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Mechanisms of Physical Education Curriculum to Promote Students' Health Literacy Formation in the Perspective of Interdisciplinary Integration

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SUMMARY: *The sample consists of 1,000 freshmen and sophomore students at XX University in G province who completed the health literacy questionnaire, which has been developed to examine three dimensions and six types of health issues in assessing health literacy levels among the sampled population. Univariate analyses are performed for the measurement of health literacy levels according to gender and academic tenure. Next, correlations between health literacy and three dimensions of physical education curriculum behaviors are analyzed. Finally, a Logistic regression model is applied to explore the impact of physical education curriculum behaviors on health literacy levels. Based on the results, students' health literacy levels were found to be low and imbalanced, with significant correlations with gender, academic tenure, existence of chronic disease, and specialty field of physical education. Physical education curriculum involvement is highly correlated with the time spent exercising during class. High levels of health literacy are positively associated with students' physical education curriculum behaviors, with high-frequency and intensity levels of exercise and increased exercise time. It is suggested that correlations exist between students' physical education exercise behaviors and health literacy, and efforts should be made to improve health literacy by targeting students with little or no involvement in physical education curriculum activities.*

KEYWORDS: *One-way analysis of variance; Logistic regression algorithm; Correlation analysis; Physical education course behavior; Student health literacy*

1 Introduction

With the intensification of academic pressure and the diversification of social needs, the health environment faced by students is constantly changing, and their physical health is gradually declining, so how to cultivate students' health literacy has triggered a great deal of attention from education departments and parents [1-3]. Literature [4] used bibliometric software to visualize and analyze studies related to students' health literacy during the period of 2013-2025, pointing out that in recent years, the focus has been on students' health literacy, obesity and dietary behaviors, and that the first two are likely to be the focus of research in the coming years.

The concept of health literacy is mainly based on the focus on schooling and adolescent students. Literature [5] combed the concept of health literacy, and it was found that the school environment is one of the key links in the formation of health literacy in adolescents and young adults, in which pedagogy is a key mechanism to promote the development of their health literacy. "literacy" and called on governments and society to establish minimum standards of

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health-related competence for students at all grade levels in schools [6]. Since then, the concept has been interpreted by international organizations, government agencies, experts, and scholars worldwide, which has also provided an important theoretical basis for subsequent research. Under the comprehensive implementation of the “health first” principle, this concept has regained importance in school education [7-9]. In the school context, it differs from the broad public-health understanding because of the diversity of its subjects, the complexity of its components, and the close connection with both school-based physical education and students themselves [10-13].

The core of cross-disciplinary integration is to overcome the fragmentation of traditional subjects and facilitate the enhancement of learner well-being through multidimensional curriculum linkage [14]. In the field of physical education, interdisciplinary integration helps to cultivate students' health literacy formation. Literature [15] explored the effect of the role of interdisciplinary integration principle perspective to cultivate the formation of students' health culture, mainly with health care, and proposed a method to promote the formation of students' health culture based on interdisciplinary integration. Literature [16] employed social network analysis and an exponential random graph model to investigate collaborative mechanisms in university health promotion, the incorporation of health education into students’ daily lives, and the synergy generated by interdisciplinary cooperation in higher education to support information dissemination and student well-being. Literature [17] analyzed the practice of combining physical education with health-related instruction to improve learning quality by embedding health components into PE lessons and thereby strengthening students’ understanding of healthy lifestyles and relevant awareness.

In addition, literature [18] found out that the continued degradation of the physical condition among Chinese university students was due to several issues such as inadequate exercise consciousness, poor health value, lack of family involvement in understanding sports and doing exercises, lack of proper enforcement of sports policies at schools, as well as misconception in sports value. In addition, it was argued that incorporating a technology-based health management system into physical education will promote the physical condition among college students. Literature [19] ntroduced a combination of physical education and biotechnology education, resulting in an educational teaching system using a digital platform to assist in the development of digital skills. The approach not only developed health-related competence among students, but also increased their aesthetic and adaptability competence in the digitally-based physical education classroom. Literature [20] suggested an operational five-dimensional model for interdisciplinary theme learning in PE and health-related courses that could help develop core literacy among students by way of a dual-driver mechanism that considers both teachers and learners. Literature [21] suggested that physical activities be integrated in mental health and socialization training in the PE class in order to promote students' mental health, thus promoting their health-related competence. Despite the steady increase in research conducted in this field, there has been little focus on the mechanism behind the formation of health-related competence among students.

