

## Influencing factors on University students' participation intention in sport during the Covid-19 pandemic based on the extended MGB model

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*This study examined the effect of public health emergencies on the university students' behavior intention of sports participation by applying the extended model of goal-directed behavior. Two new variables, cognition of public health emergency and frequency of past behavior, were added to improve the model's predictive ability. Employing 1558 university students in China as research samples, the results have revealed that attitude, perceived behavior control, positive anticipated emotion and negative anticipated emotion had a positive effect on the desire for sports participation, which in turn influenced their behavioral intention for sports participation. At the same time, cognition of public health emergencies and frequency of past behavior had positive effects on the desire and behavioral intention for sports participation. In addition, the results also proved that the complex correlation coefficient of the desire to participate in physical exercise is 0.44. The value indicates that the seven variables of university students' attitude, subjective norm, anticipated emotion, perceived behavior control, cognition of public health emergency and frequency of past behavior explain the 44% variation of exercise desire. The complex correlation coefficient of participation intention in physical exercise is 0.61, which manifests those three variables of university students' cognition of public health events, the frequency of past behavior and the desire to participate in sports explain the 61% variation of exercise intention. The findings shed light on a better understanding of the decision-making processes of university students under public health emergencies.*

KEY WORDS: Extended model of goal-directed behavior (EMGB); Behavioral intention/Public health emergency, Structural equation model, sports participation.

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## **1. Introduction**

Public health emergency refers to the epidemic situation of major infectious diseases that occur accidentally and cause or may cause serious damage to the public health, unknown diseases involving mass, major food and occupational poisoning and other emergencies seriously affecting public health and life safety (Jia, Guo, Wang, & Barnes, 2020). On March 11, 2020, the world health organization announced that the COVID-19 outbreak had entered a global pandemic (Tariku & Hajure, 2020). The life changes caused by the COVID-19 outbreak on individuals will become stressful life emergencies affecting them. Stress is part of a complex dynamic system in which individuals interact with the environment, it is a kind of reaction state produced by individuals facing various stimuli or pressures in themselves and the environment, including cognitive, emotional, behavioral, and physiological changes (Egner, Sütterlin, & Calogiuri, 2020). When a public health event such as the COVID-19 outbreak is perceived as a threat to human health, the public's behavioral intention to sports participation may also change. University students are a young and particular social group of people. Therefore, this paper analyzes the public health emergency on the behavioral intention of university students in sports participation and its influencing factors as well as attempts to apply the Extended Model of Goal-oriented Behavior (EMGB) theory to the study of behavioral intention in sports participation.

The model of goal-directed behavior (MGB) originates from the theory of planned behavior (TPB). According to the TPB, individual behavior is directly affected by behavioral intention, it is also influenced by individual behavioral attitude, subjective norms, and perceived behavioral control (Kim, Ham, Yang, & Choi, 2013). Previous studies have found that behavioral intention is the best variable to explain behavior, therefore, many scholars tend to use behavioral intention instead of actual behavior to carry out research. Perugini et al constructed the MGB model, in the MGB model, desire could be a critical factor in explaining a person's decision formation (Perugini & Bagozzi, 2001). The MGB model not only retained the original variables of the TPB model, including attitude, subjective norm and perceived behavioral control but also borrowed from extending the TPB model that the expected emotional response in the emotional process influences the decision-making process (Nimri, Patiar, & Jin, 2020). In the TPB model, the anticipated emotions variable was added, and desire was conceptualized as a mediator between attitude, anticipated emotions (i.e., positive, and negative), subjective norm, perceived behavioral control, frequency of past behavior, and behavioral intention (Prochaska, 2020). Compared with

the TPB model, the incorporation of these additional variables is necessary to broaden and deepen a theory, and the predictive ability and explanatory power of the MGB model have been significantly improved. Therefore, it has often been applied to understand a variety of human behaviors, including education, medical treatment, business, and tourism in recent years (Alvarez-Risco, Mlodzianowska, García-Ibarra, Rosen, & Del-Aguila-Arcentales, 2021). However, the application of MGB in the field of sports is still in the development stage, Hagger et al discovered that the TPB model could explain 44.5% variance of exercise intention and 27.4% variance of exercise behavior (Hagger, Chatzisarantis, & Biddle, 2002). The method of theoretical review to analyze the existing theoretical model of exercise behavior was utilized. By integrating the continuous TPB model with the stage model of healthy action process orientation, they established a theoretical model that can not only include the macro environment and micro psychological factors but also explain and predict exercise behavior. Based on the new model constructed by combining the TPB model and the theory of health action process, Feng et al introduced self-determination motivation into the new model and studied the applicability of the new model to university students, the results demonstrate that the model is also applicable to the prediction of university students' activity behavior (Feng, Mao, & Che, 2015). When scholars tested simultaneously using multilevel modelling, the only significant moderator of the intention-behavior relationship was the extent to which behavioral intentions were based on anticipated affective reactions (behavioral intention more strongly based on anticipated affective reactions were significantly stronger predictors of behavior). This effect remained when behavioral intention stability (which also moderated the intention-behavior relationship), self-efficacy and past behavior were also controlled (Hong & Chung, 2022). Therefore, intention based on expected emotional response is considered to be a considerable predictor of healthy behavior.

