.6. Research tools

3.6.1. Academic adjustment scale

This scale was used to measure the participants' academic progress. It was developed by Anderson et al. and assesses academic adjustment across three dimensions: academic motivation, academic accomplishment, and academic lifestyle. The scale consists of nine items [19].

3.6.2. The beliefs about assessment scale

The revised 26-item BAS was employed to appraise students' attitudes towards high-stakes assessment in second language acquisition. This scale comprises four subscales: Benefit for Learning (13 items), Authenticity (5 items), Consistency with Learning Objectives (3 items), and Fairness (5 items). Examples of benefits for learning include assessments that assist in planning studies and reflecting on real-life events. The BAS utilizes a five-point Likert-type scale ranging from disagree (1) to agree (5). Based on statistical analysis and existing research, experts have recommended the exclusion of consistency with learning objectives and authenticity [20].

3.6.3. Basic psychological needs scale

The Basic Psychological Needs Scale consists of twenty-one items aimed at evaluating students' attitudes towards autonomy, competence, and relatedness. For instance, items on the autonomy and competence scales include "I feel like I can make a lot of decisions about how my coursework gets done" and "I feel most days a sense of accomplishment from this course [21]."

3.6.4. Classroom participation survey

To assess student participation, ten pertinent items from the Global Engagement Style Frequency and Global Engagement Style Preference subscales were employed, taking into consideration whole class discussions and small group discussions [22].

Table 2
Rotated component matrix of the items.

Item No	Factor									
	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
BFL 2	0.788									
BFL 1	0.781									
BFL 5	0.767									
BFL 7	0.749									
BFL 3	0.745									
BFL 4	0.725									
BFL 10	0.722									
BFL 13	0.699									
BFL 9	0.687									
BFL 8	0.687									
BFL 6	0.646									
BFL 11	0.526									
CPS 14		0.811								
CPS 17		0.802								
CPS 18		0.787								
CPS 15		0.784								
CPS 21		0.766								
CPS 20		0.765								
CPS 16		0.763								
CPS 19		0.650								
AUT 22			0.794							
AUT 25			0.732							
AUT 27			0.715							
AUT 26			0.689							
AUT 24			0.673							
AUT 28			0.645							
AUT 23			0.625							
FLCAS 29				0.788						
FLCAS 31				0.782						
FLCAS 35				0.725						
FLCAS 36				0.718						
FLCAS 33				0.679						
FLCAS 34				0.636						
REL 37					0.721					
REL 40					0.683					
REL 39					0.649					
REL 43					0.628					
REL 44					0.625					
REL 42					0.525					
REL 41					0.431					
COMP 45						0.732				
COMP 48						0.676				
COMP 49						0.629				
COMP 47						0.572				
AM 55							0.707			
AM 53							0.574			
AM 51							0.493			
AA 56								0.698		
AA 7								0.544		
AA 59								0.537		
AL 60									0.599	
AL 61									0.537	
AL 63									0.490	
FAIRN 65										0.536
FAIRN 67										0.456
FAIRN 69										0.437
FAIRN 71										0.435

3.6.5. Foreign language classroom anxiety scale

The Foreign Language Classroom Anxiety Scale, consisting of 33 items, was customized to evaluate the sources of foreign language apprehension among international students in language courses. However, eight questions were modified to align with the specific context of this study, which examines language anxiety among international students in core college courses across various disciplines. "I stress when I have to speak English in class without preparing beforehand." On a scale of 1 (strongly disagree) to 5, the participants responded to the eight statements by indicating their agreement [23].

Table 3
Matrix of reliability coefficients, AVE and squared correlation among study factors.