In order to analyze the relationship between physical education courses and students' health literacy level, this paper adopts the stratified random sampling method to conduct a health literacy questionnaire survey on 3 aspects and six types of health problems for 1,000 students in freshmen and sophomores of XX University in G Province. The level of students' health literacy and influencing factors were initially analyzed through the method of single factor analysis; then based on Pearson's correlation coefficient and Logistic regression algorithm, the correlation between students' physical education course behaviors and the formation of students' health literacy in the interdisciplinary integration perspective was analyzed.

2 Materials and methods

2.1 Sources of materials

2.1.1 Survey Objects and Methods

The survey was conducted on 1000 students of freshmen and sophomores of University XX in G province, including 500 male and female students; the number of students majoring in physical education and non-physical education majors was 1:9.

This study adopts the Internet+ network survey method, using stratified random sampling to select 1000 students enrolled in the freshman and sophomore years of this school. The questionnaire was sent to the respondents through the Questionnaire Star software to conduct the questionnaire survey by sending the National Health Literacy Survey Monitoring Questionnaire to the respondents, and the period of this study's network survey was from October 1 to October 31, 2024.

2.1.2 Content of the survey

(1) Demographic characteristics and health self-assessment of the survey respondents, including gender, self-assessment of health status, height, weight, BMI, frequency and duration of physical activity, physical sensations during physical activity, grade, and major. Since the survey respondents were all school students between the ages of 19 and 22, information on age, literacy and occupation was not collected.

(2) The health literacy questionnaire includes three aspects, namely basic health knowledge and concepts, healthy lifestyle and behavior, and health skills.

2.1.3 Quality control

The survey results were exported to an Excel data sheet, and the data were double-checked and cleaned by trained informants to eliminate a few samples where personal information was not standardized, e.g., height, weight, and other indicators that were filled in confidentially or with a question mark.

2.2 Method of scoring the questionnaire

The survey for measuring the health literacy included 56 questions that came in four categories, which are judgments, single choice, multiple choice, and scenarios. Amongst the scenarios, there were 3 single choice questions and one multiple choice question. For scoring, each judgment item earned 1 mark, each single choice earned 1 mark, and each multiple choice earned 2 marks, and wrong answers earned no marks at all. The highest possible marks were 66. A cut-off of 80% or more out of the total marks was set as health literacy.

The health literacy test consists of three scales which include basic knowledge and understanding of health issues, healthy habits, and health skills, with the maximum possible scores of 28, 22, and 16, respectively. The test includes six types of questions which consist of scientific health concepts, prevention and management of infections, prevention and management of non-infectious diseases, safety, first aid, basic medical literacy, and health information literacy, with maximum possible scores of 11, 7, 12, 14, 14, and 8, respectively. A score of 90% or more in any question means the individual has that component of health literacy.

2.3 Statistical methods

IBM SPSS25.0 software was applied for statistical analysis, and the difference was considered statistically significant at $P < 0.05$.

The count data were described by applying the constitutive ratio, the mean and standard deviation for the measures that conformed to normal distribution, and the median and interquartile spacing for the measures that were skewed.

2.3.1 Single factor analysis

When the measurements were normally distributed, one-way ANOVA was utilized but when the measurements were not normally distributed, rank sum test was applied, and the chi-square test or Fisher's exact probability method was used with counting data. Students' health literacy is determined by multiple factors, generally from simple to complex, from single factor to multi-factor, step by step to mine the data information, so this study did one-way analysis before Logistic regression analysis to do preliminary screening of independent variables, and then included meaningful independent variables into the regression model.

In the chi-square test, Cramer's V is an index that indicates the degree of correlation of the categorical variables, with a value ranging from 0 to 1, and the larger the value, the stronger the correlation.