The theory by testing extensions such as the MGB model was improved recent years. Esposito et al. added desire and positive and negative anticipated emotions applied to physical activity (PA) intention structure (Esposito, van Bavel, Baranowski, & Duch-Brown, 2016). The extended model of goal directed behavior (EMGB) model is an improvement over the MGB model by adding new constructs to analyze intention more comprehensively. Previous studies have been conducted to implement the EMGB model for analyzing people's decision-making processes. Wang et al. build a theoretical framework to explain Korean domestic tourists' decision-making process under COVID-19 by applying an extended model of goal-directed behavior (Wang, Choe, & Song, 2021). Xu et al. devel-

oped an extended model of goal-direct behavior to investigate the role of non-pharmaceutical interventions in predicting latent cruise travelers' decision-making process in the COVID-19 pandemic context to foster the growth of a sustainable cruise business (Xu, Youn, & Lee, 2021). Several studies have been focused on developing the EMGB model in estimating people's intentions. Qiao et al. examined South Korean residents' travel-related behavioral intention for mainland China post-COVID-19 utilizing an extended model of goal-directed behavior (Qiao, Zhao, Xin, & Kim, 2021). Hwang et al. developed a study to identify the significance of drone food delivery services using the moderating role of the outbreak of COVID-19. The research proposed that there is a positive relationship between the overall image and the desire according to the extended model of goal-directed behavior (Hwang, Kim, & Kim, 2020). Hwang et al. designed research to examine how to form behavioral intentions based on the concept of expected benefits in the field of drone food delivery services with the extended model of goal-directed behavior (Hwang & Kim, 2020). There are few pieces of literature on the research of behavioral intention of sports participation based on the extended model of goal-directed behavior (EMGB) model. Therefore, this paper tends to make an exploration to study people's intentions to participate in physical exercise by utilizing the EMGB model theory.

## **2. Materials and Methods**

### **2.1. THEORETICAL BACKGROUND AND HYPOTHESES**

Based on the MGB model, this paper introduces the cognition of public health emergency and the frequency of past behavior into the MGB model, constructs an EMGB mode, and studies the behavioral intention of Chinese university students to sport participation and its influencing factors under public health emergency. This paper explores the influence of original variables such as attitude, subjective norm, perceived behavioral control, and positive and negative anticipated emotions on behavioral intention incorporating desire as a mediator into the MGB model. According to the motivation hypothesis, when people perceive a higher level of risk, they tend to take protective precautions to reduce the perceived risk. Research revealed that epidemic diseases would have negative effects on related industries such as tourism, including the increased perceived risk of potential tourists' experience and the anxiety and fear caused by insufficient information on the origin, prevention, and treatment of diseases (Prasetyo, Castillo, Salonga, Sia, & Seneta, 2020). Considering the above factors, this paper adds the cognition of public health emergency to the variables established on the MGB model. In the aspect of the habit process, people's past behavioral performance significantly reflects their own behavioral habits. Past behavior is considered as an important determinant of human decision-making, which has a considerable influence on people's future behavioral

performance. Therefore, the model also introduces the frequency of past behavior as an original variable. The existing research revealed that behavioral intention was the best variable to explain behavior. Based on the extended the MGB model theory, exploring the mechanism of university students' behavioral intention in sports participation can better improve the explanatory power of the model to behavior. The research framework of this paper is shown in Figure 1 as follows.

The empirical studies of the MGB model and other theories have discovered that among the effects of attitude, subjective norm, perceived behavior control and other individual psychological variables on behavioral intention, desire can play a critical factor, which is the most crucial factor to explain the actual behavioral intention. Attitude refers to an individual's understanding, evaluation, and tendency to perform a specific act, as well as his subjective willingness to cooperate with the implementation of this act (Kim, Kim, & Han, 2021). Attitude has an indirect effect on behavioral intention to sport participation through desire. The empirical research showed that attitude had a positive effect on desire. Subjective norm referred to the social pressure that an individual perceived when deciding whether to carry out a specific behavior (Kim & Kim, 2021). Social pressure might come from family members, relatives, friends, neighbors, teachers, colleagues, and classmates. These external social pres-

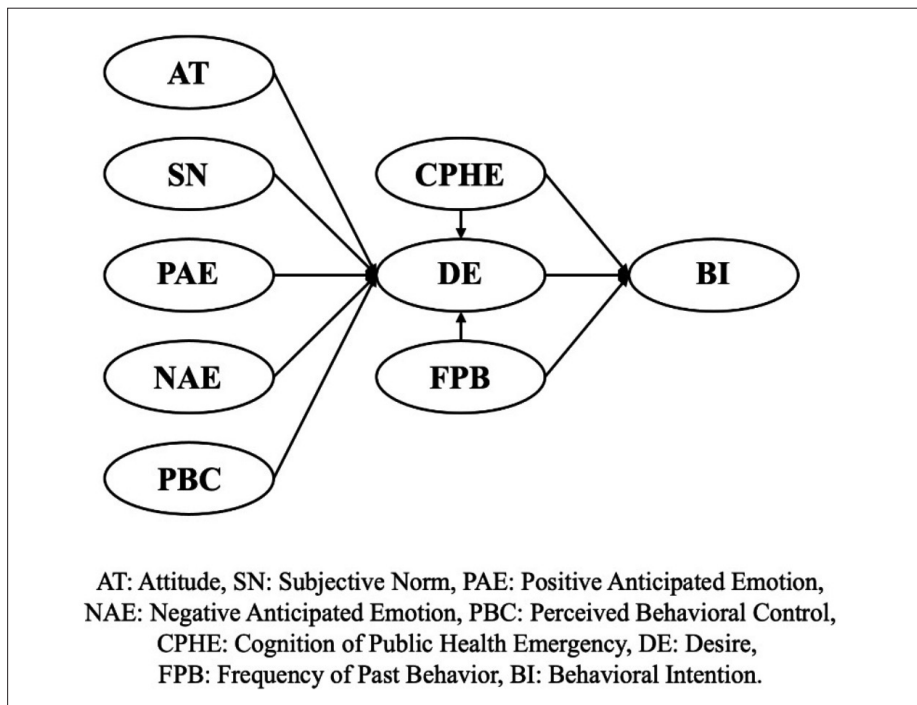


Fig. 1. - The proposed research models. Established on the EMGB model theory and the existing research results, this study divides the factors that affect university students' behavioral intention to sport participation into the following categories.

tures would affect a specific behavior that individuals take (Sajedifard & Sajedifard, 2022). Research has shown that subjective norm does not directly affect individuals' behavioral intentions but play a role by influencing the mediating variable of desire. Perceived behavioral control refers to the individual's perception of the difficulty of performing a specific behavior, and it is the perception of the controllable degree of related factors that promote or hinder the implementation effect of a specific behavior. Lee et al tested the influence relationship between subjective norms and desire when studying the travel behavior decision of international tourists during the influenza epidemic period. Perceived behavior control has a positive role in promoting behavioral intention. A stronger perception of behavior control can strengthen the desire of individuals to perform, thus positively affecting behavioral intention. Expected emotion is a kind of anticipated emotion formed by people's successful execution of certain behavior in the future (Park, Lee, & Peters, 2017). The current studies all follow the emotion dichotomy proposed to classify the emotion, which was according to the effect of emotion, the expected emotion was divided into two types: positive anticipated emotion and negative anticipated emotion. Several researchers utilized the MGB model to study parents' cognition of adolescent horse riding. Their studies showed that perceived behavior control, positive anticipated emotion and negative anticipated emotion have significant influence on desire, and desire also has significant influence on behavioral intention (Song, You, Reisinger, Lee, & Lee, 2014; Meng & Choi, 2016; Soorani & Ahmadvand, 2019). This paper proposes the following hypothesis based on the above discussions.

