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A Study on the Impact of on Learning Satisfaction Among University Students from the Perspective of Online Aerobics Courses — Focusing on the Mediating Effect of Learning Motivation and Learning Engagement

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Abstract

The purpose of this paper is to analyse the effect that on aerobics online courses will have on university students' learning satisfaction, and the mediating role that learning engagement and learning motivation will play between aerobics online courses and university students.

1,000 university students majoring in "aerobics" were used as the research subjects. Afterwards, the explanatory variable was "aerobics", the explanatory variable was "university student learning satisfaction", and the mediating variables were "learning engagement" and "learning motivation". The data obtained from the questionnaire survey were analyzed empirically using descriptive statistics, reliability test, analysis of variance, correlation analysis, regression analysis and validation analysis of mediating variables.

Based on the results, first, there are significant gender and grade differences in college students, college students' learning satisfaction, college students' learning engagement and college students' motivation. Second, there are negative correlations between college students' and college students' learning satisfaction, college students' learning satisfaction, college students' learning engagement and college students' learning motivation. Third, the regression results showed that the stress of the online aerobics course has a negative impact on the satisfaction of the students, and the higher the stress felt by the students in the online aerobics course, the lower the learning engagement and learning motivation of the students and the lower the learning satisfaction of the students.

As the conclusion, universities should focus on improving the teaching format of aerobics online courses to relieve the stress of university students, improve their commitment, motivate them to learn and achieve an increase in their satisfaction.

Keywords: aerobics online course, university students, learning engagement, learning satisfaction, learning motivation

1. Introduction

In some universities' physical education classes, aerobics courses are usually part of the curriculum, which aims to exercise students' bodies and coordination through aerobic exercises and dance movements. Due to the restrictions caused by the pandemic, traditional face-to-face physical education classes have been affected, and schools and teachers have turned to online teaching. In this situation, aerobics courses have also undergone a transformation, shifting from traditional face-to-face teaching to online aerobics courses (Lee, 2019). Online

aerobics courses differ from traditional ones in certain ways. Online courses may lack practical guidance and peer interaction, requiring students to rely more on their own discipline and motivation to participate (Ho, 2014). Additionally, online aerobics courses offer greater flexibility, allowing students to choose when and where to attend classes according to their own schedules. However, the change in teaching mode may also affect college students' satisfaction. Firstly, they may face difficulties in terms of technology and equipment. Due to a lack of appropriate equipment or unstable internet connections, students may not be able to successfully participate in online aerobic exercise courses, leading to frustration and disappointment, thus reducing satisfaction. Secondly, online learning may lack opportunities for interaction and practice. Aerobic exercises usually require students to complete movements under the guidance of a coach, but in online courses, students can only learn through watching videos. This lack of interaction and practice may affect students' learning efficiency and motivation, resulting in decreased satisfaction (Li, 2014). On June 22, 2022, China conducted a group deliberation on the third draft of the Sports Law Amendment, providing stronger legal guarantees for the construction of a sports power and a healthy China (Yang et al., 2023). Similar policy documents are constantly being put forward, which has provided policy support for online aerobics courses. In this context, it is evident that studying the impact of online aerobics courses on college students' satisfaction is necessary. Considering that there are many factors that influence college students' academic satisfaction, this paper reviews existing research perspectives. Firstly, college students will undergo key transitions characterized by change, confusion, and exploration, and the stressful environment they face during this period may have a long-term impact on their satisfaction (Kittler, Braun, et al., 2013). Secondly, some scholars have pointed out the impact of academic engagement on students' satisfaction. For example, as learning progresses, the average number of video views per student, average number of logins, completion rates of videos, and completion rates of chapter tests all show a significant decline, and overall satisfaction will also decrease accordingly (Jen, Kuan, Sut & Hoi, 2018). Furthermore, scholars have studied the relationship between academic motivation and college students' satisfaction, combining learning motivation with intelligence level to study their impact on satisfaction. They believe that motivation factors, intelligence level, and satisfaction are related, among which intelligence level, goal mastery, and intrinsic motivation are significantly positively correlated with satisfaction, while extrinsic motivation is significantly negatively correlated with academic satisfaction (Zhao, Ma & Zhang, 2019). This paper argues that it is necessary to study the correlation between variables such as academic stress, academic engagement, and academic motivation that affect college students' satisfaction based on the aforementioned previous research. The development of educational information technology has promoted the transformation of aerobics teaching methods. By combining online digital teaching with traditional classroom teaching, students can be more active in the learning process of aerobics, enhance academic motivation, improve satisfaction, and optimize teaching effectiveness (Wang, 2022).

The aim of this study is to investigate the effect of on the satisfaction of university students in the online teaching of aerobics, and the mediating role played by engagement and motivation between the two, and to suggest corresponding teaching suggestions.

The research questions in this paper include the following:

Q1: What will be the impact on university students' satisfaction in teaching aerobics online?

Q2: What role will engagement and motivation play in mediating between university students and satisfaction?

2. Theoretical Background

2.1 Aerobics Online Course

"Curriculum" is one of the fundamental components in the field of education, and so far, there is no consensus on its definition. According to related research, there are at least 119 different definitions of "curriculum" (Guo, 2003). Scholar Zhang (2005) believes that the differences in defining the curriculum mainly stem from researchers or practitioners having different uses of the curriculum in their educational work, leading to different conceptual descriptions. Additionally, the definition of the curriculum is still limited by research literature or established policy documents, resulting in differing viewpoints (Chapter, 2005).