2.3.2 Logistic regression algorithm

The aim of the project is to reduce the redundant information about non-essential participation records in physical education classes while improving computational efficiency, with the caveat that the health literacy of the students remains intact. To examine the correlation between the physical education syllabus and the growth of the health literacy of the students through an interdisciplinary approach, the logistic regression method was selected as the most appropriate method of regression analysis since it can model linear equations and has faster computation times.

Logistic regression is essentially derived from linear regression for solving the classification problem of discrete data, and its computational function is:

$$z = \sum_{i=1}^{n} w_i x_j + b \tag{1}$$

where n is the number of features a sample has; w_i is the weight of a feature of the sample; x_i is the value of a feature of the sample; b is the offset parameter; and z is the value of regression calculation. w and b are optimally determined by calculating the minimum value of the loss function, which ultimately makes the results of logistic regression classification the closest to the actual required results.

The regression calculation function of equation (1) yields a result with a range of values of $(-\infty, +\infty)$, which is unable to solve the nonlinear problem and cannot realize the effect of classification. Therefore, it is necessary to introduce an activation function to convert the linear function into a nonlinear function, for logistic regression algorithm, the most commonly used activation function is the sigmoid function, which converts the results of regression calculations with a large range of values into an output with a range of values of $(0,1)$, which is given by the formula:

$$g(z)=\frac{1}{1+\mathrm{e}^{-z}} \tag{2}$$

The sigmoid function is a monotonically increasing function, when z tends to positive infinity, $g(z)$ tends to 1, when z tends to negative infinity, $g(z)$ tends to 0.

The regression calculation result z of Eq. (1) is brought into the sigmoid function of Eq. (2), and the final logistic regression classification judgment function based on the sample eigenvalues is:

$$y(x)=\frac{1}{1+\mathrm{e}^{-\sum_{i=1}^{w} w_i x_i - b}} \tag{3}$$

The judgment of classification can be realized if for the result value of $y(x)$ greater than 0.5, it corresponds to classifying the sample as B, and for the result value of $y(x)$ less than 0.5, it corresponds to classifying the sample as A.

In order to make the classification result obtained by logistic regression calculation accurate and minimize the error between it and the actual result, it is necessary to determine the appropriate parameters w and b. The relationship between the error and the parameters is called the loss function, and logistic regression usually uses the log-likelihood loss function, which is given by the formula:

$$L(y(x),y)=-\frac{1}{m}\sum_{i=1}^{m}\left(y_i \ln\left(y_i(x)\right)+\left(1-y_i\right)\ln\left(1-y_i(x)\right)\right) \tag{4}$$

where m is the number of input samples; y is the actual result; $y(x)$ is the result of logistic regression calculation. Determine the parameters of the regression function by solving the minimum value of the loss function. Currently there are many algorithms for parameter optimization, and for the log-likelihood loss function generally use the gradient descent method to find the optimal solution of the parameters.

3 Correlation analysis between students' health literacy and behavior in physical education courses

3.1 Analysis of students' health literacy level

86.2% of the surveyed university students self-assessed their health status as good, and 13.8% of the students with chronic diseases. The reliability and validity of the questionnaire were 0.8814 and 0.8539, respectively, which were highly reliable and could be analyzed for correlation.

3.1.1 Level of students' health literacy in the 3 dimensions

Table 1 summarizes the findings of the student health literacy survey in terms of three dimensions, named A, B, and C to denote the knowledge and concept, healthy living habit, and health skill, respectively. The sum of all points obtainable from the questionnaire was 66. There were statistically significant differences in the health literacy levels between college students in terms of gender, academic year, physical education major, and whether or not they had any chronic diseases ($P < 0.05$). In particular, the freshmen had significantly higher health literacy

levels compared to the sophomores, whereas the physical education majors had significantly lower health literacy levels than the other majors.

