

## An Investigation of The Physical Fitness Evaluation on Nursing School Students at The Campus Level

Katsunori Fujii

### 学内レベルにおける体力評価の検討

藤井勝紀

ABSTRACT This paper attempted to investigate the precise degree to evaluate on the physical fitness at the campus level in nursing professional school. Measurements of the physique (stature, body weight and chest girth) and physical fitness (side step, vertical jump, back strength, grip strength, trunk extension and standing trunk flexion) have been carried out with regards to Aichi Nursing Professional School of freshwomen in every April between 1987 and 1989. From these obtained data, computed the correlation matrix, and multiple correlation and regression equation between the physique and physical fitness. And the standard error from regression and multiple regression planes was sought for investigating the precise degree of the estimation. As the result, it was recognized that there were significant items on the correlation and multiple correlation between physique and physical fitness in 1989, however, it was concluded that it was not certain with regards to the raising rate of precise degree in the estimation.

#### 1. Introduction

A number of studies (1)(2)(3)(4)(5)(6) on the physical fitness and motor ability of female college students have been carried out and results of those studies are published in Japanese Society of Physical Education. Thus the present level of physique and physical fitness in the younger generation (elementary, junior and senior high school, and university students) is well documented. However, there are problems with the method of evaluation. If mean value is estimated simply, then the evaluation of physique and physical fitness is possible to judge from the standard deviation of it. The regression and multiple regression estimation when considering physique at the time of

the physical education class, that is during elementary and secondary schooling will be impossible to judge only from the mean value.

Mizuno (7) devised a standard table of Japanese physical fitness in 1980 by considering the above mentioned. It is considered that this table is quite effective. However, the table has already become old and it should be mentioned that it is not suitable for evaluating individual data. Therefore, if the physical fitness of nursing school students is measured at the ratio of once every three years at the campus level and the standard table of physical fitness used to analyze the results, it is believed that their physical fitness could be understood clearly. Consequently, from 1987 to 1989, the physique and physical fitness

Table 1 Mean value and standard deviation of physique and physical fitness

Items	1987		1988		1989		Trend of National Health in 1987	
	Number of data		40		40			
	X	S D	X	S D	X	S D	X	S D
Stature	158.1	4.08	157.4	5.34	156.5	5.82	157.6	5.87
Body Weight	51.6	4.78	52.2	6.26	52.3	6.04	52.1	6.29
Chest Girth	82.5	3.47	80.9	4.02	82.9	3.87		
Side Step	44.9	3.48	46.5	7.17	45.3	2.87	41.3	
Vertical Jump	50.9	4.25	46.8	4.93	46.2	5.22	43.1	
Back Strength	86.8	19.0	91.9	19.7	95.1	18.0	87.1	
Grip Strength R	30.0	4.34	31.0	3.90	30.5	4.92		
Grip Strength L	27.4	3.43	28.3	4.40	28.4	4.40		
Trunk Extension	57.9	4.98	61.0	6.37	56.3	7.26	57.1	
Trunk Flexion	15.8	7.03	15.3	6.25	14.3	5.02	16.6	
Rohrer Index	131.1	13.7	132.9	14.7	135.8	14.3		

X : Mean Value S D : Standard Deviation

of nursing school students has been measured once a year and a new standard table has been devised from the analysis of the results.

2. Method

The Physique ( stature, body weight and chest girth) and physical fitness ( side step, vertical jump, back strength , grip strength, trunk extension and standing trunk flexion ) of The Aichi Nursing Professional School of freshmen were measured at 37 in 1987 , 40 in 1988 and 1989 in April of those years. The mean value and standard deviation were calculated from the data and the result was compared with the physique and physical fitness surveys in The Trend of National Health. The correlation matrix of the physique and physical fitness was computed

and a regression and multiple regression analysis between physique and physical fitness was attempted.

