A colligation of facts and principles basic to sound curriculum construction for physical education in China

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A COLLIGATION OF FACTS AND PRINCIPLES BASIC TO SOUND CURRICULUM CONSTRUCTION FOR PHYSICAL EDUCATION IN CHINA

by

Hwei Lan Chang

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, in the Department of Physical Education, in the Graduate College of the State University of Iowa

August, 1944
ACKNOWLEDGMENT

Grateful acknowledgment is hereby made to Professor C. H. McCloy, who suggested the topic for this study and under whose direction the study was pursued. Grateful acknowledgment is also made to Professors M. E. Barnes, Elizabeth Halsey, Howard V. Meredith, Roland Rooks, and W. W. Tuttle.
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Chapter I
INTRODUCTION

China became "physical fitness" and "national unification" conscious at the time of the founding of the "Nationalist Government" in 1927. This consciousness did not, however, express itself in the form of an active promotion of physical education by the government until about four years later. The steps taken by the government in fostering the national program of physical education for all school levels have, unfortunately, been handicapped by the lack of an adequately organized curriculum\(^1\) of physical education - a curriculum purposefully constructed to achieve the objectives of physical education.

Need of Facts for the Construction of a Curriculum of Physical Education for China

The first national course of study for physical education in China was built in 1934\(^2\) by the Curriculum Committee of Physical Education.

\(^1\) The term "curriculum," as used in this study, has reference to a body of organized material, which treats the philosophy of education, general objectives of physical education, objectives of physical education of the specified school level, physical activities with their description, teaching suggestions and illustrated lesson plans on each type of physical activity, hints and notes, and suggestions regarding the measurement of results.

\(^2\) Before that time there existed various materials which included, typically, some discussion of principles and some description of such activities as marching, gymnastics, low-organized games, and folk dancing.
Education of the Chinese Ministry of Education. Its main purpose was to supply teaching material to the teachers of physical education who had had no specialized training. Its contents included chiefly a list of physical activities and their adaptation for the different school levels. No thoroughgoing attention was given to the matter of how the objectives of physical education were to be realized. The objectives of these teachers were to provide opportunity for the child to exercise the body, to master skills, and to have a good time.

Shortly after the outbreak of the present war in 1939 the national course of study for China was revised as a result of the demand for extensive physical training. The information concerning the nature of the child which was accessible to the Curriculum Committee of Physical Education was inadequate; consequently the course of study was revised largely on the basis of assumptions which were, at the best, the product of the previous experiences of the curriculum committees.

Concerning the child there was no source of organized facts available to serve as a dependable foundation and guide in the construction of the course of study of physical education.

Philosophy of Education of China

The philosophy of education in China has been affected in recent decades by three major influences: the political revolution, the literary revolution, and the philosophy of education of certain leading educators of the United States. (20 p. 9)¹

¹ The number in the parenthesis refers to the bibliography.
Literary Revolution

The so-called literary revolution began in 1917. It has contributed much to the development of a democratic education, for it has aimed to use the spoken language in literary writing and thus to achieve a written medium of expression that would be common to all.

Philosophy of the Education of Leading Educators of the United States

Following 1920, a number of outstanding educators of the United States went to China at different times. They included John Dewey, Paul Monroe, G. R. Twiss, and W. A. McCall, and W. H. Kilpatrick. They lectured and advised as to the reformation of the educational system in China. These visitors, whether they approached the problem from the philosophy of education, teaching methods, administration, or tests and measurements, all contributed a single common influence to the educational system of China, that is, democratic education. This was accepted with great enthusiasm, for it harmonized with the democratic ideas of Dr. Sun Yat-sen, the founder of the Republic of China. Thus the basic educational principles in China came to be recognized as the following:

Education must recognize the needs of the individual
Education must recognize individual differences
Education must recognize constant social changes
Education must recognize the integration of the whole personality of the individual
Education must recognize the continuity and the interaction of experiences
Education must recognize the relationship of the individual to his environment

The Aim of Education in China, as formulated in 1928, is in accordance with Dr. Sun Yat-sen's Three Principles of the people. The Three Principles of the people are the principles of the people's
nation, the people's right, and the people's livelihood. These principles are basically democratic.