Table 1: Survey Results on Students' Health Literacy in Three Aspects

Metric	Group	Number	Health literacy		Health Literacy in Three Aspects		
			Available	Not available	A	B	C
Sex	Male	500	243	257	140	236	124
	Female	500	287	213	162	201	137
	X^2	—	18.108		23.247	34.356	4.827
	P	—	0.000		0.000	0.000	0.063
Grade	Freshman	497	183	314	188	218	128
	Sophomore	503	228	275	166	186	101
	X^2	—	7.044		6.475	12.625	7.021
	P	—	0.002		0.013	0.000	0.007
Are you a sports student?	Yes	100	100	61	114	56	81
	No	900	900	257	322	285	330
	X^2	—	7.954		1.663	4.524	0.359
	P	—	0.005		0.008	0.004	0.024
Chronic disease	No	862	267	343	301	356	202
	Yes	138	43	87	38	54	28
	X^2	—	2.231		9.22	11.224	2.274
	P	—	0.013		0.987	2.007	2.054
Health Self-Rating	Good	805	333	472	244	292	170
	Not very good	195	153	171	10	8	5
	X^2	—	0.0214		4.265	1.537	0.233
	P	—	0.732		0.092	0.464	0.628

3.1.2 Literacy level of students in 6 categories of health problems

The findings from the surveys conducted on learners' literacy performance regarding the six health problems are presented in Table 2. The six health problems are described as follows: scientific knowledge about health, prevention and cure of infectious diseases, prevention and cure of chronic diseases, safety and first aid, basic medical treatment, and health information. In the examined school, there were significant gender disparities in relation to the six health dimensions. In particular, boys performed better than girls in terms of scientific health knowledge and safety/first aid, but the latter exhibited higher competencies in the other four health dimensions. The most significant gender gap was recorded in scientific health knowledge, which was statistically significant ($P < 0.05$). On the other hand, the girls obtained statistically significant higher marks than the boys in prevention and cure of infectious diseases, the most disparate dimension ($P < 0.05$). In 4 health issues, excluding safety and first aid and basic medical care, there was a high degree of difference in the level of literacy between students majoring in physical education and students majoring in other subjects, such as scientific view of health and infectious city prevention and treatment. Chronic disease prevention and basic medical care did not have any significant difference ($P>0.05$) in relation to the students' grades, specialty, the presence of chronic diseases, and self-assessment of health.

Table 2: Survey Results of Students' Health Literacy Level of Six Health Problems

Metric	Group	Number	Health Literacy in six Aspects					
			A	B	C	D	E	F
Sex	Male	500	219	145	89	244	85	168
	Female	500	269	243	145	318	138	234
	X^2	—	6.474	28.785	8.277	22.215	8.888	10.371
	P	—	0.000	0.000	0.002	0.000	0.001	0.000
Grade	Freshman	497	245	210	124	290	116	223
	Sophomore	503	245	178	123	258	101	191
	X^2	—	0.116	8.133	0.831	7.68	7.346	17.798
	P	—	0.276	0.000	0.092	0.000	0.128	0.000
Are you a sports student?	Yes	100	101	70	39	120	51	88
	No	900	387	329	201	437	183	337
	X^2	—	8.905	12.361	6.048	2.576	1.147	4.394
	P	—	0.001	0.001	0.0103	0.110	0.281	0.032
Chronic disease	No	862	406	341	206	472	189	348
	Yes	138	72	52	37	74	36	57
	X^2	—	10.827	6.482	4.163	16.333	4.41	7.732
	P	—	0.000	0.004	0.240	0.000	0.022	0.002
Health Self-Rating	Good	805	364	295	168	403	162	296
	Not very good	195	9	15	5	13	5	12
	X^2	—	8.221	17.271	2.276	13.18	1.846	2.819
	P	—	0.093	0.003	0.750	0.014	0.753	0.577

3.2 Analysis of correlation between students' health literacy and physical education curriculum behavior

3.2.1 Correlation analysis of the 3 dimensions of health literacy

Correlation coefficients above 0.8 between the scores of the three health-literacy dimensions and the overall health-literacy score have been obtained as shown in Table 3 below. All P values were below 0.001. From these results, one can conclude that there is a high statistical correlation between the different dimensions of health literacy. The correlation coefficient between the score of "Health Knowledge and Conceptual Literacy" and the score of "Health Lifestyle and Behavioral Literacy" is 0.9013, and the correlation coefficient between the score of "Health Knowledge and Conceptual Literacy" and the score of "Basic Skills Literacy" is 0.8942; the correlation coefficient between the score of "Health Lifestyle and Behavioral Literacy" and the score of "Basic Skills Literacy" is 0.8307. The correlation coefficients of the scores of the three aspects with the overall health literacy score are all greater than 0.9, indicating a strong correlation among the three.

