

The correlation analysis between exercise dependence and exercise motivation

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Abstract

Purpose: Study the correlation between exercise motivation and exercise dependence behaviour for female university students' involvement with extracurricular physical exercise. **Method:** Refers to domestic and overseas relevant literatures, employ the exercise dependence scale and exercise motivation scale, conduct a survey among 617 exercise-loving female university students. The result shows: positive correlation of exercise intensity and exercise dependence; the 2 dimensions appearance motivation and ability motivation included in the exercise motivation appeared to be correlative to exercise dependence, while other motivations appear to be uncorrelated to exercise dependence. **Conclusion:** the main reasons of female university students' dependence on exercise are appearance motivation and ability motivation and other motivations are not the cause of their dependence, should start with the 2 motivations to prevent female university students from their dependence on exercise.

Keywords: Multivariate Regression Analysis; Exercise Dependence; Exercise Motivation; Correlation; Female University Students

1 Introduction

In 1987, Veale proposed the concept of exercise dependence for the first time. He pointed out exercise dependents regard exercise as the most important part of life every day, almost excluding all the other social activities. Once exercise stops, there will arise symptoms similar to physical addicts' withdrawal symptoms, including anxiety, amnesia, testiness, anorexia, etc. [1]. More seriously, although some people get hurt in the exercise, they wouldn't stop it, which will make the condition of an injury more serious. In the following research process, some overseas researchers gradually defined exercise dependence as: a kind of physiological and mental symptom due to an individual's keen and excessive involvement with exercise, which can lead to negative physiological (such as withdraw and bear) and mental (such as disappointment and anxiety) influences and then further affect the individual's physiological and mental health and social life [2].

The definition of motivation is a mental disposition or impetus that inspires an individual to implement exercise and lead it toward some objective [3]. In popular sports, exercise motivation concerns the purpose, intensity, frequency and results of physical exercise while in competitive sports, exercise motivation is one of the most important factors of motor learning, motor skills and motor skill performance. Therefore, the exercise motivation research includes the study of physical

exercise participants, athletes and students majoring in sports study [4].

The research on university students' physical exercise behavior is currently the hotspot of the physical exercise psychology research. University is the last phase of students receiving physical education. In the phase of university, the involvement with physical exercise exerts a great influence on life-long physical education [5]. So, it is a very significant project to study the correlation of exercise motivation and exercise dependence for university students' involvement with physical exercise.

2 Study objects

In this research, 652 female university students having physical exercise frequently from 3 colleges or universities in Hunan Province, the object of the investigation, had the group self-statement written examination. Before the formal questionnaire test, they were given consistent instructions and matters needing attention. After the test, the papers were turned in with 617 effective and recovery percentage 94.63%.

3 Study methods

3.1 TOOLS

Exercise dependence scale [6]: In 2004, Terry designed the exercise dependence scale (EAI), which is composed

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of 6 questions. The Likert5 points scoring system was adopted, from 1 point= disagree very much; 2 points= disagree; 3 points=disagree but have no objection; 4 points =agree; 5 points =agree very much with the total points from 6 to 30 points. According to Terry’s study, EAI≥24 is firmly believed as having exercise dependence, EAI=13-23 is firmly believed as having the exercise dependence symptom, EAI=0-12 is firmly believed as having no exercise dependence symptom.

Exercise motivation scale [7]: The simplified physical exercise motivation scale revised by Shanping Chen, etc. in 2013(MPAM-R). The scale was formed with 15 questions covering 5 types of exercise motivations including fun, ability, appearance, health and socialization, and with 15 items in total. The Likert 5-level scale scoring system was adopted for the scale and the motivation intensity varied from “none” to “very intense”.

3.2 DATA PROCESSING

The double portion entry of the investigation result was implemented by a specially-assigned person using EpiData. After data cleaning, the statistical analysis was implemented using SPSS16.0, the quantitative data were expressed with mean number ± standard deviation, the qualitative data were expressed with the case number and constituent ratio, the one-way analysis of variance was implemented for multi-group quantitative data comparison, the Person correlation analysis and multivariate linear stepwise regression analysis were implemented for the correlation analysis of the exercise dependence score, and the difference was P<0.05, which had statistical significance.

3.3 PEARSON CORRELATION AND MULTIVARIATE REGRESSION ANALYSIS

Correlation analysis a statistical approach used to study whether there exists a dependence relationship between phenomena and discuss the correlative direction and degree of the specific dependently correlative phenomena and also study the correlativity between random variables. There exists a certain relation between correlation indexes. The 3 variables x1, x2, x3 are used as an example and the relations between them are as follows:

$$R_{1.23}^2 = r_{12}^2 + 2_{13.2}^2(1 - r_{12}^2) \tag{1}$$

$$R_{1.32}^2 = r_{13}^2 + 2_{12.3}^2(1 - r_{13}^2) \tag{2}$$

Multiple regressions refer to the regression model of a dependent variable (forecast object) and several independent variables (predictors). Its basic approach is to work out the cross product and Si according to various variables.