Factor	α	CR	AVE	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
BFL	0.787	0.847	0.506	**0.711**									
CPS	0.824	0.895	0.740	0.403	**0.860**								
AUT	0.718	0.756	0.503	0.397	0.623	**0.709**							
FLCAS	0.825	0.875	0.551	0.406	0.696	0.539	**0.742**						
Rel	0.845	0.876	0.500	0.610	0.470	0.411	0.496	**0.707**					
COM	0.729	0.780	0.520	0.355	0.568	0.547	0.752	0.462	**0.721**				
AM	0.823	0.865	0.519	0.642	0.435	0.365	0.414	0.718	0.378	**0.720**			
AA	0.854	0.901	0.694	0.338	0.406	0.663	0.330	0.400	0.337	0.382	**0.833**		
AL	0.861	0.897	0.594	0.633	0.585	0.448	0.594	0.623	0.561	0.563	0.310	**0.771**	
FAIR	0.920	0.936	0.676	0.468	0.641	0.515	0.710	0.564	0.665	0.527	0.342	0.814	**0.822**

Note: α = Cronbach's Alpha, CR= Composite Reliability, all correlation values are statistically significant at $\rho < 0.001$, AVE = Average Variance Extracted, Diagonal bolded values show the square root of AVE.

3.7. Data analysis

Construct validity and reliability were assessed through varimax rotation, EFA and item analysis. In addition to these methods, other descriptive statistics and fit indices were employed to determine the model-to-data fit and underlying factors of the measuring instrument, including the means, standard deviations, test-retest reliability, Cronbach's alpha coefficients, CR, AVE, correlation matrix, *t*-test, KMO measure of sampling adequacy, chi-square test, CFI, GFI, TLI, and RMSEA. In addition, CFA was conducted. Statistical analyses were performed using SPSS version 22, AMOS version 24, and JASP 0.14.1.0.

Fig. 1 presents the scree plot, which illustrates the eigenvalues associated with each principal component. The scree plot is used to identify the point at which the eigenvalues start to level off, known as the 'elbow,' which indicates the optimal number of factors to retain. The plot shows a steep decline from the first to the second component, followed by a gradual levelling off. This pattern suggests that the first few components account for the most significant variance in the data, with the first component having an eigenvalue above 20, capturing a substantial portion of the total variance. The second component's eigenvalue drops significantly to below 5, and subsequent components show progressively smaller eigenvalues. The 'elbow' in the plot occurs around the third component, suggesting that retaining the first two or three components is optimal for explaining the majority of the variance in the dataset (Fig. 1). This analysis aids in identifying the most critical factors, thereby simplifying the complexity of the data for further analysis.

Table 2 presents the results of the factor analysis. The first factor consists of 12 items with factor loads ranging from 0.526 to 0.788. The second factor consists of eight items with factor loads ranging from 0.650 to 0.811. Similarly, the third, fourth, and fifth factors consisted of seven, six, and seven items, respectively, with factor loads within the ranges of 0.625–0.794, 0.636–0.788, and 0.431–0.721, respectively. Additionally, the sixth factor consists of four items with factor loads ranging from 0.572 to 0.732, the seventh factor consists of three items with factor loads ranging from 0.493 to 0.707, the eighth factor consists of three items with factor loads ranging from 0.698 to 0.537, the ninth factor consists of three items with factor loads ranging from 0.490 to 0.599, and the last factor consists of four items with factor loads ranging from 0.435 to 0.536. It should be noted that all values below 0.40 were excluded from the analysis [24].

The reliability coefficients, AVE, and squared correlations among ten study factors are presented (Table 3). For Beliefs about Foreign Language Learning (BFL), the values are α: 0.787, CR: 0.847, AVE: 0.506, and squared correlation 0.711. For Critical Thinking in Problem Solving (CPS), the values are α: 0.824, CR: 0.895, AVE: 0.740, and squared correlation 0.860. Autonomy (AUT) has α: 0.718, CR: 0.756, AVE: 0.503, and squared correlation 0.709. Foreign Language Classroom Anxiety Scale (FLCAS) shows α: 0.825, CR: 0.875, AVE: 0.551, and squared correlation 0.742. For Relevance (Rel), the values are α: 0.845, CR: 0.876, AVE: 0.500, and squared correlation 0.707. Communication (COM) has α: 0.729, CR: 0.780, AVE: 0.520, and squared correlation 0.721. Attitude and Motivation (AM) shows α: 0.823, CR: 0.865, AVE: 0.519, and squared correlation 0.720. Academic Achievement (AA) has α: 0.854, CR: 0.901, AVE: 0.694, and squared correlation 0.833. Active Learning (AL) shows α: 0.861, CR: 0.897, AVE: 0.594, and squared correlation 0.771. Finally, Fairness (FAIR) has α: 0.920, CR: 0.936, AVE: 0.676, and squared correlation 0.822. All constructs show statistically significant correlation values ($\rho < 0.001$), confirming their reliability and discriminant validity (Table 3).