**Hypothesis 1 (H1).** Attitude has a positive effect on the desire to sport participation.

**Hypothesis 2 (H2).** Subjective norm has a positive effect on the desire to sport participation.

**Hypothesis 3 (H3).** Perceived behavior control has a positive effect on the desire to sport participation.

**Hypothesis 4 (H4).** Positive anticipated emotion has a positive effect on the desire to sport participation.

**Hypothesis 5 (H5).** Negative anticipated emotion has a positive effect on the desire to sport participation.

This section may be divided by subheadings. It should provide a concise and precise description of the experimental results, their interpretation, as well as the experimental conclusions that can be drawn. In the MGB model, desire, as a moderator variable, is the most direct determinant of behavioral intention. It contains a stronger capability to predict behavioral intention and has a positive role in promoting behavioral intention. Studies demonstrated that the desire to sport participate can provide motivation or motive factors for the behavioral intention for sports participation and can better effectively explain the reasons for individuals to perform certain behaviors (Symonds & Russell, 2018). At the same time, the desire, as a moderator variable, is controlled and influenced by attitude, subjective norm, perceived behavior control, positive and negative anticipated sentiment, and ultimately affects the individual's behavioral intention and actual behavior. Founded on the discussion, this paper proposes the following hypothesis:

**Hypothesis 6 (H6).** The desire to sport participation has positive influence on the behavioral intention to sport participation.

In order to better explain and predict the behavioral intention, scholars added antecedent variables according to certain behavior and construct the EMGB model (Li & Su, 2022). Existing studies have shown that adding a specific antecedent variable for some specific behaviors would indeed enhance the explanatory power of the model (Anaki & Sergay, 2021). It was reasonable to infer that there was a positive correlation between risk cognition and



readiness intention, and risk cognition is the most important factor among all the factors influencing individual readiness behavior (Yoganathan, Osburg, Kunz, & Toporowski, 2021). Therefore, this paper adds the antecedent variables of cognition about public health emergencies to the MGB model to explore the impact on the desire and behavioral intention for sports participation. In addition, the research indicated that past behavior could affect the desire, the behavioral intention, and the actual behavior. This paper also adds the frequency of past behavior to the MGB model to study its influence on the desire and the behavioral intention for sports participation. This paper proposes the following assumptions based on the above-mentioned statement:

**Hypothesis 7 (H7).** The cognition of public health emergency has a positive effect on the desire to sport participation.

**Hypothesis 8 (H8).** The cognition of public health emergency has a positive effect on the behavioral intention to sport participation.

**Hypothesis 9 (H9).** The frequency of past behavior has a positive effect on the desire to sport participation.

**Hypothesis 10 (H10).** The frequency of past behavior has a positive effect on the behavioral intention to sport participation.

## 2.2. METHODS

The questionnaire was utilized in this paper to obtain data. The research questionnaire design includes two parts. The first part is the basic information, including gender, age, monthly consumption level and so forth (Wang et al., 2020). The second part is the variable measurement. In order to ensure the content validity of the measurement scale (Almanasreh, Moles, & Chen, 2019), this study utilizes a more mature scale in the existing domestic and foreign literature. It involves university students' attitude, subjective norm, positive anticipated emotion, negative anticipated emotion, perceived behavioral control, cognition of public health emergency, frequency of past behavior, desire, and behavioral intention to sport participation etc. All items, except the frequency of past behavior, were assessed on a 5-point Likert scale ranging from 1=strongly disagree to 5=strongly agree (Liddelow, Ferrier, & Mullan, 2021). The frequency of past behavior was coded on a 5-point scale ranging from 1=never do it to 5=always insist on doing (Stein & Yeo, 2021).

Before the formal distribution of the questionnaire, the scale was tested initially according to expert interviews, and the questions in the scale were fine-tuned to ensure that the measured items could be standardized and understood by the testers. The subjects of this study were university students. The survey was collected online utilizing the platform Questionnaire Star. The data collection period was between February and March 2021. A total of 621 questionnaires were collected during the collection period. After screening and the removal of incomplete and unengaged responses, 551 questionnaires were retained for further analysis, representing a response rate of 88.7%. There are 30 measurement items in the questionnaire, which is at least 10 to 15 times higher than the effective questionnaire required by the application of the structural equation model. Questionnaires were collected from 16 provinces and 4 municipalities of China. Table I presents demographic characteristics of the respondents. Among the 551 questionnaires, a total of 42.6% were male and 57.4% were female. In terms of age, the average age was 21.4 yr. (SD=2.1), and 87.6% of them spend less than 3000 yuan per month.