Aerobic gymnastics curriculum is a course that combines gymnastics, dance, and music, with a focus on aerobic exercise, aiming to exercise the body, enhance strength, and shape aesthetics. In a narrow sense, aerobic gymnastics primarily emphasizes its fitness and aesthetic characteristics, while in a broader sense, it not only has competitive aspects but also strong fitness and appreciation (Mikhailova et al., 2020). Mikhailova et al. (2020) believe that aerobic gymnastics is a form of aerobic exercise, a sustained moderate-intensity full-body movement that primarily exercises the cardiovascular system and provides a foundation for aerobic endurance. Yu & Qi (2018) state that the aerobic gymnastics curriculum should incorporate various dance elements, such as the upper and lower limbs, trunk, head, neck, and foot movements in jazz dance, especially hip movements, to add vitality. Liu & Wu (2015) argue that the aerobic gymnastics curriculum includes not only basic techniques and physical

fitness training but also the learning of choreographed movements, self-creation, and knowledge of fitness and health.

Currently, there are many online aerobic gymnastics courses in China. For example, the National Higher Education Smart Education Platform offers an 18-week online course called "iCourse (Chinese University MOOC)". In addition, many Chinese universities offer online aerobic gymnastics courses, such as Tsinghua University, Communication University of China, and Nankai University, and the number of online learners is gradually increasing. These courses not only provide guidance on basic aerobic gymnastics movements but also include targeted training for specific body parts (such as shoulders, chest, and hips) and scoring guidelines for the National Fitness Dance Competition, providing convenience for students learning aerobic gymnastics.

2.2 University Students

Current research on the concept of draws on research on stress. Previous research has shown that there is no consistent definition of the concept of stress to date, and most of the existing literature defines stress in terms of the following three categories (Kusum, 2012). The first type is the stimulus perspective, which considers stress as a stimulus or event that can cause individuals to experience anxiety and unease. The second type is the response perspective, which considers stress as a response of the organism to a stressor (Imad, Ahmad, Aidah & Wisam, 2015). The third category is based on the stimulus-response perspective, which considers stress as a result of the interaction between various stressors in the environment and the individual's response. For example, it has also been argued that stress is a response to environmental stimuli when events and responsibilities exceed the individual's ability to cope (Sarma, Payakkakom & Kurpius, 2012). Based on existing research on stress, Marwan (2013) defined as a sense of frustration associated with academic failure, the possibility of future failure, and the associated mental distress or distress.

Based on existing studies, the summary and measurement of the elements are mainly presented in two aspects: the first aspect is to understand students by investigating their level of life events or adaptation. Lin, Li and Zhang (2018) compiled the Questionnaire for Secondary School Students, which also included four dimensions, namely school stress, family stress, social stress and self-stress. Yu and Liu (2018) also developed the Questionnaire for Secondary School Students to measure, which was divided into five dimensions: task demand stress, learning competition stress, frustration stress, expectation stress and developmental stress. The second dimension measures stress from the perspective of stress response, so as to understand the physical and psychological responses of individuals when faced with stressful situations or stressful events. For example, Pan (2018) developed the Awareness Measurement Questionnaire, which elaborates the concept of usual stress and future stress, based on the specific situation. According to the performance. it is divided into two aspects: the influence of present factors and the influence of future factors. The content of the questions on students, thus also includes the content of future factors such as the national definition of talent and personal career planning, and the scale is scored on a five-point scale to indicate the level of individual according to the score.

2.3 Learning Satisfaction

The term "Learning satisfaction" first appeared in the field of management, and then gradually applied to the field of education as the discipline continued to refine and develop. Cha (2016) argues that learning satisfaction is a positive psychological feeling that is not only derived from students' daily learning, but also related to their perceptions of aspects other than learning throughout their university career. Feelings as a criterion, a subjective assessment of the quality of education at that school is the essence of learning satisfaction, which also reflects students' attitudes and dispositions towards learning and school life. In the domestic literature, Du, Wang and Shao (2003) and others argue that students evaluate the teachers' teaching and environment of the school according to their own evaluation criteria, and are considered satisfied if they meet or exceed the criteria. Wei and Fang (2005) argue that students are considered satisfied if they meet or exceed their own predetermined standards by comparing the perceived quality of education with their own.

In terms of the division of dimensions of satisfaction, Jaeger (1974) divided it into two dimensions of satisfaction such as teacher level and course level; Wen and Shi (2013) considered that three dimensions of satisfaction such as environment, teaching and learning, and students constitute satisfaction; Wang (2003) divided satisfaction into dimensions such as learning environment, teacher teaching, learning course, and learning achievement; Yi (2009) divided satisfaction into four dimensions such as self-growth, interpersonal relationship, content of teaching materials, and learning achievement; Zhai et al. (2012) concluded that satisfaction consists of satisfaction in various aspects such as course materials, teacher teaching, learning environment, school administration, teacher-student relationship, and pedagogue; Peng and Yu (2011) divided satisfaction into dimensions such as teacher quality, teaching materials, employment prospect, library resources, learning interest, professional future and other dimensions. The main reference in this paper is mainly Wang (2021), which is one of the classic questionnaires for satisfaction surveys and contains two main dimensions of satisfaction such as learning effectiveness and overall experience.

2.4 Learning Engagement

The word “put in” is derived from the Latin Inpono and is often used in literature studies as Launch. put in, currently used more often as Launch (Afaf, 2019). The learning engagement is a complex, multifaceted concept with varying interpretations in different dictionaries, meaning commitment or participation in the American Heritage College Dictionary, Fourth Edition, attraction or involvement in the New Oxford American Dictionary, eagerness, active giving in the New Century English-Chinese Dictionary, and participation (planning, discussion, handling of affairs) in the Modern Chinese Dictionary (Nam, Kwon& Shin, 2019). Different researchers have different understandings of engagement, and there are three main views: engagement is a behaviour, engagement is a mental activity, and engagement is an organic unity of behaviour, cognition and emotion. Engagement is defined as the time and effort students put into educational activities, and it is believed that good educational environments and conditions should be provided and created to motivate student engagement (Xu & Tan, 2014). Engagement is usually related to personal commitment, to commitment, and reading a book, playing a game or having a conversation usually involves a high level of attention to the exclusion of other distractions, which is often referred to as immersion (Sun, Yin & Wang, 2019).