Nationalism

"Nationalism," "democracy," and "economic well being" are the terms of the old translation. They are now translated directly from the Chinese terms as "people's nation," "people's right," and "people's livelihood."

"Education shall seek to instill into the minds of the youth the national spirit, to keep alive the old cultural traditions, to raise the general level of the moral integrity and of the physical vigor of the people, to spread modern scientific knowledge, and to cultivate the aesthetic taste."

Democracy

"Education shall seek to teach such civic virtues as law-abidingness and loyalty, to foster organizing ability and a spirit of service and co-operation, to disseminate political knowledge, and to inform the people of the true meaning of liberty and equality."

Economic Well Being

"Education shall seek to instill in the people habits of manual labor and productive skill, to teach the application of science to everyday life, and to enlighten the people on the independence and harmony of the economic interests of the various classes."

The major objectives of physical education as formulated in China's First National Convention of Physical Education in 1932 are in conformity with these objectives of education. They are as follows: \(54\) p. 1)
Adequate and harmonious development of the body
Skill in adaptation to the environment
Co-operation for "national defense"
Sportsmanship, bravery, perseverance, etc. to express
the "national spirit"
Habit of recreation through physical activities

Purpose and Scope

The foregoing discussion of the philosophy of Chinese education indicates that if physical education is a branch of education three factors must be considered in the construction of a curriculum of physical education: the needs and the nature of the child, the needs of the society of which the child is a part, and the needs for a well-constructed curriculum of physical education to meet the needs of the child in the particular society of which he is a part.

First, the present study attempts to discuss the needs and the nature of the child in relation to his environment. Consideration is given to the sociological factors involved, to the pertinent research findings in the fields of physiology, physical growth, and psychology; and to the working assumptions which appear tenable on certain problems which cannot now be solved on the basis of experimental evidence. This three-fold discussion is intended to supply a substantial foundation for the construction of a curriculum of physical education for China. It should be clearly understood that the materials presented do not embrace all the facts known in the areas drawn upon or all the conclusions which may logically be derived. The materials are selected as pertinent to the problems raised from time to time in relation to the construction of a curriculum of physical education for China.

Second, the present study illustrates how the facts and
principles amassed are of direct use in curriculum construction.
Chapter II

FOUNDATION MATERIALS: HISTORICAL(20, 27, 42, 45)

In this chapter an attempt is made to present a short sketch of the development of physical education in China from ancient times to the present. The development is traced with reference to the influence of political and cultural changes, not as a record of the program from one dynasty to another. A table is given at the end of the chapter to indicate the first appearance and the decline of certain physical activities in the Chinese history. In the interpretation of this table it must be recognized that in certain dynasties complete records are not available.

Ancient System of Physical Education

China has had a long-standing interest in physical education. During the first two thousand years (2697-249 B.C.) of her history this interest increased with the development of her culture. It reached its climax in the Chou dynasty, together with the other branches of her culture. For the next two thousand years it began to decline along with her culture. However, several individual physical activities were still emphasized in later dynasties.

Period of the Equal Development of the "Wen" and the "Wu"¹ (2697-249 B.C.)

¹ The "wen" has always corresponded to the "intellectual" aspect of education and culture. The "wu" originally denoted the physical aspects of participation in the "military art" - those abilities of individual combat which constitute the main content of military combat. The "wu" has come to connote the "physical" in "physical education," as contrasted with the "wen" or the "intellectual" in general education.
From the beginning of Chinese history until the end of the Chou Dynasty, a period of about two thousand years, both the "wen" and the "wu" were equally developed in the educational system of China. Archery, swordsmanship, wrestling, tsu-chu, (similar to soccer) and dancing had their origin in this period. Physical activities were associated with both education and warfare. The rulers were not only statesmen but also warriors, and the masses engaged in hunting, wrestling, archery, swordsmanship, tsu-chu, and dancing.