3.8. Confirmatory factor analysis

The fit of the scale was evaluated using various goodness-of-fit estimators, namely, (a) the $\chi 2$ statistic, (b) the comparative fit index (CFI), (c) the Tucker–Lewis index (TLI), (d) the incremental fit index (IFI), (d) the goodness-of-fit index (GFI; Jöreskog & Sörbom, 1984), and (f) the root mean square error of approximation (RMSEA) (CFI scores above 0.90 indicate a good fit, while an RMSEA value between 0.05 and 0.08 is considered ideal). In addition, the TLI and nonnormed fit index (NFI) were also employed. TLI values of 0.90 or higher suggest an excellent fit, while GFI values close to 0.90 are considered ideal. Furthermore, Cronbach's alpha coefficient was used to assess the internal consistency of the subscales.

The final model of the study included the student academic adjustment scale (consisting of Academic Motivation, Academic Achievement, and Academic Lifestyle), the Basic Psychological Needs Scale, the FLCAS (Foreign Language Classroom Anxiety Scale), the Beliefs About Assessment Scale (Autonomy, Competence, Relatedness), and the Classroom Participation Survey. This model

Table 4
Fit indices of study tool.

Models Fit	Criteria	Measurement Model
CMIN(X^2)	–	3158.033
DF	–	1724
X^2/DF	≤5	1.832
CFI	≥0.90	0.910
GFI	≥0.90	0.903
AGFI	≥0.90	0.914
TLI	≥0.90	0.900
NFI	≥0.90	0.920
RMSEA	≤0.08	0.051

Note: X^2 = Chi-square, DF = degree of freedom, CFI= Comparative fit index, GFI = general fit index, AGFI = adjusted goodness-of-fit index, TLI = Tucker – Lewis Fit Index, NFI= Normed Fit Index, RMSEA = Root- Mean Square Error of Approximation.

