

Study on Assessment and Improvement of Physical Fitness and Health Concept and Satisfaction of College Students with Different Goal Setting by Cooperative Learning: A Case Study of Health and Body Sculpting Course of Feng Chia University

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Abstract: This study was carried out to explore the effects of different goal setting on physical fitness, health concepts, and satisfaction of college students on cooperative learning with 53 participants (students) in two classes during one year. The improvement in physical fitness was observed in body mass index (BMI), waist and hip circumference, sit-up reach, and 800/1600 meters running. Female students' muscle endurance improved significantly with one-minute sit-ups but their waist and hip circumferences were longer than those in the weight management group. Students showed the highest scores in the dimension of well-being and the lowest score in the clinical concept of health. The satisfaction survey result showed that teachers' instruction was more effective than self-learning. In conclusion, cooperative learning allowed students to improve learning motivation, thereby improving physical fitness and learning effectiveness. It was verified that cooperative learning had a positive and significant impact on the satisfaction of students. The cooperative learning teaching mode can be applied to other physical education courses. Increasing the number of related physical education courses will improve the opportunities to improve the quality of the courses.

Keywords: Cooperative learning, goal setting, fitness

1. Introduction

The rapid progress of medicine along with science and technology gradually lengthened the average life expectancy in Taiwan. Since 2012, the Sports Department of the Ministry of Education has actively promoted the concept of "enjoying sports in living a healthy life" in sports education. Pursuing a healthy lifestyle of health and sustainability (LOHAS) in life has become mainstream in citizens' minds in Taiwan, and the leisure, fitness, and sports industry has also flourished. "A strong country must first strengthen the body, and nothing is impossible to a willing heart" is the corporate slogan of Power Wind Health Industry Incorporated, the first listed company in the fitness industry.

The fitness industry has become prominent. According to statistics from the Ministry of Finance, the revenue nearly tripled in six years since 2012 (Hsu, 2019). Fitness clubs and national sports centers are widely established, giving a positive impact on the general traditional sports cognition in Taiwan. Participants are highly motivated to fulfill their psychological needs, health and fitness, and physiological needs (Wu, 2017). More bodybuilders are actively pursuing external appearance, focusing on their body shapes and lines. Men pursue strong muscles and body lines, while women pursue better body shapes (Zeng, 2003).

Nowadays, colleges and universities have focused more on students' health in physical education. Under the influence of the social economy and technological environment, spending a longer time on the internet has greatly decreased college students' sports activities. Active participation in sports promotes national health and reduces government spending on health insurance and medical resources (Dai, 2009). Secondly, the changing of the college sports curriculum from compulsory to elective courses also influences students' opportunities to participate in sports activities. Improving the students' physical fitness has become an important topic for each school. Physical education courses are developing towards indoor venues. Related courses to "Fitness and exercise" have also become one of the favorite courses among college students. Therefore, the gym has become an important place in a college. Guiding students to have correct sports concepts, develop motor skills, and have good physical fitness is not only a responsibility but also a problem that needs to be paid attention to and solved by physical education teachers. Most people prefer exercising with others or in a team rather than doing alone because people have greater enjoyment when exercising together. They can also generate social support and strengthen their commitment to continued exercise (Heinzelmann & Bagley, 1970). Physical education is the foundation of physical fitness. How to make college students maintain physical and mental health while fully enjoying sports and leisure life

and reducing the incidence of diseases through the improvement of physical fitness are the direction of school physical education efforts. These are also the motivation for this study.

The course “Health and Body Sculpting” in this study is based on various sports training for fitness. Physical education teachers can integrate professional physical education teaching into the concept of the goal-setting theory and teach students how to understand their goal settings. Based on the correct and effective theoretical introduction, students can design their exercise routines, apply the theory to modify their exercise behavior, and increase their learning efficiency. Theories include exercise physiology, exercise psychology, muscle anatomy, and sports training. Students can incorporate the principles and use of various fitness equipment into their exercise routines. Teachers can further teach students how to integrate the training skills in the gym to increase the frequency of their autonomous workouts. A cooperative learning strategy is adopted, and students are divided into four groups according to different goal settings, namely 1) Muscle Strength, 2) Muscle Hypertrophy, 3) Body Shape, and 4) Bodyweight Management. The students with the same goal setting are divided into groups of three to four. Through the power of peers in cooperative learning, the students can supervise and support each other to overcome the obstacle encountered during the workouts. The purposes are to stimulate students’ motivation to participate in sports, to understand their state of physical fitness, to help them integrate “goal setting” into their lives, to change their lifestyles, and to develop lifelong exercise habits.