Table 3: Correlation analysis of three dimensions of health literacy

Variable	Health knowledge and concepts	Healthy Lifestyle and Behavior	Basic skill	Overall health literacy
Health knowledge and concepts	1.0000	0.9013	0.8942	0.9317
Healthy Lifestyle and Behavior		1.0000	0.8307	0.9524
Basic skill			1.0000	0.9216
Overall health literacy				1.0000

3.2.2 Correlation analysis of the six categories of health problems

The results of the correlation analysis of the six types of health problems are shown in Table 4. The correlation analysis was conducted on the scores of the six types of health problem literacy and the total score. The correlation coefficient values of the overall health literacy score with each type of problem score were all greater than 0.8, and the P values were all less than 0.01. The correlation coefficients were all statistically significant, indicating that there is a correlation between each type of health problem and the overall health literacy score. There is also a correlation among the six types of health problems. The correlation coefficient between "safety and first aid literacy" and "basic medical literacy" scores was 0.8224, with $P < 0.01$, indicating a strong correlation. The correlation coefficient between "chronic disease prevention and control literacy" and "basic medical literacy" was 0.7813, and the correlation coefficient between "chronic disease prevention and control literacy" and "health information literacy" was 0.8331, with $P < 0.01$, indicating that "chronic disease prevention and control literacy" is related to health information and basic medical knowledge acquisition, and the better the knowledge acquisition, the higher the "chronic disease prevention and control literacy". However, the correlation coefficients between "infectious disease prevention and control literacy" and "chronic disease prevention and control literacy", as well as between "infectious disease prevention and control literacy" and "health information literacy" were 0.6274 and 0.4927 respectively, indicating that their correlations were not strong, and they were weakly correlated ($P < 0.05$).

Table 4: Correlation analysis results of six categories of health issues

Variable	A	B	C	D	E	F	Overall health literacy
A	1.0000	0.6347*	0.7439**	0.6958**	0.6914**	0.7813**	0.9439**
B		1.0000	0.6274*	0.6724**	0.6574**	0.4927*	0.8071**
C			1.0000	0.7036**	0.7813**	0.8331**	0.8653**
D				1.0000	0.8224**	0.7906**	0.8728**
E					1.0000	0.6439*	0.8952**
F						1.0000	0.8032**
Overall health literacy							1.0000

3.2.3 Correlation analysis between dimensions of physical education curriculum behavior

The findings of the correlation study between the dimensions of physical education course behavior are given in Table 5. Correlation analysis of the three dimensions of physical education course behavior revealed that the correlation coefficient values were above 0.7 and the p-values were below 0.05 and the correlation coefficients were statistically significant which shows that there is a correlation between the dimensions. The correlation coefficient of frequency of physical activity and time of physical activity is 0.8527, and the correlation coefficient of intensity of physical activity is 0.7124, and the correlation coefficient of time of physical activity and intensity of physical activity is 0.8005, and the P value is less than 0.05, indicating that they have a very high correlation.

Table 5: The Correlation of the Participation in the Physical Education Class

Variable	Frequency of physical exercise in PE class	Physical Education Class Exercise Time	Exercise intensity in physical education class
Frequency of physical exercise in PE class	1.0000	0.8527**	0.7124*
Physical Education Class Exercise Time		1.0000	0.8005*
Exercise intensity in physical education class			1.0000