The Utrecht Work Engagement Scale (The Utrecht Work Engagement Scale) was developed by Schaufeli (1999) and others. The Utrecht Work Engagement Scale (The Utrecht Work Engagement Scale) was developed by Schaufeli (1999) and others. This scale consists of three subscales: vitality, dedication and concentration, each containing six, five and six items respectively, and it is now widely used and has become the most popular measurement tool. Based on this, Schaufeli (1999) developed the Utrecht Work Engagement Scale, which selected university students as the study sample and has a stable three-dimensional structure (Yoo & Kim, 2018). This article primarily refers to the dimensions of academic engagement proposed by Buhrmester et al. (1988) and Yang (2020), which include four dimensions: the first dimension is behavioral engagement; the second dimension is cognitive engagement; the third dimension is emotional engagement; and the fourth dimension is social interaction engagement.

2.5 Learning Motivation

In their article, Schraw and Sinatra (2004) suggest that individual learning behaviour can be generated by stimulating motivation. For example, rewarding students for good grades can motivate learners to learn. Liu (2009) states that self-regulation plays a large role in learning motivation, for example, one’s own need to learn and the influence of others on one’s own learning motivate learners’ learning behaviours. Mao (1995) states that motivation is present in the whole range of behaviours that students undertake to learn, from the beginning of learning to the final completion of learning.

The most classic classification of motivation is intrinsic motivation and extrinsic motivation (Ryan & Deci, 1985), and most researchers in educational psychology agree that these are the two main types of motivation. Some scholars have proposed other classifications of motivation specific to a particular area of study, for example, in the area of professional motivation. Most of these classifications are based on factor analysis. Many domestic studies have classified the types of English learning motivation of Chinese undergraduate students into: intrinsic interest motivation, achievement motivation, motivation to go abroad, motivation to study in a context, motivation for social responsibility (personal development motivation, information-mediated motivation, and motivation for external requirements (diploma or examination motivation), and they have analysed how differences in students’ personal backgrounds affect their motivation to learn (Gao, 2003; Li 2003; Wang, 2006). For the dimensional classification of learning motivation, this paper mainly refers to the results of adopting Chi and Xin’s (2006) dimensional classification of learning motivation, including endogenous and exogenous motivation. Chi and Sin’s (2006) dimensional classification of motivation was inspired by Amabile, Hill, Hennessey & Tighe (1995). Among them, endogenous motivation includes two dimensions of challenge and enthusiasm, and exogenous motivation includes four dimensions of reliance on others’ evaluation, choice of simple tasks, concern for interpersonal competition and pursuit of rewards.

2.6 Relationship Between Main Variables

It has been suggested that there is a significant correlation between academic stress and satisfaction among university students and that higher education is an important stage in life. University students undergo critical transitions characterised by change, confusion and exploration, and the stressful environments they face during this time may have a long-term impact on their satisfaction (Kittler, Braun, et al., 2013).

In terms of research on the relationship between engagement and satisfaction, some scholars’ studies have shown that there are stages of change in academic engagement among university students, for example, in online learning courses, most students value the beginning of the course and do not learn enough afterwards (Frederik, 2019). Learners are generally more engaged at the beginning of the course and satisfaction is higher at this point. However, as learning progresses, both the number of video learning sessions per capita and logins per capita for

the course, as well as the completion rate per capita and chapter test completion rate for the videos show a clear downward trend, and overall satisfaction will also decline (Jen, Kuan, Sut & Hoi, 2018).

Many studies have shown that factors such as motivation are closely related to satisfaction, and some scholars in China have combined motivation with intelligence level to study the effect on satisfaction, and concluded that motivational factors, intelligence level and satisfaction are related, where intelligence level, mastery goals, intrinsic motivation and satisfaction are significantly positively related, and extrinsic motivation and academic achievement are significantly negatively related (Zhao, Ma & Zhang, 2019).

3. Research Methodology

3.1 Research Hypothesis and Research Model

The purpose of this study was to examine the relationship between college students' engagement, motivation and satisfaction in a survey based on college students, and to verify the contribution to college students' learning satisfaction. Based on theory and prior research on various variables, a model was constructed with the independent variable, engagement and motivation as the participant variables, and satisfaction as the dependent variable, as shown in Figure 1.

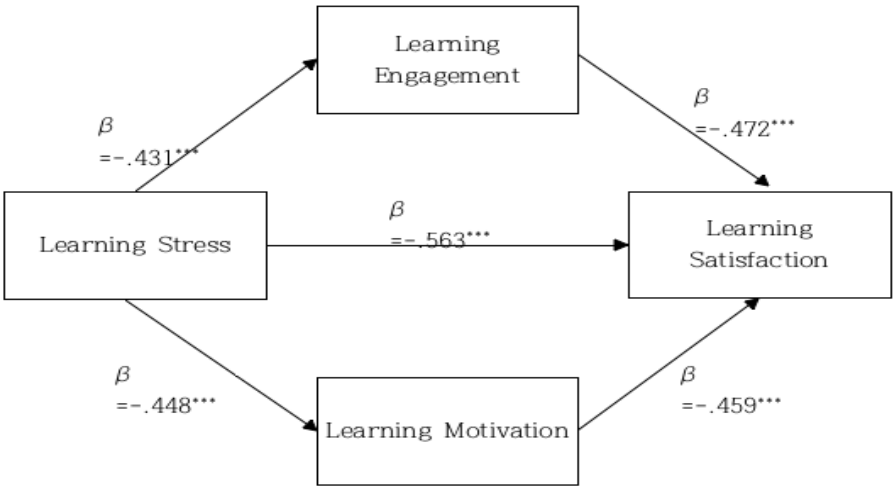

Figure 1. Research model

In the model, a mediated research model consisting of dependent variables is used to construct an effect model with the independent variable, engagement as the participation variable and satisfaction as the dependent variable, as shown in Figure 2.