2. Materials and Methods

This research course is based on various fitness training sciences such as exercise physiology, sports psychology, muscle anatomy, sports training, and the use of various fitness equipment and exercise routines to guide students on how to use these training skills to increase the frequency of their voluntary workouts. The course adopts a cooperative learning strategy to group students according to different goal setting, and finally promotes the optimization of physical fitness and participation in the course satisfaction. The research structure is shown in Figure 1.

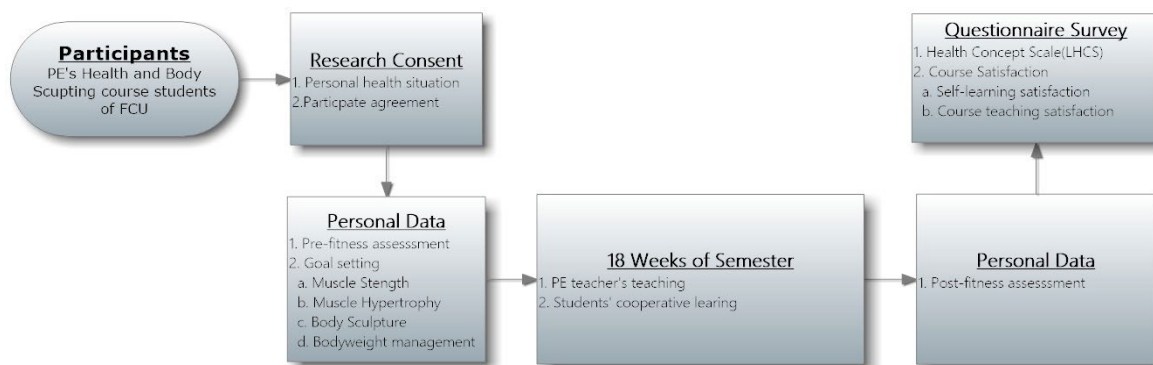


Fig. 1. Research Structure

The research objectives are as follows.

- 1) To understand the changes in the pre-and post-test scores of college students’ physical fitness through cooperative learning in goal setting
- 2) To understand the changes in the pre-and post-test scores of physical fitness of college students through cooperative learning in different goal settings
- 3) To understand college students’ health concepts through cooperative learning in goal setting
- 4) To understand college students’ health concepts through cooperative learning in different goal setting
- 5) To understand college students’ course satisfaction through cooperative learning in goal setting
- 6) To understand college students’ course satisfaction through cooperative learning in different goal setting

Participants in this course were sophomores and upper classmates enrolled in the author’s “Health and Body Sculpting Course” at Feng Chia University. There were 50 students in each class with a total of 100 students in two classes. The students had no sports backgrounds and selected the course “Health and Body Sculpting” to their interests at the beginning of the semester. Students all had a basic level of preference for fitness and good motivations to participate in sports.

Investigating how to improve students' physical fitness and health status and the level of their satisfaction with the course was the goal of this study. The questionnaire with the Health Concept Scale (LHCS) compiled by Huang (1995) based on the version of Laffrey (1986) (Li, 2010) and the Class Satisfaction Questionnaire Survey consisting of 10 items in two dimensions, self-learning effect satisfaction and course teaching satisfaction, were used in this study. After completing the course, the data was collected and compiled. Those who missed three consecutive classes or five missed classes in total were withdrawn from the study. The data under the age of 20 was also deleted. At the end of the semester, the data of 53 students who completed the course were collected, and the t-test and one-way ANOVA were conducted to compare the differences at the significant level α of 0.05 between their physical fitness before and after the test and the results of various questionnaires.