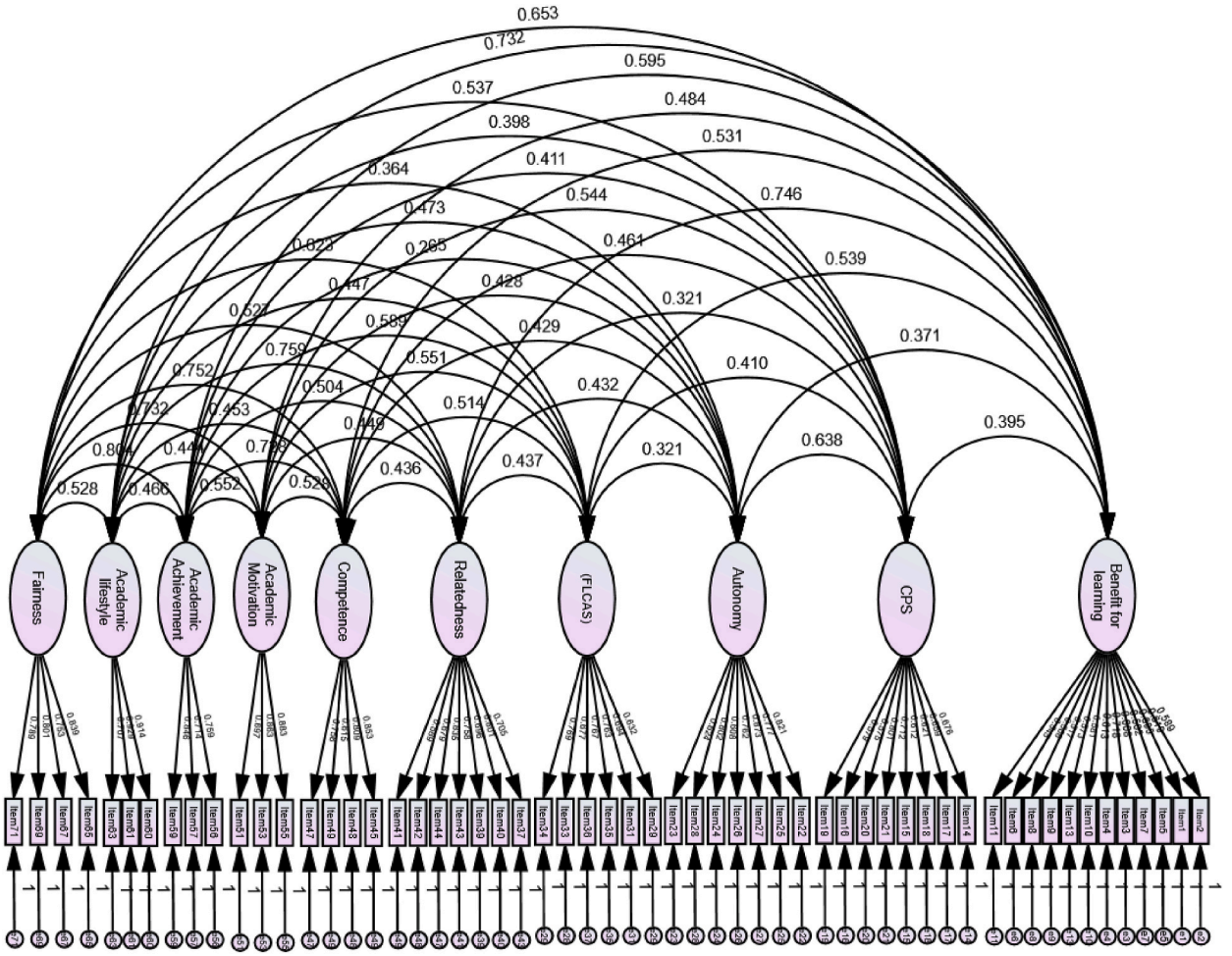

Fig. 2. Factor model.

comprised ten components and a total of 57 items. The CFA findings showed that the hypothesized model provided a satisfactory fit to the data, as indicated by the following goodness-of-fit indices: $\chi 2 = 3158.033$, $p < .001$, DF = 1724, CFI = 0.910, TLI = 0.900, NFI = 0.920, GFI = 0.903, AGFI = 0.914, and RMSEA = 0.051. Although the RMSEA value was slightly greater than ideal, the overall fit of the model was considered appropriate based on these indices. This information is summarized in Table 4.

Additionally, Fig. 2 depicts the correlations among the factors and their standardized factor loadings for each item. Loadings of 0.50 and above indicate high and acceptable validity, confirming that the tool research is a good model. All factor loadings were significant and fell within the specified range. The goodness-of-fit indices provide strong evidence for the validity of the proposed model, as all fit

Table 5
Fit indices of study' model.

Models Fit	Criteria	Mediation Model
CMIN(X^2)	–	3158.033
DF	–	1724.000
AIC	–	45009.687
BIC	–	45865.274
CFI	≥0.90	0.904
GFI	≥0.90	0.910
AGFI	≥0.90	0.901
TLI	≥0.90	0.930
NFI	≥0.90	0.902
RMSEA	≤0.08	0.060

Note: X^2 = Chi-square, DF = degree of freedom, CFI= Comparative fit index, GFI = general fit index, AGFI = adjusted goodness-of fit index, TLI = Tucker – Lewis Fit Index, NFI= Normed Fit Index, RMSEA = Root- Mean Square Error of Approximation.

Table 6
Direct effect of independent variables on dependent variables.