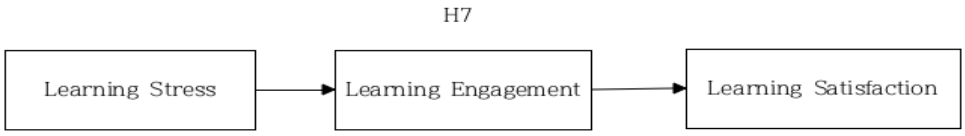

Figure 2. Mediating effect on learning engagement and learning satisfaction

In the model, a mediated research model consisting of causal variables with the independent variable, learning motivation as the participation variable and satisfaction as the dependent variable was used to construct the effect model as shown in Figure 3.

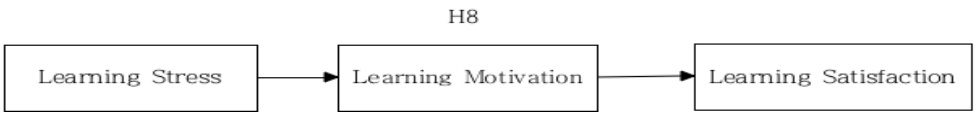

Figure 3. Mediating effect on learning engagement, learning motivation and learning satisfaction

Based on the theoretical background and prior research, the following research hypotheses were set for this study based on the purpose of the study.

<H1>The impact of demographic variables on, learning engagement, learning motivation, and learning satisfaction will vary among different student populations.

<H2> In the survey, college students will have a direct impact on their learning satisfaction.

<H3> In the survey, college students will have a direct impact on their learning engagement.

<H4>In the survey, college students will have a direct impact on their learning motivation.

<H5>In the survey, college students' learning engagement will have a direct impact on their learning satisfaction.

<H6>In the survey, college students' learning motivation will have a direct impact on their learning satisfaction.

<H7> In the survey, college students will have an impact on their learning satisfaction through the mediating effect of learning engagement.

<H8> In the survey, college students will have an impact on their learning satisfaction through the mediating effect of learning motivation.

In summary, as a study and analysis of multiple variables that influence college student satisfaction, it is a way to evaluate the effectiveness of the survey. Therefore, this study examines the impact of the stress system on the satisfaction of university students in the survey by examining the relationship between engagement, motivation and satisfaction of university students. After formulating the hypothesis of the problem, developing the model and validating it, the aim in the study was to confirm the effect on college student satisfaction in the survey.

3.2 Research Subject

In this paper, 10 universities with aerobics online courses in China were selected for the study, including Tsinghua University, Communication University of China, Nankai University, Tianjin University, Haihai University and Chongqing University, while the art universities were Beijing University of Physical Education, Capital Institute of Physical Education, Wuhan Institute of Physical Education, Xi'an Institute of Physical Education and Chengdu Institute of Physical Education. Beijing University of Physical Education, Capital Institute of Physical Education, Wuhan Institute of Physical Education, Xi'an Institute of Physical Education and Chengdu Institute of Physical Education. Each university will select 100 students, making a total of 1,000 students from 10 universities.

3.3 Research Tools

1) Questionnaire

The Inventory was developed by Tian and Deng (2007) and revised by Zhou (2021). The Inventory was revised according to the specific learning ability of the test subjects and included seven dimensions, including learning prospect stress, academic competition stress, learning effectiveness stress, learning atmosphere stress, classroom workload stress, learning conditions stress and family expectations stress. A 5-point Likert scale is used, ranging from 1 for "never" to 5 for "often", with higher scores indicating higher satisfaction.

2) Satisfaction questionnaire

The original questionnaire consisted of two dimensions: learning effectiveness and overall experience, with learning effectiveness ranging from 1-5 questions (5 questions) and overall experience ranging from 6-10 questions (5 questions), with 10 items in total. A 5-point Likert scale was used, ranging from "never" to "often" on a scale of 1 to 5, with higher scores indicating higher satisfaction.

3) Engagement questionnaire

This study's measure of engagement was based on the questionnaire designed by Fredricks (2004) and Zhou (2021), and was revised to take into account the specificity of the test subjects' engagement. It consisted of three dimensions: firstly, behavioural engagement, which included two items on body concept, one item on behavioural engagement and two items on assertiveness (5 questions). The second dimension is cognitive input, which includes 2 items on acceptance of behaviour and 3 items on acceptance of psychology (5 questions); the third dimension is emotional input, which includes 1 item on behavioural efficacy and 4 items on psychological efficacy (5 questions), for a total of 15 questions. A 5-point Likert scale was used, ranging from "never" to "often" on a scale of 1 to 5, with higher scores indicating higher satisfaction.

4) Learning motivation questionnaire

The measurement of motivation in this study was based on the motivation questionnaire developed by Buhrmester et al. (1988) and revised by Wang (2017) and others, and was modified to suit the specific learning motivation of the test subjects, and consisted of two dimensions: first, internal motivation, which included two items on internal motivation behaviour and three items on internal motivation psychology (five questions). The second dimension, external motivation, consists of 3 items of solution and 2 items of solution thinking (5

questions), for a total of 10 questions. A 5-point Likert scale is used, ranging from “never” to “often” on a scale of 1 to 5, with higher scores indicating higher satisfaction.

3.4 Data Analysis

This study was a study to develop a structural model and test relationships to illustrate the impact of changes in satisfaction performance in a university survey by mobilising college students’ engagement and motivation when they are motivated by academic stress, which in turn contributes to an individual’s academic performance. The data collected was coded into an Excel file and statistically analysed using SPSS (Statistical Package for Social Sciences). According to the purpose of the study, the variables of interest were derived based on previous research and literature.

The resulting variables are then modelled and analysed on the basis of structural equations. Structural equations have the advantage of using common variables extracted from multiple measurement variables to reflect the true picture of measurement error, combined with statistical evaluation, allowing analysis of theories etc. The appropriate analysis method was therefore chosen and the following steps were followed.