3. Results and Discussions

The two registered elective classes of Health and Body Sculpting had 50 students with a total of 100 students at the beginning of the semester. At the end of the semester, a total of 53 students remained. Table 3 shows the results of the completion of the course and the questionnaire survey. There were 23 male (43.4%) and 30 female students (56.6%). 17 students majored in business (32.1%), followed by Engineering and Science (15 students, 28.3%). 26 students were in their senior year, accounting for 49.1%. 23 students (43.4%) had the goal of maintaining weight/improving body shape, and there were no students interested in increasing muscle strength. In terms of weekly workout frequency, 25 students (47.2%) exercised regularly 2–3 times a week, and 16 people (30.2%) did once a week. A few students did not exercise for the recommended frequency. 23 students worked out with friends, while 16 (30.2%) did with classmates.

Table 1. Descriptive analysis result

Background variables	Items	n	%
Gender	Male	23	43.4
	female	30	56.6
Affiliation	College of business	17	32.1
	College of engineering and science	15	28.3
	College of construction and development	4	7.5
	College of architecture	3	5.7
	College of information and electrical engineering	8	15.1
	College of finance	5	9.4
Grade	College of humanities and social science	1	1.9
	Sophomore	11	20.8
	Junior	16	30.2
Goal setting	Senior	26	49.1
	Muscle strength	0	0
	Muscle hypertrophy	18	34.0
	Body shape	23	43.4
Weekly workout frequency	Bodyweight management	12	22.6
	once(in class)	16	30.2
	2-3 times	25	47.2
	4-5 times	8	15.1
Feeling after workout	6 times and more	4	7.5
	Very relaxed	8	15.1
	Relaxed	5	9.4
	Little tired	33	62.3
	Very tired	6	11.3
Workout companion	Extremely tired	1	1.9
	Family member(s)	1	1.9
	Classmate(s)	16	30.2
	Friend(s)	23	43.4

alone 13 24.5

Tables 2 and 3 show that the male students (n=23) and female students (n=30) showed improvement in all performances except for the sit and reach test. One-minute sit-ups helped the students have a significant improvement in the muscular endurance index, while the others did not achieve significant differences.

Table 2. Male students’ differential analysis of physical fitness level and body measurement (n=23)

	Weight (kg)	Waist	Hipline	Sit and reach (cm)	One-min sit-ups (times)	Standing long jump (cm)	1600/800m run (sec)	3-min step test
Pre-test	68.45	79.72	95.53	31.91	43.83	217.13	512.30	56.82
SD	14.71	9.35	9.06	10.42	7.68	30.73	83.44	10.51
Post-test	68.25	78.80	95.47	30.57	45.13	220.09	500.39	61.13
SD	13.55	10.73	7.79	8.99	7.30	25.32	74.52	11.90
t value	-0.24	-0.96	-0.07	-1.68	1.04	0.77	-0.97	1.78

*p<.05

Table 3. Female students’ differential analysis of physical fitness level and body measurement(n=30)

	Weight (kg)	Waist	Hipline	Sit and reach (cm)	One-min sit-ups (times)	Standing long jump (cm)	1600/800m run (sec)	3-min step test
Pre-test	59.72	74.09	96.35	37.87	35.37	160.77	318.90	51.60
SD	12.91	11.62	7.26	10.19	8.03	18.74	92.50	6.86
Post-test	59.31	73.22	95.93	34.83	37.20	162.30	299.20	51.56
SD	12.63	11.62	8.27	13.98	7.92	18.13	78.01	5.47
t value	-1.25	-1.37	-0.64	-2.06*	2.37*	0.65	-1.26	-0.03

*p<0.05

In the pre-and post-test of physical fitness of students with different goal setting, there was no significant difference between male students (n=23) groups (Tables 4 and 5). The female students (n=30) showed a significant difference in the length of the waist ($F(2,27) = 5.45, p < 0.05$) from the post-test of physical fitness on different goal setting. The results of post hoc analysis showed that the bodyweight management group had significant decrease in waist measurement than the muscle hypertrophy group. There was also a significant difference in hipline measurement, $F(2,27) = 6.07, p < .05$. The post-hoc analysis found that the hipline measurement of the bodyweight management group was a larger length of the waist than that of the muscle hypertrophy group and the body shape group. No significant difference was found in other physical fitness and body measurements.