3.2.4 Correlation Analysis of Health Literacy and Physical Education Curriculum Behavior

In Table 6, the relations are provided regarding health literacy and physical education behavioral aspects; namely, EF represents the exercise frequency, while EI stands for exercise intensity in physical education classes, and ET is used to designate exercise time. All scores relating to total health literacy, three-dimensional health literacy, and the six types of health problems have been found to be associated with the frequency, duration, and intensity of physical activity. It is possible to claim that all four health literacy aspects analyzed in this paper including health literacy itself, basic knowledge and concept literacy, healthy lifestyle and behavior literacy, and basic skills literacy demonstrated highly statistically significant and positive correlations with physical activity in terms of frequency, duration, and intensity. Thus, correlation coefficients were found to be 0.839, 0.711, and 0.733 concerning overall health literacy and the frequency, duration, and intensity of physical activity, respectively. Moreover, all coefficient values were over 0.7, which indicates a high degree of association. High scores on both overall health literacy and its three dimensions are characterized by a longer duration of participation in the physical education program along with more frequent and intense physical education exercises per week. Therefore, it can be stated that health literate college students engage in physical education activities more intensively and actively in comparison with less health literate students since the former show higher participation frequency and intensity. Health literacy and its three dimensions can potentially promote physical activity among college students. The idea about the improvement in health literacy in order to develop physical activity among college students comes up.

The 6 categories of health literacy have a correlation coefficient between the three categories of health literacy, which include: chronic disease prevention and treatment literacy, safety and first aid literacy, and basic medical literacy, as well as physical education behaviors (all positive) >0.7 indicating that they correlate positively and that the correlation is very strong ($P<0.001$). There was a modest correlation between the literacy related to infectious diseases prevention and control, and the time spent on physical activities (0.389) and a statistically significant one between the literacy related to health information and the frequency of physical exercise (0.646, $P<0.05$). As shown above, the enhancement of overall health literacy has a vital role to play in alleviating the health challenges experienced by the college students and the capacity to handle health challenges will also enhance their sports involvement.

Table 6: The Correlation between Health Literacy and Physical Education Classroom Behavior

Variable	EF	ET	EI
Health literacy	0.839**	0.711**	0.733**
Basic knowledge and conceptual literacy	0.654*	0.678**	0.735**
Healthy Lifestyle and Behavioral Literacy	0.564*	0.658*	0.533**
Basic skill literacy	0.662**	0.776**	0.607**
Scientific and Healthy View Literacy	0.438*	0.664	0.396
Infectious Disease Prevention Literacy	0.604*	0.389	0.455
Chronic Disease Prevention Literacy	0.703**	0.825**	0.726**
Safety and First Aid Literacy	0.775**	0.758**	0.715**
Basic Health Literacy	0.853**	0.834**	0.756**
Health Information Literacy	0.646*	0.639	0.615

3.3 Impact of Physical Education Program Behavior on Students' Health Literacy

3.3.1 Relationship between students' health literacy and physical education curriculum behaviors

The relationship between students' health literacy and physical education curriculum behaviors is shown in Table 7, where T1, T2, T3, T4, and T5 stand for "physical activity time <45 min per session, less than moderate intensity of physical activity, frequency of physical activity <5 times per week, failure to master 1 motor skill, and ≥5h per day of screen time, respectively ". The results of the analysis of the two single factors, “the duration of physical activity <45 min per session and the intensity of physical activity below a moderate level”, showed that, in addition to the grade level, there was a significant effect of the students' gender, major, the presence of a chronic disease, and the state of the self-assessment of their health ($P < 0.01$). Students' physical education program behaviors had a significant effect ($p<0.01$) on “students' frequency of physical activity <5 times per week”. “Failure to become proficient in 1 motor skill and ≥5h of screen time per day”, two behaviors in the physical education classroom, were not significantly different from students' gender or grade level, but were significantly different from the presence of a chronic disease and self-assessment of health status; Moreover, there was no difference noted in “not mastering one motor skill” between physical education students and non-physical education students. Nevertheless, there was a marked difference between both groups on the indicator of “spending ≥5 hours of screen time each day.” The differences between physical activity time, physical activity intensity, frequency, motor skills, and screen time behavioral indicators among students with different health literacy levels were significant ($P < 0.05$).