Firstly, general characteristics of the respondents and basic information about the university students in the survey were investigated in terms of engagement, motivation and satisfaction, descriptive statistics were extracted (means, standard deviations, percentages, frequencies, etc.) and basic analyses of the variables related to engagement, motivation and satisfaction were carried out.

Secondly, in order to conduct a multivariate normality analysis, an exploratory analysis of the normal distribution of variables related to skewness and kurtosis was conducted.

Thirdly, in order to determine the multicollinearity between the variables, correlation analysis was performed and multiple regression analysis was carried out to calculate the tolerance (tolerance) and variance inflation factor (EZH-Variance Inflation Factor).

Fourthly, the fit, credibility and feasibility of the measured models were analysed before validating the models predicted in this study.

Therefore, the morphological homogeneity of the learner groups of the learning survey was verified, and the measurement homogeneity and structural homogeneity were verified in turn by convergence constraints to determine whether there were differences between the groups. Afterwards, the variables of engagement and motivation to learn were used as mediators to test whether the mediating effect had an impact on the satisfaction of university students, using the group of university trainees from general universities as an example.

4. Research Results

4.1 Analysis of the General Characteristics of the Survey Respondents

A total of 1,100 questionnaires were distributed, and after excluding incorrect and invalid questionnaires, the actual sample was 1,000. The actual validity rate of the questionnaire was 9.91%, and the demographic variables involved in the questionnaire included gender, grade level, etc. In the headcount statistics 491 male students (49.10%) and 509 female students (50.90%), the distribution of grades was 235 (23.50%) in the first year of university, 252 (25.20%) in the second year, 253 (25.30%) in the third year and 260 (26.00%) in the fourth year.

Table 1. Basic Information of Research Participants

Basic information	variables	Frequency(*N*)	Percentage (%)
Gender	Female	491	49.10
	Gender Male	509	50.90
Grade	Freshman	235	23.50
	Grade Sophomore	252	25.20
	Grade Junior	253	25.30
	Grade Senior	260	26.00

4.2 Descriptive Statistical Analysis

The maximum value of university students’ study pressure is 4.00, the minimum value is 1.00, and the mean value is 3.01; the maximum value of university students’ satisfaction is 5.00, the minimum value is 1.0000, and the mean value is 3.638; the maximum value of university students’ engagement is 4.00, the minimum value is 1.00, and the mean value is 3.12; the maximum value of university students’ study motivation is 5.00, the

minimum value is 1.00, and the mean value is 3.74. From the distribution of the data, the sample selected for this paper is relatively evenly distributed and suitable for the next correlation and regression analysis.

4.3 Reliability Analysis

1) Reliability analysis

Reliability analysis, also known as reliability analysis, is used to measure whether the sample results are reliable, i.e., whether the sample has answered the scale type questions truthfully. For example, when the same subject is measured and the results are close for multiple measurements, the results are considered to be reliable and true, i.e., the reliability is relatively high. A Cronbach's Alpha validity test was conducted on the questionnaire and the results were obtained as shown in <Table 2>.

Table 2. Confidence analysis (Cronbach coefficient method)

Dimensionality	Cronbach's Alpha	Projects	General
	.760	42	
Learning satisfaction	.791	10	.794
.794Learning engagement	.752	15	
.794Learning motivation	.872	10	

The questionnaire was tested for each category of classification, and the Cronbach's coefficient method was .760, .791, .752, .872, all of which were greater than .6. The overall reliability test of the questionnaire revealed that the value of the total dimension of Cronbach's Alpha in the reliability test was .794, which was much greater than .6. Therefore, the reliability was reliable, and the validity of the data was next Test.

2) Validity analysis

Validity analysis, which is simply the degree of validity and accuracy of the questionnaire design, is used to measure whether the design of the questions is reasonable.

Table 3. Validity tests (KMO and Bartlett's test)

Dimensionality	KMO values	df	General
	.734	308.460	
Learning satisfaction	.723	86.330	.791
.791Learning engagement	.934	375.390	
.791Learning motivation	.771	306.000	

It can be found that the validity test has KMO values of .734, .723, .934 and .771, which are all much greater than .6, and the value of the total dimension is .791, which is also much greater than .6, further verifying that the validity is reliable and indicates that the questionnaire is well structured.

4.4 Analysis of Variance

The results of the analysis of the variance of the basic information variables gender, grade, origin, profession and siblings on the study variables were analysed using independent sample t-testing and one-way analysis of variance:

Table 4. Table of parameters for gender variability analysis

	Gender	N	M	SD	t	p
Learning Stress	Female	491	3.715	1.066	3.328**	.003
	Learning Stress Male	509	3.647	1.030		
3.328**.003Learning Satisfaction	Female	491	3.760	.969	3.474**	.000
	Learning Satisfaction Male	509	3.754	.742		
3.474**.000Learning	Female	491	3.708	.879	3.191**	.004

Engagement	Learning Engagement Male	509	3.628	.739		
3.191**.004Learning Motivation	Female	491	3.705	.886	3.701**	.000
	Learning Motivation Male	509	3.035	1.135		

Note: **p<.05, 3.701** .000

The results of the independent sample t-test for gender differences show that for university students, the t-distribution value of the test is 3.328 (p<.05), therefore there is a significant gender difference. From the results of the descriptive learning statistics, it is clear that women appear to have higher scores on study stress. Similarly, there is a significant gender difference in learning satisfaction and motivation among university students. The results of the descriptive statistics show that the engagement scores of female students appear to be higher.

Based on the same analysis method, the results of the analysis of variance for the different variables by grade level were derived: there were significant differences in university students, university students' learning satisfaction, university students' learning engagement, and motivation of university students.

4.5 Correlation Analysis

Correlation analysis is a statistical method to study whether things are correlated with each other and the strength of the correlation. Linear correlation analysis is a method to study the strength and direction of the correlation between two variables; the main purpose is to study the closeness of the relationship between the variables, and in statistical analysis, the correlation coefficient is often used to quantitatively describe the closeness of the linear relationship between two variables.