Hypotheses	Direct effect	Estimate	SE	Z values	P Values	Decision
H1	BFL → CP	0.208	0.051	4.049	<0.001	Supported
H2	BFL → Autonomy	0.210	0.048	4.413	<0.001	Supported
H3	BFL → FLCA	0.250	0.042	6.009	<0.001	Supported
H4	BFL → Relatedness	0.417	0.056	7.386	<0.001	Supported
H5	CP→ FLCA	0.181	0.039	4.679	<0.001	Supported
H6	AM→ AA	0.151	0.035	4.284	<0.001	Supported
H7	AM→ Fairness	0.200	0.054	3.674	<0.001	Supported
H8	AA→ AL	0.161	0.044	3.617	<0.001	Supported

indices meet the required criteria, indicating a well-fitting ten-factor model.

4. Results

This study utilized quantitative techniques and a casual comparative research design to evaluate the direct and indirect influence of predictor variables on independent variables and mediation variables. The findings supported the hypothesis and indicated a qualified model for measuring the relationships among the study variables. The fit indices, including CMIN (X2) = 3158.033, DF = 1724, AIC = 45009.687, BIC = 45865.274, CFI = 0.904, TLI = 0.930, GFI = 0.910, AGFI = 0.931, NFI = 0.902, and RMSEA = 0.060, met the specified criteria. The factor loadings for each indicator in the measurement model were relatively high and all significant, aligning with the required criteria. Table 5 presents the study model and fit indices.

The researchers formulated four hypotheses based on empirical evidence from the literature. Structural equation modelling (SEM) tests were conducted to estimate the direct and indirect relationships. All the items demonstrated significance at the 0.01 level for their latent factors, and the factor loadings were acceptable, supporting the current study model. The researchers hypothesized that BFL has a significant direct effect on classroom participation (CP), autonomy, FLCA, and relatedness. Additionally, CP has a significant direct effect on FLCA and academic motivation (AM), which in turn has a significant direct effect on academic achievement (AA) and fairness. Moreover, AA affects academic lifestyle (AL)." All hypotheses were tested and accepted as having a direct effect in this study, as depicted in Table 6. The specific results for the investigated variables are as follows. According to the findings presented in Table 6, BFL has a significant direct effect on CP (Estimate = 0.208; SE = 0.051; Z = 4.049; $\rho \leq 0.001$), indicating a strong relationship. Similarly, BFL has a significant direct effect on autonomy (estimate = 0.210; SE = 0.048; Z = 4.413; $\rho \leq 0.001$), suggesting a strong relationship. In addition, the results revealed that BFL significantly influenced FLCA (estimate = 0.250; SE = 0.042; Z = 6.009; $\rho \leq 0.001$), indicating a robust relationship. Furthermore, the findings in Table 6 demonstrate a significant direct influence of BFL on relatedness (Estimate = 0.417; SE = 0.056; Z = 7.386; $\rho \leq 0.001$), a significant direct effect of CP on FLCA (Estimate = 0.181; SE = 0.039; Z = 4.679; $\rho \leq 0.001$), and a significant direct effect of AM on academic achievement (AA) (Estimate = 0.15; SE = 0.035; Z = 4.284; $\rho \leq 0.001$), all of which indicate strong relationships. Additionally, Table 6 reveals a significant direct influence of AM on fairness (Estimate = 0.200; SE = 0.054; Z = 3.674; $\rho \leq 0.001$). These findings support our hypothesis, highlighting a strong relationship. Furthermore, a significant direct effect of AA on AL (estimate = 0.161; SE = 0.044; Z = 3.617; $\rho \leq 0.001$) was observed, further reinforcing this hypothesis. It is important to note that all the values associated with these relationships are positive, aligning with the theoretical conception regarding the academic achievement and lifestyle of international undergraduate students in Uzbekistan.

In contrast, the researchers also postulated mediation hypotheses for the current research. Specifically, it was hypothesized that autonomy mediates the relationship between BFL and CP, FLCA mediates the relationship between CP and relatedness, AA mediates the relationship between AM and AL, and AL mediates the relationship between AA and fairness for international students in Uzbekistan.