TABLE I  
Demographic Characteristics Of Respondents

Characteristic	%	Characteristic	%
<b>Gender</b>		<b>Monthly income</b>	
Male	42.6	Less than 3000 RMB <sup>a</sup>	87.6
Female	57.4	3001-4000 RMB	6.4
<b>Age</b>		4001-5000 RMB	4.3
Under than 18	2.4	5001-6000 RMB	1.2
18-25	91.4	Over 6001 RMB	0.5
26-35	6.2		
<b>Education level</b>			
Career college and Institutions of higher education	17.8		
University	75.7		
Graduate school	6.5		

N=551 a.US \$1=6.6988 RMB

TABLE II  
The Factor Load Matrix

Factor	1	2	3	4	5	6	7	8	9
AT1	0.168	0.078	<b>0.858</b>	0.075	0.124	0.049	0.149	0.177	0.027
AT2	0.141	0.068	<b>0.879</b>	0.125	0.100	0.032	0.107	0.174	0.058
AT3	0.138	0.139	<b>0.835</b>	0.197	0.123	0.105	0.126	0.047	0.074
SN1	0.244	0.090	0.151	<b>0.844</b>	0.033	0.059	0.133	0.015	0.003
SN2	0.235	0.076	0.136	<b>0.875</b>	0.051	0.054	0.093	0.058	0.012
SN3	0.228	0.098	0.097	<b>0.840</b>	0.076	0.102	0.092	0.146	0.030
PBC1	0.252	0.076	0.147	0.106	-0.004	0.127	<b>0.804</b>	0.038	0.071
PBC2	0.197	0.151	0.181	0.089	0.090	0.091	<b>0.779</b>	0.187	0.041
PBC3	0.038	0.110	0.062	0.122	0.224	-0.080	<b>0.712</b>	0.157	0.004
CPHE1	0.100	0.119	0.048	0.057	0.172	<b>0.830</b>	0.038	0.105	0.026
CPHE2	0.126	0.085	0.023	0.040	0.135	<b>0.843</b>	0.028	0.077	0.091
CPHE3	0.024	0.094	0.088	0.091	0.096	<b>0.771</b>	0.044	0.152	0.048
DE1	0.280	0.158	0.214	0.081	0.269	0.188	0.194	<b>0.702</b>	0.083
DE2	0.184	0.154	0.132	0.100	0.298	0.184	0.185	<b>0.771</b>	0.119
DE3	0.191	0.160	0.249	0.125	0.279	0.193	0.169	<b>0.729</b>	0.154

(Continue)



Continue TABLE II

Factor	1	2	3	4	5	6	7	8	9
PAE1	<b>0.824</b>	0.195	0.127	0.211	0.089	0.074	0.139	0.141	0.050
PAE2	<b>0.831</b>	0.138	0.142	0.220	0.053	0.088	0.148	0.194	0.032
PAE3	<b>0.858</b>	0.162	0.146	0.215	0.112	0.098	0.151	0.077	0.029
PAE4	<b>0.836</b>	0.213	0.122	0.202	0.091	0.081	0.123	0.124	0.045
NAE1	0.212	<b>0.841</b>	0.137	0.094	0.079	0.117	0.129	0.037	0.004
NAE2	0.155	<b>0.877</b>	0.107	0.109	0.103	0.110	0.131	0.108	0.031
NAE3	0.162	<b>0.834</b>	0.146	0.215	0.112	0.098	0.151	0.077	0.029
NAE4	0.213	<b>0.806</b>	0.122	0.202	0.091	0.081	0.123	0.124	0.045
BI1	0.081	0.133	0.157	0.014	<b>0.723</b>	0.200	0.135	0.243	0.308
BI2	0.104	0.137	0.123	0.112	<b>0.789</b>	0.194	0.143	0.249	0.179
BI3	0.124	0.111	0.127	0.053	<b>0.820</b>	0.164	0.084	0.183	0.146
FPB1	0.104	0.060	0.063	-0.004	0.223	0.090	0.058	0.105	<b>0.875</b>
FPB2	-0.003	0.059	0.062	0.036	0.195	0.062	0.030	0.096	<b>0.898</b>
Eigenvalue	9.764	2.899	2.229	1.792	1.527	1.401	1.275	1.033	1.001
Cumulative Variance	12.462	11.448	9.363	9.094	8.473	8.369	7.655	7.488	6.482

### 3. Results

#### 3.1. RELIABILITY AND VALIDITY

Collected data were analyzed with structural equation modelling (SEM) using SPSS (SPSS26.0) and EQS (AMOS24.0). Firstly, exploratory factor analysis (EFA) was employed to identify the dimensions of university students' consciousness structure of behavioral intention to sport participating. A theoretical hypothesis model of university students' intention consciousness structure composed of 30 items in 9 dimensions is preliminarily constructed. According to the adaptability of factor analysis, the value of KMO was 0.903, and the P-value of Bartlett's sphericity test was less than 0.000. The results demonstrate that there was a strong correlation between the observed variables, which was suitable for factor analysis. Exploratory factor analysis is carried out on the dimension structure of university students' consciousness of participating intention in sport through maximum likelihood estimation. The results showed that after removing 2 items with a factor loading less than

0.6 (including I had a lot of information about COVID-19 (NCP) and my desire to participate in sports participation), 28 items were retained, with factor loading above 0.7 and contribution rate of cumulative variance of 80.833%. The factor load matrix is displayed in Table 2 and the reliability and validity analysis are shown in Table III.

TABLE III  
*Reliability And Validity Analysis.*

Latent variables	Measured Item	Standard Load	Cronbach's Alpha	Composite Reliability	AVE
Attitude AT	I think physical exercise can improve physical and mental health (AT1).	0.858	0.904	0.8928	0.7353
	I think physical exercise can improve the body immunity (AT2).	0.879			
	I think physical exercise is an important part of life (AT3).	0.835			
Subjective Norm SN	My relatives and friends can understand my participation in physical exercise (SN1).	0.844	0.900	0.8891	0.7279
	My relatives and friends all support me to take part in physical exercise (SN2).	0.875			
	My relatives and friends all encourage me to take part in physical exercises (SN3).	0.840			
Perceived Behavioral Control PBC	I can keep doing exercises as long as I want (PBC1).	0.804	0.764	0.8095	0.5867
	I have the confidence to stick to the plan (PBC2).	0.779			
	I can stick to physical exercise without outside interference (PBC3).	0.712			
Cognition of Public Health Emergency CPHE	COVID-19 is fast and susceptible to infection (CPHE1).	0.830	0.812	0.8559	0.6647
	COVID-19 is very difficult to treat antiviral drugs and its efficacy is limited (CPHE2).	0.843			
	COVID-19 May cause death (CPHE3).	0.771			
Desire DE	I really want to take part in physical exercise (DE1).	0.702	0.896	0.7783	0.5396
	I hope to start working out soon (DE2).	0.771			
	I'd be happy to increase the frequency of physical activity each week (DE3).	0.729			