As seen in Table 5, in the multi-factor correlation analysis test is learning engagement, learning motivation, and learning satisfaction, is negatively correlated with learning engagement (r = -.369, p <.01), negatively correlated with learning motivation (r = -.485, p <.01), and significantly negatively correlated with learning satisfaction (r = -.524, p <.01).

Table 5. Correlations of the Learning engagement, motivation and satisfaction factor scales

	Learning stress	Commitment	Learning motivation	Learning satisfaction
	1			
Learning engagement	-.369**	1		
Learning motivation	-.485**	.504**	1	
Learning satisfaction	-.524**	.417**	.366**	1
**p <.05				

4.6 Regression Analysis

Table 6. Mediation between engagement, and motivation on learning satisfaction

Independent variables	Dependent variables	B	SE	β	T	Adj.R^2	F
	Learning satisfaction	-.490	.039	-.563	10.098	.585	148.888***
	Learning engagement	-.470	.043	-.431	10.186	.636	150.266***
	Learning motivation	-.451	.044	-.448	10.076	.653	
	150.266***Learning satisfaction	-.417	.053	-.450	11.333	.663	131.438***
	Learning engagement	-.402	.047	-.472	16.335	.611	
	131.438***Motivation to learning	-.411	.049	-.459	12.923	.631	

Note: ***p <.001, 131.438***

From Table 6, the regression coefficients for the independent variable of learning engagement were (β = -.431, $Adj.R^2$ = .636) and with motivation to learn were (β = -.448, $Adj.R^2$ = .653) in model 3; in model 1, the

regression coefficient for the independent variable was (β = -.563, $Adj.R^2$ = .585), indicating a significant effect p < .05, indicating a significant positive effect on the mediating variables engagement and motivation to learn. In model 3, the mediating variables engagement and motivation to learn were introduced, and the significant p < .05 for the mediating variables engagement and motivation to learn, with regression coefficients of (β = -.472, $Adj.R^2$ = .611) and (β = -.459, $Adj.R^2$ = .631), respectively, indicating a significant positive effect on the dependent variable satisfaction. In summary, the independent variable had a significant effect on the mediating variable engagement, motivation to learn, and satisfaction with the dependent variable, while the mediating variable engagement and motivation to learn had a significant effect on satisfaction with the dependent variable, allowing further testing of the mediating effect. The mediation effect was further tested by using Bootstrap's process method. The 74% confidence interval for the Bootstrap test was [.137, .760] and the interval did not contain 0, meaning that there was a significant mediation effect. When the independent variable learning stress and the mediating variables learning engagement and learning motivation to learn were included in the model at the same time, the absolute value of the regression coefficients decreased and the degree of effect tended to decrease compared to the model that included only the independent variable learning stress and the dependent variable satisfaction. According to the regression results in the table above, it can be seen that the variable fulness has a significant effect on both the mediating variable engagement, learning motivation and the dependent variable satisfaction, while the mediating variables engagement and learning motivation also have a significant effect on the dependent variable satisfaction. After the introduction of the mediating variables engagement and learning motivation, the degree of influence of the variable fulness on the dependent variable satisfaction decreases, indicating that the mediating effect is significant. The results are shown in Figure 4.

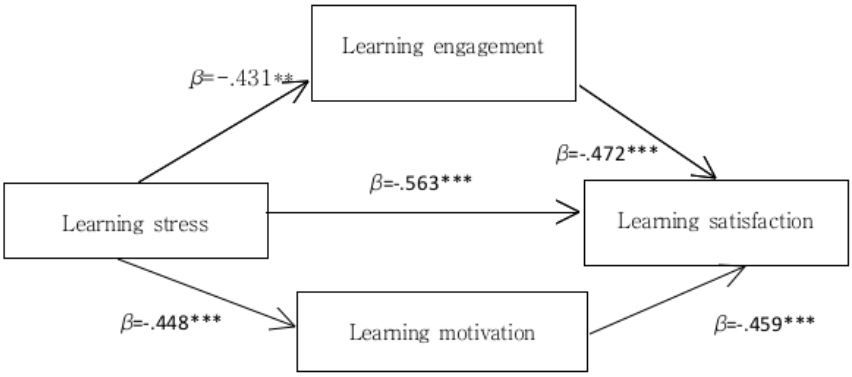

Figure 4. Mediated pathway diagram for engagement, motivation to learn

5. Conclusion

In this paper, 1000 university students majoring in "aerobics" were taken as the research subjects, firstly, we conducted a preliminary survey on their, learning satisfaction, commitment and motivation, and used questionnaires to distribute questionnaires on platforms such as "Questionnaire Star" and "WeChat App". The questionnaires were distributed through platforms such as "WeChat App" and "WeChat Small Program". Afterwards, the explanatory variable was "aerobics online courses", the explanatory variable was "university student satisfaction", and the mediating variables were "learning engagement" and "learning motivation". The empirical model was constructed with "learning stress" as the explanatory variable, "university students' satisfaction" as the explanatory variable, "engagement" and "study motivation" as the mediating variables, and the data obtained from the questionnaire survey were analyzed empirically using descriptive statistics, reliability test, ANOVA (Analysis of Variance), correlation analysis, regression analysis and validation analysis of mediating variables. Afterwards, based on the calculated results, we explore the current problems in the coordination between university students and their satisfaction in online aerobics courses in universities, as well as the mediating effects of university students' engagement and motivation to learn, providing realistic reflections and concluding recommendations for the later paper.

The conclusion of this study based on the research findings is as follows: The overall distribution of the sample is relatively uniform with little variation. The Cronbach's Alpha value for the total dimension of the scale is .794, indicating good reliability. The KMO value for the total dimension is .791, suggesting a well-structured questionnaire. There are significant gender and grade differences in college students' learning stress, learning satisfaction, learning engagement, and learning motivation. There is a negative correlation between college' learning stress and their learning satisfaction, learning engagement, and learning motivation. Regression analysis

indicate that learning stress in online aerobics courses has a negative impact on college students' learning satisfaction. The higher the learning stress perceived by college students in online aerobics courses, the lower their learning engagement, learning motivation, and learning satisfaction with the learning experience.