3. Results and Discussion

1) An investigation of the physique and physical fitness of Aichi Nursing Professional School freshmen

Table 1 shows mean value and standard deviation of the physique and physical fitness in 1987, 1988 and 1989 . In addition, items of the physique and physical fitness in the same age group as that in The Trend of National Health which was published in 1987 are also included. However , same physical fitness items and the standard deviation were not shown in The Trend of National Health. Table 1 shows there was not

Table 2 -1 Correlation and multiple correlation coefficients between physique and physical fitness

1987

Items of Physical Fitness	Correlation between ST	Multiple(MU) Correlation between ST, BW	MU Correlation between ST, BW, CG
Side Step	-0.2563	0.3744	0.3755
Vertical Jump	-0.3151	0.3233	0.3370
Back Strength	-0.0891	0.2202	0.4585*
Grip Strength(R)	0.1845	0.2735	0.2831
Grip Strength(L)	0.2236	0.2745	0.2741
Trunk Extension	0.0695	0.0770	0.1992
Trunk Flexion	-0.1863	0.2135	0.2891

( \*\* : P < 0.01 ) ( \* : P < 0.05 )  
 ST : Stature, BW : Body Weight, CG : Chest Girth  
 MU : Multiple, R : Right, L : Left

Table 2 -2

1988

Items of Physical Fitness	Correlation between ST	Multiple(MU) Correlation between ST, BW	MU Correlation between ST, BW, CG
Side Step	0.1127	0.1374	0.1386
Vertical Jump	0.2298	0.2946	0.3023
Back Strength	-0.0836	0.2161	0.3607
Grip Strength(R)	0.2204	0.4238	0.4287*
Grip Strength(L)	0.1889	0.2746	0.2775
Trunk Extension	0.0259	0.1939	0.2086
Trunk Flexion	-0.1269	0.1910	0.1995

( \*\* : P < 0.01 ) ( \* : P < 0.05 )  
 ST : Stature, BW : Body Weight, CG : Chest Girth  
 MU : Multiple, R : Right, L : Left

Table 2 -3

1989

Items of Physical Fitness	Correlation between ST	Multiple(MU) Correlation between ST, BW	MU Correlation between ST, BW, CG
Side Step	0.4841**	0.4889**	0.4889**
Vertical Jump	0.2655	0.2814	0.2841
Back Strength	-0.0635	0.1789	0.1825
Grip Strength(R)	0.2161	0.5988**	0.5991**
Grip Strength(L)	0.4216**	0.6300**	0.6362**
Trunk Extension	0.0349	0.2739	0.2939
Trunk Flexion	0.0670	0.2604	0.3263

( \*\* : P < 0.01 ) ( \* : P < 0.05 )  
 ST : Stature, BW : Body Weight, CG : Chest Girth  
 MU : Multiple, R : Right, L : Left

much difference between stature and body weight in 1987, 1988 and 1989, and the national survey. There was not a big difference in the standard deviation also. Because the regularity of normal distribution was significant on stature and body weight, it was considered that the physique of Aichi Nursing Professional School freshmen was standard.

Regarding their physical fitness, trunk extension, standing trunk flexion and side step were similar to the national level from 1987 to 1989 judging from Table 1. The nursing school students surpassed national level in the mean value of vertical jump in 1987 and that of back strength in 1989. However, there were no significant differences between both studies. And judging from the analysis of the variance of physique and physical fitness of nursing students from 1987 to 1989, there was also not much difference. Consequently, it was found that there was almost no change in nursing school students for three years and there was no difference from that of the national level.

From the above results, students who entered Aichi Nursing Professional School had the same level of physical fitness as female students in other colleges. With regards to the campus life of students after entering A.N.P.S the schedule of lectures was full-time, and they were not active in sports clubs and did little exercise. Therefore, there was a tendency for students' physical fitness to decrease after entering A.N.P.S. This tendency was noticeable from the second grade when students had no physical education class. However, it was not determined exactly because there was no data on sophomores and seniors. When considering future jobs, the preservation and promotion of physical fitness is necessary.