*(Continue)*

Continue TABLE III

Latent variables	Measured Item	Standard Load	Cronbach's Alpha	Composite Reliability	AVE
Positive Anticipated Emotion PAE	I feel excited after taking part in physical exercise every time (PAE1).	0.824	0.942	0.9037	0.7011
	I feel happy after taking part in physical exercise every time (PAE2).	0.831			
	I feel satisfied after taking part in physical exercise every time (PAE3).	0.858			
	I feel confident after taking part in physical exercise every time (PAE4).	0.836			
Negative Anticipated Emotion NAE	I feel unhappy if I don't achieve my physical exercise goals (NAE1).	0.841	0.901	0.9054	0.7054
	I would feel lost if I didn't carry out the physical exercise plan (NAE2).	0.877			
	I would be sorry if I missed a few days of exercise (NAE3).	0.834			
	I feel regret if I don't participate in physical exercise for several days in a row (NAE4).	0.806			
Behavioral Intention BI	I will take physical exercise as the first choice of leisure time (BI1).	0.723	0.878	0.8214	0.6059
	I do 30 minutes of exercise three times a week (BI2).	0.789			
	I will spend time, energy, and money on exercise (BI3).	0.820			
Frequency of Past Behavior FPB	The frequency at which I participated in physical exercise at least 3 times a week in the past year (FPB1).	0.875	0.840	0.8802	0.786
	The number of times I have completed at least 30 minutes of physical activity in the past year (FPB2).	0.898			

The Cronbach's Alpha reliability of each latent variable was calculated by reliability analysis of all observed variables. For the test of validity, this paper mainly explored the convergent validity and discriminant validity of the measuring scale. The convergent validity is determined by Composite Reliability (CR) and Average Variance Extracted (AVE). The variance of 80.833% is explained by the nine factors extracted according to the criterion of eigenvalue greater than 1. It is generally believed that when Cronbach's

Alpha is greater than 0.7, the reliability of the questionnaire is high. The Cronbach's Alpha value of this scale is 0.924, and the Cronbach's Alpha value of all 9 constructs is greater than 0.7. CR represents the internal consistency of the constructed index. It is generally believed that when CR values are all greater than 0.7, the internal consistency of the measurement items of latent variables is satisfactory, and when AVE values are all greater than 0.5 (Table III), it is believed that the scale has adequate convergent validity. For discriminant validity, it is proved that the two constructs have good discriminant validity if the square root of the AVE value of each construct is greater than the correlation coefficient between the construct and other constructs.

A summary of confirmatory factor analysis results is shown in Table IV. It can be seen from the table that the square root of the AVE value of each potential variable is greater than the correlation coefficient between the potential variable and other potential variables. Therefore, the measurement scale of each potential variable has adequate discriminant validity.

TABLE IV  
*The Summary of Confirmatory Factor Analysis results.*

	AT	SN	PAE	NAE	PBC	DE	BI	CPHE	FPB
AT	<b>0.857</b>								
SN	0.385***	<b>0.8532</b>							
PAE	0.427***	0.566***	<b>0.8373</b>						
NAE	0.308***	0.304***	0.468***	<b>0.8399</b>					
PBC	0.451***	0.380***	0.508***	0.399***	<b>0.7660</b>				
DE	0.535***	0.368***	0.544***	0.441***	0.563***	<b>0.7346</b>			
BI	0.415***	0.261***	0.366***	0.369***	0.424***	0.651***	<b>0.7784</b>		
CPHE	0.227***	0.233***	0.310***	0.314***	0.250***	0.494***	0.498***	0.8153	
FPB	0.219***	0.105***	0.200***	0.180***	0.204***	0.406***	0.572***	0.257***	<b>0.8866</b>

### 3.2. STRUCTURAL EQUATION MODEL ANALYSIS

As the first step in the evaluation of the measurement model, Confirmatory Factor Analysis (CFA) identified the structure of factors and systematically measured variables in underlying constructs (Hair, Howard, & Nitzl, 2020). This lessened multicollinearity or error variance correlations among indicators. In the second stage, hypothetical relationships among the EMGB model constructs were identified in the structure model. In this paper, AMOS24.0 software is utilized to analyze the collected sample data by Maximum Likelihood Estimate (MLE). Four common indexes used in this

study to assess the model's overall goodness of fit included: the ratio of  $\chi^2$  to degree of freedom ( $\chi^2/df$ ), the goodness of fit index (GFI), the adjusted goodness of fit index (AGFI), the standard of goodness of fit index (NFI), the comparison of goodness of fit index (CFI), the value of goodness of fit index (IFI), the goodness-of-fit index (PGFI) and expeditiously, fitting specifications (PNFI) contracted fitting index. and root-mean-square error of approximation (RMSEA). Previous studies have shown that "the closer the value of chi-squared degree of freedom ( $\chi^2/df$ ) is to 0, the better the fitting between the observed data and the model is. A value less than 3 indicates that the overall model is well fitted, a value less than 5 indicates that the overall model is well fitted and acceptable, a value greater than 10 indicates that the overall model is very poor. RMSEA below 0.1 indicates good fitting, below 0.05 indicates very good fitting, and below 0.01 indicates very good fitting. GFI and AGFI are greater than 0.90, which indicates that the fitting degree between the model and the data is very good. It is considered that the fitting degree is better when GFI and AGFI are greater than 0.80. NFI equal to 1 corresponds to the best fit, and NFI equal to 0 corresponds to the worst fit. When CFI value is greater than 0.9, IFI value is greater than 0.9, PNFI value is greater than 0.5, PNFI value is greater than 0.5, it indicates that the model is acceptable. In order to get better fitting effect, the structural equation model is modified according to the modified exponential MI. As shown in Table V, all the parameters fitted by the model in this study are within the acceptable range.