Based on the results of the study, this paper makes recommendations: Firstly, attention should be paid to reducing students in the online aerobics course: for example, promoting the "professional course + mental health course" dual course mechanism. Universities should investigate and understand the psychological state of students, adjust the teaching content in a targeted manner, and develop a "professional course + mental health course" dual course mechanism. In addition to the professional courses, they should also create high-quality mental health courses (Wei, Fang, 2005). At the same time, new media such as microblogs and WeChat public numbers are used to send timely articles on mental health topics to students to help them adjust their moods (Sun, Yin & Wang, 2011); secondly, emphasis is placed on improving students' learning engagement: the goal should be to improve the engagement in learning in aerobics online learning, and four strategies including guidance, monitoring, interaction and feedback are proposed to support students in online to support students' learning engagement in online learning, enhance students' enthusiasm for learning and strengthen knowledge learning (Mehmet, Eunice, Javier & Joshua, 2019). Process and summative assessments can be carried out in the aerobics online learning process in a timely manner to provide feedback to students on the real-time learning outcomes generated during the course learning process, helping students to adjust their learning strategies in a timely manner and choose learning methods that match the course content to promote engagement in aerobics online learning (Chee, Shorty, & Robinson, 2019); finally, focus on motivating university students: for example, setting reasonable goals. Goals can be used to motivate students to improve their performance on assignments. Generally, specific, short-term achievable goals that are moderately difficult can be effective in motivating students because they are easier to achieve.

In this study we have only explored the effects of academic stress and campus activities on university student's learning satisfaction, whereas in reality, university life is very rich and there are many other elements worth exploring, and given the presence of engagement, motivational interventions and inconsistent mediating effects, it is important to fully identify the protective factors in the pathways of action to understand the mechanisms by which academic stress affects university student satisfaction. A further part of the campus experience that is well worth investigating is the programmes and projects offered by the students' schools to help them adapt to school life. There is a small amount of research abroad on the impact of adaptation programmes on the adaptation to the format of online aerobics classes for students, but there is little research in China on the impact of adaptation programmes on the adaptation to the format of online aerobics classes for students, which is also worth investigating in the future. This is a direction worthy of future research.

References

Aljaser, A, (2019). The Effectiveness of E-Learning Environment in Developing Academic Achievement and the Attitude to Learn English among Primary Students. *The Turkish Online Journal of Distance Education,* 2, 32-33.

Amabile, T. M., Hill, K. G., Hennessey, B. A., & Tighe, E. M, (1995). The work preference inventory-assessing intrinsic and extrinsic motivational orientations. *Journal of Personality and Social Psychology, 68*(4), 580.

Appleton-Knapp, S. L., & Krentler, K. A, (2006). Measuring student expectations and their effects on satisfaction: The importance of managing student expectations. *Journal of Marketing Education, 28*(3), 254-264.

Bian, J. P, (2016). Research on aerobics teaching based on the assistance of online teaching platform. *Automation and Instrumentation,* 12, 207-208+211.

Buhrmester, D., Furman, W., Wittenberg, M. T., & Reis, H. T, (1988). Five domains of interpersonal competence in peer relationships. *Journal of Personality and Social Psychology, 55*(6), 991-1008.

Chee, C. L., Shorty, G. & Robinson, K., & Sharon, E, (2019). Academic stress of Native American undergraduates: the role of ethnic identity, cultural congruity, and self-beliefs. *Journal of Diversity in Higher Education,* 1, 22-23.

Chi, L. P., & Xin, Z. Q, (2006). Measures of college students' motivation and its relationship with self-efficacy. *Psychological Development and Education, 22*(2), 7.

Du, H. M., Wang, K., & Shao, X. P, (2003). A survey on the satisfaction of postgraduate students with the current situation of postgraduate education in higher education. *Journal of Chongqing University*, 6, 161-163.

Fan. C, (2013). Research on Remote Aerobics Network Learning System Based on Browser/Server. *International Journal of Technology Management,* 1, 19-20.

Fredricks, J. A., & Paris, B. A, (2004). School Engagement: Potential of the Concept, State of the Evidence.

Review of Educational Research, *74*(1), 59-109.

Gao, W. H, (2003). Talking about the development and motivation of internal and external learning motivation. *Health Professions Education,* S1, 2.

Hua, Z., Yang, F., & Chao, L, (2013). Empirical Analysis on Aerobics Multimedia Teaching Based on Interactive Mode. *Applied Mechanics and Materials,* 380-384.

In, J. X., Qu, C. H., & Ma, F. H, (2022). A study on the hybrid teaching model of aerobics option course. *Contemporary Sports Technology,* 09, 90-92.

Jaeger, R. M., & Freijo, T. D, (1974). Some psychometric questions in the evaluation of professors. *Journal of Educational Psychology*, *66*(3), 416-423.

Jiang, J. Y, (2016). The ecological environment and path design of "aerobics" course innovation in colleges and universities. *Journal of Zhenjiang High School,* 4, 114-116.

Kusum, T, (2012). Stressors Related to Academic Stress and Health Problems among College Students. *Indian Journal of Health and Wellbeing,* 2, 22-23.

Lee, D. Y., & Lee, J. Y, (2019). The Effects of Flipped Learning Classes in Nursing Students. *Medico-Legal Update,* 1, 17-18.

Li, J. H, (2003). Experimental discussion on the cultivation, motivation and maintenance of learning motivation. *Journal of Xinjiang Radio and Television University,* 2, 2.

Liu, Y, (2009). A study on independent learning of English for adults under open education: A survey and analysis based on "learning motivation and attitude". *Science and Technology Information,* 21, 2.