The Chou Dynasty (1122-249 B.C.) marks the most brilliant epoch in Chinese civilization. Its rich development is to Chinese history what the civilization of Greece is to European history. The main branches of the educational system were rituals (e.g., ceremonials, manners, and social conduct), music, archery, charioteering, writing, and mathematics, which were called the Luh-Yi, or Six Arts, which corresponded to the "liberal arts" in the modern system of education. It will be noted that archery and charioteering were taught coordinately with rituals, music, writing, and mathematics. Physical development reached its climax with that of the other branches of learning.

Archery, about which much was written in Li-Chi, or Book of Rituals, was both a branch of education and an aspect of military training. There were archery meets at regular intervals for public officials, common people, and students of schools. Gentlemanly conduct, corresponding to what is now called sportsmanship in Europe and America, was very much observed in the archery meets. Confucius, who is believed to have been skillful in archery, stated: "There is no competition among gentlemen. Must there, then, be competition in archery? Rather start the game with a humble bow (shaking one's own
hands) and finish with a drink. The value of competition is in the improvement of the gentleman's conduct."

Accompanied by instrumental music, dancing was enjoyed by the royal family as well as by the common people. Dancing exhibitions were generally held in the spring. Ritual dancing still constitutes an important item in the spring festival at some of the temples.

Chinese boxing, the "national exercise," is believed to have had its origin in this period. It is of interest that among the many physical activities existing at that time the "national exercise" is the only one still practiced.¹

¹ The present form of boxing is considerably modified from the early form. Many Chinese enjoy practicing boxing for the purpose of both "physical fitness" and recreation.

Period of Unequal Development of the "Wen" and the "Wu" (249 B.C.-1902 A.D.)

In this period physical training was promoted or suspended according to the military need, the current political trends, and the predominant philosophies or religions of the particular dynasties.

There was a great decline of both the "wen" and the "wu" in the Chin Dynasty (244-206 B.C.). In order to concentrate the ruling power in himself, Shih Hwang-ti built the Great Wall to protect the country from barbarian invasions, and consolidated the feudal states within by the burning of the classical books, by the destruction of war implements, and by the wholesale massacre of scholars. Civilians were forbidden to engage in self-protecting physical activities, a design which was part of the ruler's personal military equipment with which he might suppress any uprising against himself. He aimed to blind and
to cripple the people intellectually and physically, and he achieved his objective successfully, though at the expense of the Chinese civilization.

The Han Dynasty (206 B.C.-221 A.D.) gradually became the golden period of literary production and may be thought of as a reaction to the tyranny of the war lord, Shih Hwang-ti, of the preceding dynasty. The people were divided into four classes: scholar, farmer, artisan, and merchant, in order of rank from the highest to the lowest. The scholar was highly respected, and there was no soldier class as such. The last part of this statement may be interpreted in two ways: (1) every one was equipped with physical skill and powers so that no soldiers were needed; (2) warlike physical training was despised. The latter inference may be correct, for this is a period in which attention was devoted to literary production, and physical training was neglected.

In spite of the literary inclination of this period, toward the end of the period, Chinese boxing came into prominence. The present so-called "wai-chia" or external boxing and "nei-chia" or internal boxing had their origins in this period. The terms, "external" and "internal" express the nature of the application of the forces. "Wai-chia" boxing is executed with impulsive force; "nei-chia" boxing with plastic and flowing movements which might be mistaken by white people for dancing. "Wai-chia" boxing is the parent of the present Japanese jiu-jitsu, which was introduced into Japan at the end of the Ming Dynasty and became popular there. Many Chinese, both men and women, still practice both kinds of Chinese boxing as daily exercise and recreation, neither type, however, is universally taught in the schools.

The period of the Three Kingdoms (221-265 A.D.) has been
compared to the "Age of Chivalry" in Europe. The great men were the people who were able to fight and write.

From the Tang Dynasty to the Sung Dynasty (620-1280 A.D.) was the period which impresses the Chinese as a period of wealth, culture, literature, and war as well as of frivolity and extravagance. Certain physical activities were further developed, but dancing and wrestling became professional. From the Yuan Dynasty to nearly the end of the Ching Dynasty (1280-1902) there was no outstanding development of any special physical activities.