### 3.3. HYPOTHESIS TEST RESULTS

According to the aforementioned path hypothesis and data analysis, the standardized path coefficient between variables is measured to test each re-

TABLE V  
*The Model Fitting Index.*

Index	$\chi^2/df$	RMSEA	GFI	AGFI	NFI	CFI	IFI	PGFI	PNFI
critical value	< 3	< 0.08	> 0.9	> 0.9	> 0.9	> 0.9	> 0.9	> 0.5	> 0.5
Index value before correction	3.710	0.070	0.827	0.793	0.887	0.914	0.914	0.693	0.797
Index value after correction	2.292	0.059	0.877	0.851	0.911	0.939	0.940	0.728	0.812

search hypothesis (Moneva Abadía, Gallardo Vázquez, & Sánchez Hernández, 2019). It can be seen from Table 6 that the P-value of H2 is not less than 0.001, indicating that the hypothesis cannot pass the test. P values of H1, H3, H4, H5, H6, H7, H8, H9 and H10 are all less than 0.001, indicating that the hypothesis passes the test. In addition, according to the assumptions of the structural equation model, the size of the normalized path coefficient value is shown in Table VI and in Figure 2. Among them, the perceived behavioral intention has the largest effect on the desire to participate in physical exercise, followed by attitude. The interaction effect of attitude and desire is 0.276, the interaction effect of desire and positive anticipated emotion is 0.231, and the interaction effect of desire and perceived behavior control is 0.278. The standardized path coefficient of the desire to participate in physical exercise on the intention to participate is 0.541, and the total effect of the past behavior frequency on the intention to participate in physical exercise is 0.371, the effect of the former is significantly higher than the latter. The

TABLE VI  
Tables should be placed in the main text near to the first time they are cited.

<b>Paths</b>	<b>Standardized path coefficient</b>	<b>P-Value</b>	<b>Conclusion</b>
H1 Attitude → Desire to sport participation	0.276	***	Supported
H2 Subjective norm → Desire to sport participation	-0.009	0.856	Not Supported
H3 Perceived behavior control → Desire to sport participation	0.278	***	Supported
H4 Positive anticipated emotion → Desire to sport participation	0.231	***	Supported
H5 Negative anticipated emotion → Desire to sport participation	0.130	***	Supported
H6 Desire to sport participation → Behavioral intention to sport participation	0.541	***	Supported
H7 Cognition of public health emergency → Desire to sport participation	0.303	***	Supported
H8 Cognition of public health emergency → Behavioral intention to sport participation	0.167	***	Supported
H9 Frequency of past behavior → Desire to sport participation	0.242	***	Supported
H10 Frequency of past behavior → Behavioral intention to sport	0.371	***	Supported

\* Notes: \*\*\* P < 0.001

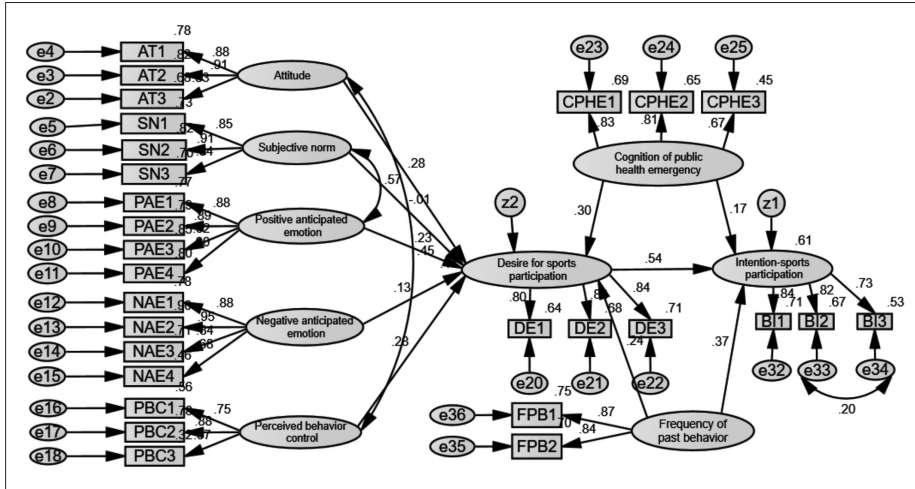


Fig. 2. - Results of the extended model of goal-directed behavior.

interaction effect of desire and cognition of public health emergency is 0.303. Finally, the explanatory power of the whole model for the desire to participate in physical exercise is 0.44 and the explanatory power for the intention to participate in physical exercise is 0.61.

#### 4. Discussion

After Based on the EMGB model theory, this paper constructs the EMGB model of university students' behavioral intention to sport participation and its influencing factors under public health emergencies, university students who were aware of public health emergencies during the COVID-19 pandemic are surveyed by questionnaire. The empirical results indicate that university students' attitudes, positive anticipated emotion, negative anticipated emotion, and perceived behavior control have significant positive effects on their desire to sport participation. The desire for sports participation has a significant positive impact on the behavioral intention for sports participation, and the cognition of public health emergency has a significant positive impact on the desire and intention for sports participation. The past behavior frequency of university students has a significant positive effect on the desire and intention for sports participation. Although subjective norm has a negative influence on university students' desire, the effect



is not significant. In summary, the EMGB model and research hypothesis of university students' intention for sports participation and its influencing factors under public health events proposed in this paper have been fully demonstrated and supported.

In the face of a public health emergency, university students' perception of risk directly affects their desire to participate in physical exercise. Affected by COVID-19, people will naturally develop a response adaptation to the epidemic. This response adaptation refers to people taking protective precautions to reduce their perceived risks. Therefore, more university students realize that improving physical fitness and immunity through physical exercise is one of the effective ways to reduce the risk of epidemic disease. The empirical analysis results prove that university students' desire and intention for sports participation will increase with their awareness of public health events. Meanwhile, the frequency of university students participating in physical exercise in the past has had a direct positive impact on their desire and intention for sports participation. University students who have been participating in physical exercise are confronted with the COVID-19 pandemic. Although there may be negative effects from relatives or friends (the results show that the negative effects are not significant), they can still maintain good exercise habits. The attitude and perceived behavioral control of university students' participation in physical exercise have a significant indirect influence on the participation intention through mediating variables. Among them, attitude and perceptual behavioral control are the important determinants for maintaining the desire to participate in the exercise in the face of the COVID-19 pandemic. In addition, the results also show that the complex correlation coefficient of the desire to participate in physical exercise is 0.44. This shows that the seven variables of university students' attitude, subjective norm, anticipated emotion, perceived behavior control, cognition of public health events and frequency of past behavior explain the 44% variation of exercise desire. The complex correlation coefficient of participation intention in physical exercise is 0.61, which indicates that three variables of university students' cognition of public health events, the frequency of past behavior and the desire to participate in sports explain the 61% variation of exercise intention. The sample data of this study fit well in the structural equation model, the research proves that the EMGB theory can be used to analyze the university students' intention to participate in physical exercise and its influencing factors, EMGB model has strong applicability in the field of human social behavior, this paper makes a beneficial exploration to study people's intention to participate in physical exercise by using the EMGB theory.