Mao, J. P, (1995). Reflections on the current characteristics of college students' learning motivation in China. *Research in Teacher Education,* 1, 5.

Marwan, Z. B, (2013). Academic Stress among Undergraduate Students: The Case of Education Faculty at King Saud University. *Interdisciplinary Journal of Education*, 1, 110-112.

Mehmet, A. Karaman, E. L., Javier, C. V. & Joshua, C. W, (2019). Predictors of Academic Stress Among College Students. *Journal of College Counseling*, 1, 18-19.

Nam, C. W., Kwon, J. S. & Shin, D. M, (2019). The effects of reflection strategies types on pre-service teachers group cohesiveness and attitude toward cooperative learning in the design thinking learning environments. *Korean Association for Learner-Centered Curriculum and Instruction*, 7, 96-97.

Pan, Y. F, (2018). Exploring the mediating effect of mental toughness in emotional intelligence to resolve academic stress: A case study of students enrolled in eight universities in Hohhot. *Innovation and Entrepreneurship Theory Research and Practice*, 12, 98-99.

Peng, S. N., & Yu, J, (2011). Research and cognitive analysis of university students' satisfaction with their majors: A case study of Nanjing Information Engineering University. *Literature and Education*, 28, 3.

Raufelder, D., Kittler, F., Braun, S. R., Latsch, A., Wilkinson, R. P., & Hoferichter, F, (2013). The interplay of perceived stress, self-determination and school engagement in adolescence. *School Psychology International, 35*(4), 405-420.

Ryan, R. M., & Deci, E. L, (1985). The "third selective paradigm" and the role of human motivation in cultural and biological selection: a response to Csikszentmihalyi and Massimini. *New Ideas in Psychology, 3*(3), 259-264.

Sarma, A. R., Payakkakom, A. & Kurpius, S. E. R, (2012). Self-Esteem, Valuing of Education, and Academic Stress among Undergraduates in Thailand. *Journal of Asia Pacific Counseling,* 1, 191-192.

Schaufeli, W. B., & Utrecht, U, (1999). Evaluación de riesgos psicosociales y prevención del estrés laboral: algunas experiencias holandesas. *Revista De Psicología Del Trabajo Y De Las Organizaciones,* 15, 147-172.

Schraw, G., & Sinatra, G. M, (2004). Epistemological development and its impact on cognition in academic domains. *Contemporary Educational Psychology*, *29*(2), 95-102.

Shi, J. X., (2016). Construction of an online teaching platform for aerobics technique class. *Science and Technology Outlook,* 31, 193.

Sun, H. M., Yin, S. Y. & Wang, C. Y, (2011). A study on the relationship between college students' learning engagement status and social support. *Journal of Suihua College,* 1, 41-43.

Tao, L., Pan, N. M., Mo, D. L., Zhou, M., Zhang, J. & Wang, Y. L., (2017). A study on the application of club

teaching joint online platform teaching model in aerobics teaching. *Sports World (Academic Edition),* 1, 134-135.

Tian, L., & Deng, Q, (2007). Preliminary development of a study stress questionnaire for university students. *Chinese Behavioral Medicine Science*, *16*(8), 3.

Wang, J. H., TSAI, K. C., CHU, S. K., Lei, C. L., Chio, I. L., & Lee, H. M, (2015). Study of Learning Pressure, Learning Attitudes, and Achievement among Macau Undergraduates. *Canadian Social Science*, 9, 17-18.

Wang, L. (2015). Practice and exploration of micro-courses in college aerobics professional courses. *Contemporary Sports Science and Technology,* 25, 64-65.

Wang, Q. T, (2003). *A study of the correlation between learning patterns, motivation and satisfaction in adult education: A case study of the Extension Education Technology class at Kaohsiung College of Hospitality and Tourism*, Kaohsiung, Taiwan: Yishou University Research Institute.

Wang, R, (2017). A *study on the effect of case teaching method on intercultural sensitivity, cultural intelligence and learning motivation of college students* (Dissertation, Shaanxi Normal University), 57.

Wang, S. Y, (2006). Teachers' feedback on classroom assessment and students' motivation to learn: a literature review (in English). *Chinese Applied Linguistics (English)*, 2, 78-84.

Wei, H. F., & Fang, W. M, (2005). Research on the content system of student satisfaction in colleges and universities. *Journal of Liaoning College of Education and Administration*, 9, 32-33.

Wen, J., & Shi, Q. H, (2013). Exploring the elements and structure of university students' learning satisfaction. *Macro Quality Research*, 3, 87-94.

Xu, J. Q., Tan, Y. Y. & Hou, X. Y, (2014). A study of university students' learning engagement and its enhancement strategies. *Explorations in Higher Education,* 6, 132-136.

Yi, H. Q, (2009). A study on the application of factor analysis to the study satisfaction of adult physical education students. *Journal of Nanjing Institute of Physical Education: Social Science Edition,* 5, 3.

Yoo, M. J., & Kim, H. J, (2018). The Effects of Learning Attitude and Major Satisfaction of Male Nursing Students on Nursing Professionalism, *Korean Association for Learner-Centered Curriculum and Instruction*, 8, 18.

Yu, J. J., & Liu, G. H, (2018). A study on the relationship between the causes of learning burnout and learning burnout among higher vocational students — An example from Shandong Province. *Journal of Yueyang Vocational and Technical College*, 2, 31-36.

Zhai, J. Y., Yang, P. C., Chen, Q., Shi, Y., & Hou, R, (2012). A study on the correlation between learning barriers and learning satisfaction among nursing in-service students. *Chinese Journal of Nursing*, *47*(7), 3.

Zhao, M., Ma, Y. T., & Zhang, B. S, (2019). The effect of study stress on depression and its mechanism among postgraduate students in higher education. *Journal of Shangluo College*, 6, 68-73.

Zhou, J, (2021). *A study on the relationship between academic stress and study commitment among college students in the context of "increasing the burden".* Doctoral dissertation, Nanchang University.