Table 7: The Relationship between Health Literacy and Physical Education

Metric	Group	Participation behavior in PE class				
		T1	T2	T3	T4	T5
Sex	Male	648	656	794	430	423
	Female	186	148	89	373	435
	X^2	49.953	50.496	9.664	2.856	0.367
	P	0.000	0.000	0.000	0.108	0.499
Grade	Freshman	482	345	425	493	445
	Sophomore	429	363	122	405	422
	X^2	0.335	0.321	54.641	0.505	0.773
	P	0.581	0.576	0.000	0.503	0.387
Are you a sports student?	Yes	289	317	262	87	172
	No	443	486	485	481	434
	X^2	28.121	48.94	9.064	0.359	8.13
	P	0.000	0.000	0.000	0.506	0.000
Chronic disease	No	156	319	364	116	162
	Yes	620	536	660	514	791
	X^2	50.635	72.607	7.522	23.891	11.135
	P	0.000	0.000	0.000	0.000	0.000
Health Self-Rating	Good	255	432	300	262	275
	Not very good	632	547	697	694	705
	X^2	73.308	70.751	37.56	30.002	13.212
	P	0.000	0.000	0.000	0.000	0.000

3.3.2 Regression Analysis of Health Literacy and Physical Education Curriculum Behavior

Students' health literacy level (0 = high level, 1 = medium level, 2 = low level) was used as the independent variable, and the results of univariate analyses of different demographic characteristics affecting physical activity behavior, physical activity (<45 min per activity, <5 times per week, and less than a medium level of intensity), failure to be proficient in 1 motor skill, and screen-watching time of ≥5h were used as the dependent variables, respectively, with $P < 0.05$ were used as dependent variables for multifactor logistic regression analysis. The results of the regression analysis of students' health literacy and physical education curriculum behaviors are shown in Table 8, where T1, T2, T3, T4, and T5 stand for "time spent in physical exercise per session <45 min, physical exercise intensity below moderate level, frequency of physical exercise <5 times per week, failure to master 1 motor skill, and screen viewing time ≥5h per day, respectively ".

It was found that there was a significant positive correlation between the four behaviors of students in the physical education program, namely, “physical activity time <45 min per session, less than moderate intensity of physical activity, failure to master one motor skill, and screen time ≥5 h per day,” and the students' low level of health literacy (P=0.0000<0.001). 0.001). There was a significant correlation between the two physical education curriculum behaviors of “failing to become proficient in 1 motor skill and watching screen time ≥5h per day” and students' intermediate health literacy level ($P < 0.05$). In summary, all five physical education course participation behaviors affect students' health literacy levels, but to a lesser extent; failure to master 1 motor skill and watching screen time ≥5h per day have a greater impact on students' health literacy levels. It is clear that students' active exercise behaviors in physical education courses can promote students' health literacy to a lower degree.

Table 8: Analysis of Health Literacy and Physical Education Curriculum Behavior

Participation behavior in PE class	Health literacy level	β	SD	Waldx^2	P	OR
T1	High	--	--	--	--	1.0000
	Medium	0.1192	0.1004	2.4209	0.1118	1.1599
	Low	0.2892	0.0904	8.9808	0.0000	1.3605
T2	High	--	--	--	--	1.1721
	Medium	0.1308	0.1102	2.4496	0.1039	1.1399
	Low	0.3012	0.0994	9.0204	0.0000	1.3486
T3	High	--	--	--	--	1.0000
	Medium	0.0590	0.0897	0.3211	0.5606	0.9592
	Low	0.2101	0.0998	4.3202	0.0213	1.2397
T4	High	--	--	--	--	1.0000
	Medium	0.3591	0.1297	6.7103	0.0082	1.4402
	Low	0.4413	0.1607	6.1804	0.0076	1.5198
T5	High	--	--	--	--	1.2324
	Medium	0.1812	0.0908	4.9196	0.0296	1.1903
	Low	0.3301	0.1000	11.4209	0.0000	1.3791

4 Conclusion

The sampling method was employed in this paper to administer a health literacy questionnaire survey to 1,000 students who were in XX University of G Province and later assess the relationship between three dimensions of health literacy and six health issues and physical education courses through one-way analysis of factors (ANOVA) and logistic regression algorithm. The key findings include:

(1) The health literacy of the students is poor and the school needs to concentrate on the present condition of the students to learn physical education skills across grades and gender as well as to decrease their daily screen watching time due to their engagement with them.