Multiple linear regression analysis is a method for finding approximate linear relationship between an independent variable Y and a plurality of predictors x1, x2, x3, ... Xn, the model is:

$$Y = b_0 + \sum_{i=1}^n b_i x_i \quad b_0 \text{ is the regression coefficient} \tag{3}$$

$$R_{1.32}^2 = r_{13}^2 + 2_{12.3}^2(1 - r_{13}^2)$$

The linear regression equations may also be expressed as:

$$y_t = \beta_0 + \beta_1 x_{t1} + \beta_2 x_{t2} + \dots + \beta_k x_{tk} + u_t \tag{4}$$

(t = 1, 2, ..., n)

Solving diversity regression model parameters, binary regression standard solved using the least squares method when error sum of squares ($\sum e^2$) is the smallest:

$$\begin{aligned} \sum y &= nb_0 + b_1 \sum x_1 + b_2 \sum x_2 \\ \sum x_1 y &= b_0 \sum x_1 + b_1 \sum x_1^2 + b_2 \sum x_2^2 \\ \sum x_2 y &= b_0 \sum x_2 + b_1 \sum x_1 x_2 + b_2 \sum x_2^2 \end{aligned} \tag{5}$$

4 Results

4.1 GENERAL INFORMATION

In the survey, 652 questionnaires were handed out and the objects were all female university students that had physical exercise frequently. 617 effective questionnaires were retrieved with the recovery rate 94.63%. The average age was 20.53±0.91 and most of the weight indexes were 18.5-23.9, accounting for 68.7%. The persistent involvement durations were mostly over 1 year and less than 2 years, accounting for 28.7%. The weekly exercise frequency was predominantly 3 times, accounting for 31.4%. Each exercise duration concentrates on 1 to 2 hours, accounting for 46.8%. The general information of the objects being investigated is shown in Table 1 below.

TABLE 1 General information of the Objects being investigated

General information		Number	Constituent ratio (%)
Age(years old)	19	54	8.8
	20	301	48.8
	21	140	22.7
	22	122	19.8
BMI	<18.5	96	15.6
	18.5~23.9	424	68.7
	24.0~26.9	71	11.5
	≥27	26	4.2
Persistent exercise duration	Less than 3 months	89	14.4
	3-6 months	110	17.8
	6-12 months	169	27.4
	1-2 years	177	28.7
	Over 2 years	72	11.7
Exercise frequency	Once a week	49	7.9
	Twice a week	224	36.3
	3 times a week	194	31.4
	4 times a week	62	10.0
	more than 4 times a week	88	14.3
Each exercise duration	Within 30 minutes	65	10.5
	30-60 minutes	135	21.9
	1-2 hours	289	46.8
	Over 2 hours	128	20.7

4.2 THE RELATION BETWEEN PERSONAL BACKGROUND AND EXERCISE DEPENDENCE (EAI)

According to Terry's study, the score $EAI \geq 24$ was firmly believed as exercise dependence and the result of the investigation indicated that 54 female university students were firmly believed as exercise dependent with relevance ratio 8.75%. As can be seen in Table 2, between different ages, the EAI score difference has no statistical significance ($F=1.254, P=0.289$); between different BMIs, the BMI normal score was lower than the EAI score of body weight abnormality and the difference has statistical significance ($F=3.863, P=0.009$). In addition, the longer the persistent involvement duration and each exercise duration are and the more frequent the weekly exercises are, the higher the EAI score is ($P < 0.05$).

TABLE 2 Analysis of the Personal Background and EAI Score

General information		Score of EAI	F	P
Age(years old)	19	16.3±4.4	1.254	0.289
	20	15.3±5.7		
	21	15.2±4.8		
	22	16.1±5.4		
BMI	<18.5	16.2±5.1	3.863	0.009
	18.5~23.9	15.1±5.2		
	24.0~26.9	16.9±5.8		
	≥27	16.9±6.3		
Persistent exercise duration	Less than 3 months	14.3±5.0	3.250	0.012
	3-6 months	14.9±5.1		
	6-12 months	15.7±5.8		
	1-2 years	16.2±5.0		
Exercise frequency	Once a week	14.8±4.5	4.035	0.003
	Twice a week	14.9±5.2		
	3 times a week	15.3±5.0		
	4 times a week	16.1±6.0		
	more than 4 times a week	17.4±6.0		
Each exercise duration	Within 30 minutes	14.1±4.7	4.608	0.003
	30-60 minutes	15.5±4.9		
	1-2 hours	16.3±5.6		
	Over 2 hours	16.9±5.6		

4.3 CORRELATION ANALYSIS OF EXERCISE MOTIVATION AND THEIR EXERCISE DEPENDENCE

The Pearson correlation analysis shows that the two dimensions ability and appearance are positively correlative to the EAI score ($P < 0.05$), while the three dimensions fun, health and socialization have no statistical significance for their correlativity to the EAI score ($P > 0.05$). See Table 3.