## 5. Conclusions

Nowadays, the worsening of COVID-19 worldwide has prompted university students to gradually deepen their risk awareness, which directly affects their desire to participate in physical exercise (González & Marlovits, 2020). As a result of COVID-19, university students will naturally develop a responsive adaptation to the pandemic, which means that they take proactive protective precautions to reduce their perceived risk (Hüttel & Balderjahn, 2022). Therefore, in the face of the normal situation of COVID-19 prevention and control, more university students have realized that sports are an effective means to gain a healthy and strong body and improving physical fitness and immunity through physical exercise is one of the effective ways to reduce the risk of COVID-19. Meanwhile, physical exercise can promote muscle firmness and strength, enhance the elasticity of blood vessel walls, improve the function of the central nervous system, and promote the improvement of circulatory and respiratory system function (Szucs, Szucs, Petrekanits, & Varga, 2019). Moreover, physical exercise can improve the excitability, balance, and flexibility of the cerebral cortex nerve, help to relieve people's daily mental pressure and make people feel happy. It can be seen that physical exercise not only contributes to physical health but also carries the specific ideological function of shaping sound personality and tempering volitional quality (Moberg, 2002). Therefore, it is urgent to take effective measures to mobilize the enthusiasm of university students to participate in physical exercise, improve the awareness of physical exercise and self-exercise ability of university students, so that they develop good exercise habits that sports become a way of life. In view of this, it is suggested that first, colleges and universities should strive to create a good campus sports culture atmosphere, carry out systematic and complete sports activities and sports health education, cultivate university students' lifelong physical exercise awareness, take multiple measures to promote the inheritance and development of sports spirit, so that university students form correct sports values. Secondly, the campus should optimize the physical exercise environment, improve the professional level and teaching ability of physical education teachers, guide university students to master the correct method of scientific physical exercise, and customize training projects and training intensity for each student, so that students gradually develop active participation in physical exercise healthy and positive lifestyle. Third, the university can take credit incentive mechanism, such as good models lead to encourage college students to participate in sports clubs or sports organizations, such as exercise groups in the sports organizations encouragement and supervising each other to com-

plete the training program together, with the power of the team stimulates personal subjective initiative, in the exercise experience the joy of all-round development of body and mind, Gradually make good exercise habits rooted in the daily life of college students.

The survey data of this study fit well with the constructed EMGB model theory. The study proves that the extended goal-oriented behavior theory can be used to analyze university students' physical exercise behavioral intention and its influencing factors, and the EMGB model has strong applicability in the field of human social behavior. This paper makes an applicable exploration for utilizing this theory to study people's behavioral intention to participate in physical exercise.

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## REFERENCES

- Almanasreh, E., Moles, R., & Chen, T. F. (2019). Evaluation of methods used for estimating content validity. *Research in social and administrative pharmacy*, 15(2), 214-221.
- Alvarez-Risco, A., Mlodzianowska, S., Garcia-Ibarra, V., Rosen, M. A., & Del-Aguila-Arcentalles, S. (2021). Factors affecting green entrepreneurship intentions in business university students in COVID-19 pandemic times: case of Ecuador. *Sustainability*, 13(11), 6447.
- Anaki, D., & Sergay, J. (2021). Predicting health behavior in response to the coronavirus disease (COVID-19): Worldwide survey results from early March 2020. *Plos one*, 16(1), e0244534.
- Egner, L. E., Sütterlin, S., & Calogiuri, G. (2020). Proposing a framework for the restorative effects of nature through conditioning: Conditioned restoration theory. *International Journal of Environmental Research and Public Health*, 17(18), 6792.
- Esposito, G., van Bavel, R., Baranowski, T., & Duch-Brown, N. (2016). Applying the model of goal-directed behavior, including descriptive norms, to physical activity intentions: A contribution to improving the theory of planned behavior. *Psychological Reports*, 119(1), 5-26.
- Feng, Y. J., Mao, Z. X., Che, & G. W. (2015). Constructing a model for prediction and intervention of college students' physical activity: combined self-determined motivation with TPB model. *Journal of Beijing Sport University*, 38(5), 72-76.
- González, R. J., & Marlovits, J. (2020). Life under lockdown: notes on covid 19 in Silicon Valley. *Anthropology Today*, 36(3), 11-15.
- Hagger, M., Chatzisarantis, N., & Biddle, S. (2002). A meta-analytic review of the theories of