(2) The correlation between the scores of the 3 dimensions of health literacy and the overall health literacy scores is highly significant and the correlation coefficients exceed 0.9; the correlation coefficient of the literacy scores of the 6 categories of health problems and the scores of each category of problem are both greater than 0.8, which means that the different types of health problems correlate with the overall health literacy scores ($P < 0.05$). There was a highly significant positive correlation ($P<0.001$) between the student behaviour in the three categories of health problems and physical education lessons, with correlation coefficient above 0.7.

(3) The relationship between student health literacy and behavior in physical education courses is positive, and the greater the degree of health literacy, the more likely students will participate in physical education course exercise.

About the Author

Binghong Pian, my academic and professional development has been deeply grounded in the field of physical education. Leveraging the systematic training of two core programs—Sports Training and Physical Education Teaching—at Wuhan Sports University, I have developed a "trinity" system of professional competencies integrating practical skills, theoretical research, and achievement transformation, thus accumulating a solid foundation and extensive

experience in both academic research and sports practice.

In terms of educational background, I completed my undergraduate and postgraduate studies at Wuhan Sports University successively, forming a progressive knowledge structure evolving from "sports practice" to "teaching research". During my undergraduate studies, I majored in Sports Training, systematically mastering core foundational theories such as Exercise Physiology, Sports Anatomy, and Sports Training Science. Meanwhile, I delved deeply into the methodologies of specialized sports skill training and the practical guidance system. Through extensive specialized training practice and teaching internships, I consolidated my practical operational capabilities in physical education and fostered a keen insight into the laws of sports training. At the master's level, I pursued Physical Education Teaching, elevating the depth of theoretical knowledge and research perspectives on the basis of my undergraduate Sports Training foundation. I focused on studying professional courses including Curriculum and Instruction in Physical Education, Psychology of Physical Education, and Research Methods in Physical Education, gradually forming a research direction centered on "optimization of physical education teaching" and "improvement of training effectiveness", which laid a solid theoretical foundation for subsequent academic research and teaching practice. As a key university in the field of physical education in China, Wuhan Sports University, with its robust academic atmosphere and comprehensive practical platforms, has enabled me to achieve the coordinated development of sports skills and academic thinking.

In terms of academic research and achievement transformation, since embarking on my career, I have consistently adhered to the philosophy of "practice-driven research and research-feeding practice", continuously deepening my work in the field of physical education teaching and training, and achieving a series of academic outcomes and practical breakthroughs. In terms of academic output, I have independently published three journal papers, with research content closely aligned with key issues in physical education teaching and training, focusing on core topics such as the optimization of sports training methods and the innovation of physical education teaching models. Through empirical research and theoretical analysis, I proposed solutions that are both operable and innovative, some of which have been cited by peers, providing valuable references for research in related fields. In terms of research projects, I presided over one prefecture and department-level project, which aimed to enhance students' autonomy. The project systematically investigated the current situation of local physical education teaching, constructed a path for integrating traditional Chinese spiritual culture into physical education teaching, and the research outcomes received positive feedback after practical application. Additionally, the project won the first prize at the prefecture and department-level for its innovation and practical value, fully demonstrating the academic value and application potential of the research outcomes.

In terms of sports practice and comprehensive capabilities, I have always maintained a deep commitment to sports practice, closely integrating academic research with sports practice. In the field of professional competitions, I represented my municipal city in the Social Group (Prefectural-level City Group) of the 14th Henan Provincial Games. Relying on my solid foundation in sports training and strong team collaboration capabilities, I helped the team achieve an excellent result of the second place in the group competition. This experience not only verified the practical effectiveness of my expertise in Sports Training but also deepened my understanding of issues such as "team collaboration in competitive sports" and "practical optimization of sports training", providing abundant practical materials for subsequent academic research. In the field of teaching practice, based on my professional accumulation in Sports Training and Physical Education Teaching, I integrated academic research outcomes into daily teaching, forming a three-dimensional teaching model of "theoretical explanation + skill demonstration + practical feedback", which effectively improved teaching quality and realized

a positive interaction between academic research and teaching practice.

In summary, I have established a solid theoretical foundation in physical education, systematic academic research capabilities, and rich practical experience. In the future, I will continue to focus on the field of physical education teaching and training, deepen the development path of "integration of practice and research", and continuously produce more valuable academic achievements and practical outcomes.

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