TABLE 3 Correlation analysis of exercise motivation and exercise dependence

Factors	Correlation index (r)	P
Fun	0.020	0.625
Ability	0.277	<0.001
Appearance	0.299	<0.001
Health	0.010	0.805
Socialization	0.018	0.660

4.4 MULTIVARIATE LINEAR REGRESSION ANALYSIS OF RELEVANT FACTORS OF EXERCISE DEPENDENCE

The multivariate linear stepwise regression analysis (regression approach) was implemented with the EAI score seen as the dependent variable and the 5 dimensions BMI, persistent exercise duration, exercise frequency, each exercise duration and exercise motivation with 9 variables as the independent variables. The result showed that the equation determination coefficient $R^2=0.356$ has statistical significance ($F=22.545, P < 0.001$) and the exercise frequency, each exercise duration, persistent exercise duration, ability and appearance were positively correlative to exercise dependence, which was roughly consistent with the above-mentioned single factor analysis.

TABLE 4 Multivariate Linear Regression Analysis of Exercise Dependence Relevant Factors

Selected factors	B	SE	β	t	P
Constant term	7.333	1.097		6.685	<0.001
Exercise frequency	0.321	0.135	0.169	2.380	0.017
Each exercise duration	0.222	0.102	0.122	2.178	0.029
Persistent exercise duration	0.239	0.121	0.108	1.981	0.048
Ability	0.390	0.060	0.247	6.474	<0.001
Appearance	0.459	0.065	0.268	7.065	<0.001

5 Discussions

The finding was that age and exercise dependence have no significant difference. The result is consistent with Furst's [8]. The result shows that the total exercise time, weekly exercise times and each exercise duration all have significant effects on exercise dependence. They are the forecast index of exercise dependence. The longer the total exercise time and each exercise duration are and the more frequent the weekly exercises are, the more likely to be greater the exercise dependence will be.

The result of the correlation analysis proved the existent high correlativity between some dimensions of exercise motivation and exercise dependence. The result indicated: the ability and appearance motivations have direct positive effects on exercise dependence. The mechanism is the higher the ability and appearance motivations are the easier to produce exercise dependence, which is consistent with Hausenblas and Fallon's study results [9]. The purpose of physical exercise for female university students is to obtain a desirable figure. If the expected effects cannot be reached or negatively commented, they will have excessive physical exercise, leading to mental, physiological and social withdrawal symptoms. If enough satisfaction is felt in the exercise, the exercise motivation will be strong, also leading to excessive exercise.

On the whole, exercise motivation has a certain positive effect on exercise dependence. The mechanism is that the higher the appearance and ability motivations are, the more likely to produce exercise dependence and easier for exercise dependents to regard reshaping the

body as the main purpose of exercise. To control their body shape effectively or persistently obtain the satisfaction exercise brings, exercise dependents force themselves to exercise, which, more seriously, could cause extreme behaviour.

6 Conclusions

Female university students' total exercise time, exercise frequency and each exercise duration exert a significant effect on their exercise dependence. The research result indicated that age and the EAI score have no significant difference ($F=3.50$, $P>0.05$), and the longer the persistent exercise duration and each exercise duration are and the more frequent the weekly exercises are, the more likely to produce exercise dependence.

The inner motivations the appearance and ability motivations have direct positive effects on exercise dependence, while the external or inner motivations ability, socialization and health have no prominent correlativity with exercise dependence.

After this investigation, we argue that female university students shouldn't excessively depend on exercise for their excessive pursuit of perfect body shape or stature, or they are apt to force themselves to get involved with exercise extremely, leading to the production of their exercise dependence. Moreover, they need to control the amount and intensity of exercise when enjoying the ability it brings.

But in this investigation, the objects are only Chinese female university students, so it remains to be answered whether the reason of Chinese male university students' exercise dependence is also the excessive pursuit of their body shape and whether their addiction to the joy exercise brings also leads to exercise dependence,

which needs our further research to instruct university students to get involved with exercise more scientifically.

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