Table 4. Male students’ post-test differential analysis of physical fitness and body measurement with different goal setting(n=23)

	Weight (kg)	Waist	Hipline	Sit and reach (cm)	One-min sit-ups (times)	Standing long jump (cm)	1600/800m run (sec)	3-min step test	
Muscle hypertrophy (n=15)	Mean	66.93	77.88	95.23	28.33	45.67	224.67	496.6	60.05
	SD	13.91	7.69	8.01	9.02	8.04	27.93	93.39	10.09

Table 4. cont.

Body shape (n=5)	Mean	69.14	80.68	93.26	36.80	39.40	198.80	533.80	62.80
	SD	14.50	12.43	8.54	8.78	6.35	39.71	69.32	11.46
Bodyweight management (n=3)	Mean	73.67	87.33	100.33	31.33	42.00	210.00	555.00	64.31
	SD	13.61	11.24	5.03	5.51	6.08	20.88	13.86	22.43
	F	0.30	1.35	0.77	1.79	1.39	1.48	.81	0.19

* $p < 0.05$

Table 5. Female students' post-test differential analysis of physical fitness and body measurement with different goal setting(n=30)

		Weight (kg)	Waist	Hipline	Sit and reach (cm)	One-min sit-ups (times)	Standing long jump (cm)	1600/800m run (sec)	3-min step test
Muscle hypertrophy (n=15)	Mean	53.35	60.50	92.00	47.00	42.00	177.00	266.33	54.99
	SD	0.88	0.50	0.87	19.16	3.61	10.54	46.09	9.89
Body shape (n=5)	Mean	56.48	71.33	93.14	35.67	36.72	159.11	335.67	51.65
	SD	13.21	11.69	7.15	13.40	9.27	19.23	110.79	5.79
Bodyweight management (n=3)	Mean	66.94	81.22	102.83	29.11	36.56	158.67	302.89	50.24
	SD	10.55	7.63	7.89	11.89	5.68	18.71	49.45	2.58
	F	2.71	5.45*	6.07*	2.06	0.59	1.27	0.91	0.84
	Post hoc		4>2	4>2;4>3					

* $p < 0.05$

Table 6 shows that all students (n=53) scored the highest in the health concept dimension of tranquility and well-being, especially in “feeling happy and free”. The clinical concept of health showed the lowest score of 3.94. “No need to see a doctor” and “not sick” also had the lowest scores. “Health concept of tranquility and well-being”, “adaptive health concept”, “role functional health concept”, and “clinical health concept” were in the order of the scores. In the results of the course satisfaction survey, the score of “course teaching satisfaction” was 4.54, which was higher than that of “self-learning satisfaction” with a score of 3.81. The item of “this semester’s teaching content” showed the highest score of 4.75. “The degree of completion of the exercise goal set by oneself” and “the degree of improvement in physical fitness after the course” had the lowest score of 3.72 (Table 7).

Table 6. Descriptive analysis of Health Concept scale (n=53)

Dimension	Items	Mean	SD	Overall mean/SD
Clinical health concept	4 no symptoms of sickness	4.11	0.93	3.94 .92
	6 no need to see a doctor	3.81	1.11	
	12 not sick	3.81	1.23	
	17 no need for any medicine	4.09	1.08	
	21 no physical nor mental problems	3.85	1.08	

Table 6. cont.

	3 able to finish daily routine	4.30	0.61	
	5 able to do must-do tasks	4.28	0.66	
	7 live creatively	3.83	0.91	
Role functional health concept	13 able to accomplish the highest goal	3.77	0.85	4.07
	14 able to achieve daily responsibility	4.21	0.77	0.61
	15 able to live in the way you are most satisfied	4.25	0.83	
	20 able to take responsibility as being son/daughter, friend, or students	3.96	0.92	
	2 able to adapt to changes in the surrounding environment	4.23	0.69	
	8 able to adapt to changes in life	4.15	0.77	
	10 able to cope with external pressure	4.08	0.83	4.19
Adaptive health concept	11 able to change and adapt to the needs of the environment	4.25	0.68	0.59
	16 able to adjust to the actual situation, not forcing	4.13	0.83	
	18 able to cope with changes in the surrounding environment	4.30	0.75	
	23 not knocked down by stress	4.23	0.87	
	1 feeling happy and free	4.60	0.53	
Health concept of tranquility and well-being	9 welcome each day with high spirits and enthusiasm	4.08	0.87	4.23
	19 able to reach full potential	4.04	0.94	0.63
	22 behaving as expected	4.15	0.72	
	24 at the best physical and mental state	4.28	0.74	