- reasoned action and planned behavior in physical activity: Predictive validity and the contribution of additional variables. *Journal of sport & exercise psychology*.
- Hair Jr, J. F., Howard, M. C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *Journal of Business Research*, 109, 101-110.
- Hong, H., & Chung, W. (2022). Integrating health consciousness, self-efficacy, and habituation into the attitude-intention-behavior relationship for physical activity in college students. *Psychology, Health & Medicine*, 27(5), 965-975.
- Hüttel, A., & Balderjahn, I. (2022). The coronavirus pandemic: A window of opportunity for sustainable consumption or a time of turning away?. *Journal of Consumer Affairs*, 56(1), 68-96.
- Hwang, J., Kim, D., & Kim, J. J. (2020). How to form behavioral intentions in the field of drone food delivery services: The moderating role of the COVID-19 outbreak. *International Journal of Environmental Research and Public Health*, 17(23), 9117.
- Hwang, J., & Kim, H. (2020). The effects of expected benefits on image, desire, and behavioral intentions in the field of drone food delivery services after the outbreak of COVID-19. *Sustainability*, 13(1), 117.
- Jia, Q., Guo, Y., Wang, G., & Barnes, S. J. (2020). Big data analytics in the fight against major public health incidents (Including COVID-19): a conceptual framework. *International journal of environmental research and public health*, 17(17), 6161.
- Kim, E., Ham, S., Yang, I. S., & Choi, J. G. (2013). The roles of attitude, subjective norm, and perceived behavioral control in the formation of consumers' behavioral intentions to read menu labels in the restaurant industry. *International Journal of Hospitality Management*, 35, 203-213.
- Kim, E. J., Kim, J. J., & Han, S. H. (2021). Understanding student acceptance of online learning systems in higher education: Application of social psychology theories with consideration of user innovativeness. *Sustainability*, 13(2), 896.
- Kim, Y. J., & Kim, H. S. (2021). A study on the consumption value of customer using the extended theory of planned behavior: Focused on upscale Korean restaurant. *Culinary Science & Hospitality Research*, 27(2), 32-46.
- Li, F., & Su, Q. (2022). The roles of novelty seeking and food authenticity in youth travellers' decision-making process at night markets: An application of a model of goal-directed behaviour. *Current Issues in Tourism*, 25(14), 2322-2337.
- Liddelow, C., Ferrier, A., & Mullan, B. (2021). Understanding the predictors of hand hygiene using aspects of the theory of planned behaviour and temporal self-regulation theory. *Psychology & health*, 1-18.
- Meng, B., & Choi, K. (2016). The role of authenticity in forming slow tourists' intentions: Developing an extended model of goal-directed behavior. *Tourism Management*, 57, 397-410.
- Moberg, D. O. (2002). Assessing and measuring spirituality: Confronting dilemmas of universal and particular evaluative criteria. *Journal of adult development*, 9(1), 47-60.
- Moneva-Abadía, J. M., Gallardo-Vázquez, D., & Sánchez-Hernández, M. I. (2019). Corporate social responsibility as a strategic opportunity for small firms during economic crises. *Journal of Small Business Management*, 57, 172-199.
- Nimri, R., Patiar, A., & Jin, X. (2020). The determinants of consumers' intention of purchasing green hotel accommodation: Extending the theory of planned behaviour. *Journal of Hospitality and Tourism Management*, 45, 535-543.
- Park, E., Lee, S., & Peters, D. J. (2017). Iowa wetlands outdoor recreation visitors' decision-making process: An extended model of goal-directed behavior. *Journal of Outdoor Recreation and Tourism*, 17, 64-76.
- Perugini, M., & Bagozzi, R. P. (2001). The role of desires and anticipated emotions in goal di-

- rected behaviours: Broadening and deepening the theory of planned behaviour. *British journal of social psychology*, 40(1), 79-98.
- Prasetyo, Y. T., Castillo, A. M., Salonga, L. J., Sia, J. A., & Seneta, J. A. (2020). Factors affecting perceived effectiveness of COVID-19 prevention measures among Filipinos during enhanced community quarantine in Luzon, Philippines: Integrating Protection Motivation Theory and extended Theory of Planned Behavior. *International journal of infectious diseases*, 99, 312-323.
- Prochaska, J. O. (2020). Transtheoretical model of behavior change. *Encyclopedia of behavioral medicine*, 2266-2270.
- Qiao, G., Zhao, X. L., Xin, L., & Kim, S. (2021). Concerns or desires post-pandemic: An extended MGB model for understanding South Korean residents' perceptions and intentions to travel to China. *International journal of environmental research and public health*, 18(5), 2542.
- Sajedifard, M., & Sajedifard, Z. (2022). Rural students' achievement goal orientation choices: A qualitative analysis of the influential individuals and factors. *School Psychology International*, 43(2), 156-177.
- Song, H., You, G. J., Reisinger, Y., Lee, C. K., & Lee, S. K. (2014). Behavioral intention of visitors to an Oriental medicine festival: An extended model of goal directed behavior. *Tourism Management*, 42, 101-113.
- Soorani, F., & Ahmadvand, M. (2019). Determinants of consumers' food management behavior: Applying and extending the theory of planned behavior. *Waste Management*, 98, 151-159.
- Stein, J. P., & Yeo, J. (2021). Investigating meal-concurrent media use: Social and dispositional predictors, intercultural differences, and the novel media phenomenon of "mukbang" eating broadcasts. *Human Behavior and Emerging Technologies*, 3(5), 956-968.
- Symonds, M. L., & Russell, W. (2018). Intrinsic and extrinsic motivation of small college sports officials. *Journal of Sport Behavior*, 41(2), 209-226.
- Szucs, B., Szucs, C., Petrekanits, M., & Varga, J. T. (2019). Molecular characteristics and treatment of endothelial dysfunction in patients with COPD: a review article. *International journal of molecular sciences*, 20(18), 4329.
- Tariku, M., & Hajure, M. (2020). Available evidence and ongoing hypothesis on corona virus (COVID-19) and psychosis: is corona virus and psychosis related? A narrative review. *Psychology Research and Behavior Management*, 13, 701.
- Wang, H., Xia, Q., Xiong, Z., Li, Z., Xiang, W., Yuan, Y., ... & Li, Z. (2020). The psychological distress and coping styles in the early stages of the 2019 coronavirus disease (COVID-19) epidemic in the general mainland Chinese population: A web-based survey. *Plos one*, 15(5), e0233410.
- Wang, J., Choe, Y., & Song, H. (2021). Korean domestic tourists' decision-making process under threat of covid-19. *International journal of environmental research and public health*, 18(20), 10835.
- Xu, W., Youn, H. J., & Lee, C. K. (2021). Role of non-pharmaceutical interventions for COVID-19 in cruise tourists' decision-making process: An extended model of goal-directed behavior. *Sustainability*, 13(10), 5552.
- Yoganathan, V., Osburg, V. S., Kunz, W. H., & Toporowski, W. (2021). Check-in at the Robo-desk: Effects of automated social presence on social cognition and service implications. *Tourism Management*, 85, 10.