Table 7
Indirect effect of independent variables on dependent variables through mediation variables.

Hypotheses	Indirect effect	Estimate	SE	Z values	P Values	Decision
H9	BFL→ Autonomy → CPS	0.178	0.063	3.949	<0.001	Supported
H10	CP→ FLCA → Relatedness	0.201	0.093	4.991	<0.001	Supported
H11	AM→ AA → AL	0.173	0.047	4.448	<0.001	Supported
H12	AA→ AL → Fairness	0.164	0.065	3.895	<0.001	Supported

BFL has an indirect effect on classroom participation through autonomy. These findings indicate a substantial indirect impact of BFL on CP via autonomy (estimate = 0.178; SE = 0.063; Z = 3.949; $\rho \leq 0.001$) and support the hypothesis that autonomy is a significant mediator variable between BFL and CP. Additionally, there is an indirect effect of CP on relatedness through FLCA. These findings indicate a strong indirect effect of CP on relatedness through FLCA (estimate = 0.201; SE = 0.093; Z = 4.991; $\rho \leq 0.001$) and support the hypothesis that FLCA is a strong mediator variable between CP and relatedness. There is also an indirect effect of AM on AL through AA (estimate = 0.173; SE = 0.047; Z = 4.448; $\rho \leq 0.001$), which supports the hypothesis that AA is a strong mediator variable between AM and AL. Moreover, there is an indirect effect of AA on fairness through AL (estimate = 0.164; SE = 0.065; Z = 3.895; $\rho \leq 0.001$), which supports the hypothesis that AL is a strong mediator variable between AA and fairness among international undergraduate students in Uzbekistan. All the hypotheses above have been confirmed, as shown in Table 7.

5. Discussion

This is the first study to examine the mutual relationships among academic adjustment, assessment, anxiety, psychological needs, and culture shocks among students at Bucheon University in Tashkent. This study considered the direct effect of learning benefits on class participation, the significant relationship between learning benefits and autonomy, the relationship between learning benefits and relatedness, the direct effect of class participation on FL anxiety, the direct effect between academic motivation and academic lifestyle, the direct effect between motivation and fairness, the correlation between academic achievement and academic lifestyle, the indirect impact of learning benefits on class participation through autonomy, the indirect impact of class participation on relatedness through FL classroom anxiety, the indirect effect of academic motivation on academic lifestyle through academic achievement, and the indirect impact of academic achievement on fairness through academic lifestyle.

The results of the direct effect of learning benefits on class participation were found to be significant. These findings offer initial support for the extensive body of research in this field. For example, previous studies have shown that social media platforms such as Facebook and online forums can influence classroom dynamics and student learning in various ways. These platforms serve as viable mechanisms for promoting student participation and fostering peer-to-peer dialogue. Additionally, evaluating students' performances in class helps them enhance their communication skills with their teachers and show additional abilities, such as identifying their strengths and weaknesses when working with classmates and instructors [25]. Hence, utilizing diverse assessment strategies is considered one of the many factors associated with effective learning.