Table 7. Course Satisfaction(n=53)

dimension	items	Mean	SD	Overall mean/SD
	1. goal accomplishment performance	3.72	0.63	
	2. motivation for continued engagement in sports	3.96	0.73	
Self-learning satisfaction	3. self-efforts and demands during workout	3.79	0.77	3.81
	4. the degree of physical fitness improvement after the course	3.72	0.72	0.57
	8. the degree of body shape improvement after the course	3.87	0.73	
	5. this semester's teaching content	4.75	0.43	
	6. cooperative learning mode	4.53	0.64	4.54
Course satisfaction	7. learning in a group with the same goal	4.42	0.82	0.47
	9. skills/techniques improvement	4.34	0.62	
	10. overall course satisfaction	4.66	0.48	

Table 8. Correlation analysis between health concept and course satisfaction

Dimension	1 Clinical health concept	2 Role functional health concept	3 Adaptive Health concept	4 Health concept of tranquility and well- being	5 Self-learning satisfaction	6 Course satisfaction
1	1.00					
2	0.58*	1.00				
3	0.67*	0.89*	1.00			
4	0.68*	0.80*	0.83*	1.00		
5	0.20	0.31*	0.23	0.24	1.00	
6	0.32*	0.37*	0.39*	0.39*	0.43*	1.00

* $p < 0.05$

The correlation analysis between each health concept dimension and all six dimensions of satisfaction was analyzed (Table 8). The students' self-learning satisfaction was significantly correlated with the role-functional health concept. Although there was a significant correlation between course satisfaction and the health concept, the correlation coefficients were around 0.4, indicating that the correlation relationship was low.

In the two classes of Health and Body Sculpting, 25 students (47.2%) exercised 2–3 times a week, and 12 (22.6%) exercised four times and more. According to the reports by the Sports Department of the Ministry of Education (2010), the proportion of college students in Taiwan who exercised regularly three times more every week during the semester was only 25.5%. The students in this study participated in regular exercise more frequently. This implies that the students who take the physical education course under their choices of interests have a higher participation rate in regular sports. It also highlights that the physical education course with the student's choice of interest can increase the attractiveness of sports participation. In the future, it is suggested that more courses with students' choice of interest need to be offered in course planning.

The goal-setting interventional physical education program allowed the better performance of the students in the post-physical fitness tests, including body mass index, waist and hipline measurement, sit-ups, and 800/1600-meter running. Also, the results of female students' one-minute sit-ups showed their muscle endurance index improved significantly. However, both male and female students showed no progress in their sit-and-reach tests after the course, and female students even showed a significant regression. It suggests that stretching training to improve the extensibility of muscle tissue be added to the course. In the pre-and post-test of physical fitness of students with different goal setting, no significant differences were found between male and female students. Only significant differences were found in female students' waist length in the bodyweight management group, which significantly decreased than in the muscle hypertrophy group. The hipline length under the bodyweight management group was significantly longer than that of the muscle hypertrophy group and the body shape group, respectively. The female students in the bodyweight management group have longer waist and hipline lengths, which indicates that a high waist-to-hip ratio is an indicator of increasing the risk of chronic diseases. Therefore, in the future, in addition to the basic knowledge of sports nutrition, it is recommended to keep regular weight measurement records for students with heavy body weight to achieve a reasonable weight status with exercise plans and dietary adjustments.