2) On the evaluation of physical fitness

As mentioned in this introduction, new data measured every year is needed for evaluation when considering physique. Table 2 shows the correlation and multiple correlation between

Table 3 -1 Rasing rate of precise degree for mean value evaluation of regression and multiple regression estimation

1987

Items of Physical Fitness	Standard Deviation	Standard Error (SE) from Regression Plane	SE from Multiple Regression Plane
Side Step	3.48	3.41	3.32
Vertical Jump	4.25	4.09	4.14
Back Strength	19.00	19.19	19.07
Grip Strength(R)	4.34	4.33	4.30
Grip Strength(L)	3.43	3.39	3.39
Trunk Extension	4.98	5.04	5.11
Trunk Flexion	7.03	7.00	6.92

R : Right L : Left

Table 3 -2

1988

Items of Physical Fitness	Standard Deviation	Standard Error (SE) from Regression Plane	SE from Multiple Regression Plane
Side Step	7.17	7.22	7.29
Vertical Jump	4.93	4.86	4.84
Back Strength	19.30	19.48	19.35
Grip Strength(R)	3.90	3.85	3.63
Grip Strength(L)	4.40	4.38	4.34
Trunk Extension	6.37	6.45	6.42
Trunk Flexion	6.25	6.28	6.30

R : Right L : Left

Table 3 -3

1989

Items of Physical Fitness	Standard Deviation	Standard Error (SE) from Regression Plane	SE from Multiple Regression Plane
Side Step	2.87	2.54	2.57
Vertical Jump	5.22	5.10	5.14
Back Strength	18.00	18.20	18.20
Grip Strength(R)	4.92	4.87	4.05
Grip Strength(L)	4.40	4.04	3.49
Trunk Extension	7.26	7.35	7.17
Trunk Flexion	5.02	5.07	4.98

R : Right L : Left

physique and physical fitness ( correlation between stature and physical fitness, multiple correlation between stature and body weight, and physical fitness, and between stature, body weight and chest girth , and physical fitness ) from 1987 to 1989. As shown in this table(the correlation between stature and physical fit-

ness )it was significant in the side step and grip strength in 1989. It was also significant in the side step and grip strength in 1989 with regards to the multiple correlation between stature and body weight , and stature , body weight and chest girth, and physical fitness. However, it was not very significant on items of physical fitness in 1987 and 1988 . This result is different from former papers<8>9>10> which we have submitted. In other words , in former papers, it was concluded that it was significant on the side step, vertical jump, back strength and grip strength in first-year female college students. These papers are based on research over eight years between 1975 and 1982. Consequently, it could be said that this time, the result is a little different. The reason could be that the regularity of normal distribution in items of the physical fitness was not significant there was little data on nursing school students. Table 3 shows standard deviation, and standard error from regression and multiple regression planes of physical fitness. As shown in Table 3 from 1987 to 1989, the precise degree of regression and multiple regression estimation has increased slightly in the side step, vertical jump, back strength and grip strength. In 1989 especially, the rate of precise degree is higher than in 1987 and 1988. The increase of the precise degree in regression and multiple regression estimation means that the standard error from regression and multiple regression planes has to decrease gradually from that of standard deviation, and this is controlled by the significance of correlation coefficients. In my other papers, the validity of regression and multiple regression estimation was recognized, however , the time result was not certain. Therefore, in the evaluation of physical fitness in the A.P.N.S. students, it was concluded that the estimation of mean value would be more valid than that of regression and multiple regression.

## 4. Conclusion

The raising rate of precise degree in regression and multiple regression estimation was discussed on the physical fitness of nursing school students at the campus level. It was not certain with regards to the raising rate of precise degree in the estimation from the result this time. Therefore, regarding the evaluation of A. P. N. S students' physical fitness at the campus level, it was found that the estimation of mean value would be more valid than that of regression and multiple regression.

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