The correlation between the benefits of learning and autonomy yielded significant findings. The relationship between assessment and autonomy calls for rigorous research in the literature [26]. The results of Shen et al.'s study supported the notion that peer assessment enhances Chinese learners' autonomy in English writing classes, reduces dependency on tutors, and boosts confidence in learning. Furthermore, Gholami's quasi-experimental study, which involved 49 participants, revealed improvements in autonomous learning through peer assessment and its impact on language proficiency. Thus, the assessment of learning is an additional tool that contributes to students' academic development by facilitating autonomous learning. The results also indicated a significant relationship between learning benefits and relatedness, which includes learners' emotions and relationships. Although there is limited research on these dimensions, past evidence often relates to the assessment of learners of their emotions. Considering the assessment process, emotions may bias judgment, introduce random noise to evaluations, and serve as reliable data sources. A discussion on understanding emotions and their contribution to learning assessment was presented by Ref. [27], drawing on recent research from social psychology and education. Class participation plays a crucial role in language learning. A significant correlation was found between class participation and foreign language anxiety. This result aligns with that of Kaisar and [28], who stated that virtual classroom teaching poses hindrances to learners, such as the absence of real practice, group work, pair work, and limited interaction, causing them to feel uncomfortable, isolated, and anxious. However, in a Turkish EFL classroom, an investigation of emotional factors, including inspiration, enthusiasm, worry, self-confidence, and extroversion/introversion, revealed a negative correlation between class participation and anxiety. Similarly, the investigation revealed a negative correlation between the perceptions of both students and instructors regarding involvement and anxiety [29] in foreign language classes. Overall, the findings show a modest and unfavourable relationship [30], indicating that students' engagement evaluations and worries about learning a foreign language are negatively correlated. It is evident from a plethora of research evidence that students with high anxiety levels struggle to concentrate on learning and may fail to complete tasks in the classroom [31]. The present investigation results seem to contradict those of some previous studies, highlighting the need for further research to explore the reasons behind these findings.

The findings regarding the direct relationship between academic motivation and academic lifestyle have also been validated. Multiple research studies have demonstrated the importance of academic motivation in assessing students' lifestyles. For instance, reactive approach motivation (RAM) theory suggests that students experience anxiety and exhibit extreme lifestyles due to motivational conflicts caused by personal ambiguity [32]. The results of this study indicate that students who are autonomously motivated are

more self-driven, embrace challenges, and derive enjoyment from learning. This enables them to exercise significant control over their instructional strategies and achieve greater academic success [33].

The findings of this study reveal a significant direct relationship between motivation and fairness. They support the study's conclusion regarding the predictive role of classroom justice in students' motivation within a college course, yielding a positive correlation [34]. Moreover, another study exploring students' inclination to learn and their perception of fairness found substantial benefits [35]. Similar findings were obtained in the present study, further substantiating the evidence.

The results also indicate a significant correlation between academic achievement and lifestyle. A considerable body of research has confirmed this finding. Heidari et al. discovered that nursing students can enhance their cognitive abilities, perceptions, and academic performance through their lifestyles. As a result, it is recommended that lifestyle instruction be incorporated into the school curriculum to improve students' lifestyles. Additionally, research suggests that factors such as lifestyle, cognitive abilities, emotions, and personal and familial attributes all influence educational achievement levels, educational structure, and course content [36].

The research findings also demonstrate a significant indirect effect of learning benefits on class participation through autonomy [37]. It was concluded that autonomous motivation had a negligible influence on students' engagement in peer assessment. Furthermore, extensive literature suggests that students are more motivated to learn and perform better when they believe that they have control over their learning. Many academics argue that active participation in class signifies engagement and active learning, which benefits time management, interpersonal skills, critical thinking, listening and speaking abilities, writing skills, and the recognition of cultural differences [38].

Based on the findings of the present study, it is evident that class participation has a significant indirect effect on relatedness through FL classroom anxiety. These results align with previous research suggesting that anxiety is a complex concept and that FL students who experience anxiety in language classes tend to experience feelings of anxiety when they participate in language learning and use (p. 33). Other factors, such as low emotional intelligence, high levels of perfectionism [39], low self-esteem, low levels of language proficiency [40], low levels of motivation [41], negative self-evaluations [42], and negative beliefs in language abilities, have also been identified as sources of anxiety in foreign language classes [43].

The indirect influence of academic motivation on academic lifestyle through academic achievement is substantial. Research indicates that Japanese children are more likely to achieve better academic performance if their parents and educators ensure that they have breakfast daily, promote autonomous motivation from a young age, and encourage regular exercise as they grow older. Additionally, this study supports previous findings suggesting that ambition motivation plays a minor role in mediating the association between a healthy academic lifestyle and academic achievement. Although the indirect relationship between academic achievement and lifestyle through motivation has not been extensively studied in previous research, various factors support this theory. In summary, academic achievement may decrease students' motivation to learn by causing anxiety about their academic lifestyle.