In terms of health concepts, all students scored the highest on "tranquility and well-being", in which the score for "feeling happy and free" was the highest. The score of the clinical health concept was the lowest, in which the scores for "no need to see a doctor" and "not sick" were the lowest. The scores of each dimension decreased in the order of "health concept of tranquility and well-being", "adaptive health concept", "role functional health concept", and "clinical health concept". The students believed that physical healthiness was not representing the health of a person on the whole except with a need to see a doctor and sickness. Instead, the state of feeling happy was important for psychological health, and freedom was thought to be the main purpose of health.

In the course satisfaction survey, students showed a higher score in "course teaching satisfaction" than in "self-learning satisfaction". "This semester's teaching content" recorded the highest score. Scores for "the degree of completion of the exercise goal set by oneself" and "the degree of improvement in physical fitness after the course" were the lowest. The students agreed that teachers evaluated course teaching and its content highly. However, they were not satisfied with the goals that they set. This indicates

that they had a strong determination for improving their physical fitness performance. It may also mean that students have positive expectations in their pursuit of a better self.

5. Conclusions

After a semester of teaching and learning interaction between the course teacher and students, students showed a high level of satisfaction with the teaching evaluation of the Health and Body Sculpting course. In addition to teaching the professional theories of fitness and sports, it also allows students to interact and learn under the same goals and encourage each other to improve their learning motivation, their physical fitness, and learning effectiveness in cooperative learning. Cooperative learning has a significant positive impact on the satisfaction of college students in fitness and physical education courses. It is suggested that cooperative learning be applied to other physical education courses in the future to help students set different goals in learning. In addition to improving their physical fitness and posture, students can achieve the goals that are set by themselves.

In summary, the course was highly satisfactory for students' learning. It is recommended to increase the number of physical education courses so more students can participate. There were 50 students in each class with one teacher and one teaching assistant in this research. Within the limited time, it is impossible to completely adjust every student's posture while using the training equipment and mastering the learning situation of each student. Usually, there is only one teacher assigned to one general physical education course. It is recommended to reduce the number of students in elective courses to improve the opportunities for interactions between teachers and students and facilitate the continuous improvement of course quality.

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References

1. Dai, X. -L. (2009). sequence. *In the 1998 National Sports Development Conference of the Sports Committee of the Executive Yuan (page 1)*. (in Chinese) Taipei, Sports Affairs Council, Executive Yuan.
2. Heinzelmann, F., & Bagley, R. W. (1970). Response to physical activity programs and their effects on health behavior. *Public Health Reports*, 85, 905-911.
3. Hsu, Y. -P. (2019). *The fitness industry has nearly tripled its revenue in 6 years*. Liberty Times Financial News, November 6, 2019, <https://ec.ltn.com.tw/article/breakingnews/2969528>. (in Chinese)
4. Huang, Y. -H. (1995). *Predictores of health-promoting lifestyles among college students*. Unpublished Master's Thesis of Kaohsiung Medical College, Kaohsiung City. (in Chinese) <https://hdl.handle.net/11296/8m5fpe>
5. Laffrey, S. C. (1986). Development of a health conception scale. *Research in Nursing & Health*, 9, 107-113.
6. Li, C. -C. (2010). *The Effect of Physical Fitness and Health Concept in College Students by Goal Setting of Exercise Intensity*. Unpublished Master's Thesis, Department of Exercise Education, Taipei Sports and Physical Education College, Taipei City. (in Chinese) <https://hdl.handle.net/11296/55p6ty>
7. Ministry of Education (2010). *National primary and secondary school nine-year consistent curriculum*. Taipei City: Ministry of Education, 19-25. (in Chinese)
8. Ministry of Education (2012). *The Spring of Classroom Teaching ~ Transcend Learning Community through Group Cooperative Learning*. (in Chinese) Retrieved from <http://www.coop.ntue.edu.tw/qa.php>
9. Wu, T. -Y. (2017). *The Study on Group Fitness Class Members' Participational Motivation and Leisure Benefit-A Case Study of Gyms in Kaohsiung as an Example*. Unpublished Master's Thesis, Department of Physical Education, National Kaohsiung Normal University, Kaohsiung City. (in Chinese) <https://hdl.handle.net/11296/77bz3m>
10. Zhang, H. -L. (2003). Application of goal setting theory in fitness. *Journal of Physical Education of Fu Jen Catholic University*, 2, 177-188. (in Chinese)

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