The findings also reveal a significant indirect effect of academic achievement on fairness through academic lifestyle. University students, especially during the COVID-19 epidemic, have expressed concerns about their academic performance due to experiencing unhealthy academic lifestyles characterized by concentration issues, poor sleep, limited social interactions, increased stress, and anxiety [44]. Although research on the effects of academic lifestyle on affective variables is limited, the findings suggest that academic lifestyle is a crucial factor in academic achievement [45] and that fairness is a positive indicator of learning [46].

6. Conclusion

University students in Uzbekistan encounter difficulties in adapting to the foreign academic context [47]. Therefore, it is essential for university instructors to proactively develop practical courses addressing academic adjustment, basic psychological needs, assessment beliefs, classroom anxiety in foreign languages, and classroom participation. The questionnaire used in the investigation demonstrated strong validity and reliability, establishing a validated model that exhibited complete mediation among all variables. This model holds potential for assisting higher education leaders and staff in the development of programs that foster positive relationships among these variables, drawing upon the insights gained from this study.

Given the importance of academic adjustment, beliefs about assessment, classroom participation, and anxiety in a foreign language class within the context of higher education, this study examined the direct and indirect effects of all subfactors. By investigating the relationships that directly and indirectly impact the study variables, the findings confirm the existence of significant factors such as Academic Adjustment (including Academic Motivation, Academic Lifestyle, and Academic Achievement), Basic Psychological Needs (Autonomy, Competence, and Relatedness), Beliefs about Assessment (Benefit for Learning and Fairness), Classroom Participation, and Students' Foreign Language Classroom Anxiety. This validation helps establish an accurate study model. Importantly, the study revealed that Benefit for Learning greatly influences students' participation in class, autonomy, foreign language anxiety, and relatedness. Additionally, it indirectly affects classroom participation through its impact on autonomy. Furthermore, classroom participation directly affects language anxiety, while academic motivation directly influences academic achievement, fairness, and academic lifestyle. Academic achievement, in turn, has a direct impact on academic lifestyles. Furthermore, classroom participation indirectly affects relatedness through foreign language classroom anxiety, academic motivation influences academic lifestyle through academic achievement, and academic achievement impacts fairness through academic lifestyle. In summary, the study's results demonstrate a fully mediated model among all variables, providing a validated framework to guide higher education leaders and staff in developing programs that emphasize positive relationships among all factors, as outlined in this study.

7. Limitations and further Consequences

Although the current study included enough variables to ensure accurate results, some limitations should be noted. First, the measures were self-report questionnaires, and many responses may not reflect the actual behaviors of the participants, potentially leading to biases. Second, the investigation was conducted at one private university in Tashkent, Uzbekistan. Consequently, the results may not represent the diversity of learners in higher education in Uzbekistan. Third, the sample size was limited, and the data collection techniques did not allow for sophisticated analyses. Therefore, future research should employ comparative studies with larger sample sizes and utilize various research methodologies to investigate the construct further.

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Data availability statement

https://zenodo.org/records/11491023?token=eyJhbGciOiJIUzUxMiJ9.eyJpZCI6IjY2NzlkOTRlLTU3YWYtNDEwOC1hMTIxLTk1Mzc1NmU5NTM2NyIsImRhdGEiOnt9LCJyYW5kb20iOiIzODNiNzEzYTM0ZGI0MGFhNzZmOWY1NWMzMDUwNjgzOSJ9.Z-NgnOK6HbqLRnKCWmeAnt1qhqLXC5ExOPjoKngsBWNkh4IONv6-woE7MvhiOBkTUI5wzvYXX4qFdmdm1r-DnA.

CRediT authorship contribution statement

Nargiza Nuralieva: Writing – original draft. **Zhao Wei:** Supervision. **Abdo Hasan AL-Qadri:** Methodology. **Nadia Saraa:** Resources. **Ming Chang:** Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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