It is necessary to call special attention to the fact that the literary examination, of which the deteriorating effects on the health of the people are well known to both the Chinese and many foreigners began with the Tang Dynasty. It was used as the basis of preferment. Physical development and literary attainment became antagonistic to each other instead of being developed harmoniously, as in the time of the Chou Dynasty and of the Three Kingdoms. The literary examination was further elaborated by the triennial examinations of the Ming Dynasty (1368-1644 A.D.). The resultant physical decline facilitated the Manchurian invasion. After the conquer of the Manchus, the essay examination for preferment was continued. It was one of the many factors which had weakened the Chinese both physically and spiritually, and the examination was abolished shortly before the overthrow of the Manchurian monarchy and the founding of the Republic of China in 1912.

The present physical inferiority of the Chinese may be partly attributed to the accumulating effect of the over-emphasis on literary attainment and the negligence of the physical development from the Tang Dynasty to nearly the end of the Ching Dynasty (620-1902 A.D.), a period of more than a thousand years.
Development of Modern Physical Education

Since the last century China has been repeatedly oppressed by the world-known unequal treaties. The most recent treaties and probably the most severe, were those resulting from the Boxer War at the opening of the century. The national humiliation of the imposed concessions and forced indemnities marked the turning point between modernization on the one hand and the abandonment of ancient culture on the other hand. Chinese boxing suffered a great decline among the civilians. Because it was the weapon of the rebel, the Government prohibited civilians from practicing it, or being in possession of the boxing instruments. Many people engaging in boxing as recreation were innocently imprisoned. The fact was overlooked that boxing, like many modern inventions, could be used for both beneficial and harmful purposes.

While the ancient Chinese boxing was prohibited, modernization brought with it Western physical education. In schools, gymnastics were introduced. In North China, however, many civilians still practiced boxing secretly, for they were convinced that it was a good activity for self-protection, physical fitness, and recreation.

Introduction of Western Physical Education into the Schools-Gymnastics Period (1902-1910)

Gymnastics was first introduced into schools in the form of military gymnastics, which was a combination of German and Japanese gymnastics and taught by military officers. It was very rigid and was not welcomed by the students. Although gymnastics was scheduled as a required course in the curriculum, the requirement did not in the majority of schools go very much beyond the printed form.
The Foundation of the Modern Physical Education-Athletics Period
(1910-1927)

Aside from the fact that athletics became popular in the schools during this period, there were many new developments which ushered in modern physical education in China. The major developments were (1) the holding of the First National Athletic Meet at the time of the Nanyang Industrial Exposition in Nanking in 1910, (2) the organization of the Far Eastern Athletic Association to take care of the far eastern athletic meets, (3) the establishment of playgrounds and training institutes and the organization of a provincial physical education association by Kiangsu province, which was the leading province in its interest in the promotion of physical education (4) the establishment of the Y.M.C.A. and the Y.W.C.A. Normal School of Physical Education, (5) the organization of the two-year-training course in the Nanking Teachers' College (the present National Central University), in the Peiping Teachers' College, and in the Chengtu Teachers' College, and the extension of the two-year-training courses to three and four-year courses, (6) the organization of summer schools in Nanking, Hangchow, and other places, (7) the organization of the National Physical Education Association.

Recent Development of the National Program of Physical Education

Japan's constant threats to the territorial rights of China were one of the recent forces which made China "physical fitness" and "national unification" conscious. These threats kept accumulating until in September of 1931 when Japan's troops marched against Mukden, the capital of Manchuria. In the following summer the Chinese Ministry of Education called a national physical education conference in the
national capital, Nanking, to discuss a plan for the development and promotion of a national program of physical education. The seven-day convention produced a blueprint for a national program of physical education.

One immediate result of the convention was the holding of a national athletic meet the following year. The meet was sponsored by the Ministry of Education for the purpose of stimulating the interest of the people. A huge athletic field was constructed. It included a stadium with about thirty thousand seats, a swimming pool, a baseball field, a "national exercise" combative field, tennis courts, basketball courts, and volleyball courts. The plan was to hold a national athletic meet every two years in the large cities of different parts of the country to offer an incentive and an opportunity for stimulating widespread interest.

The municipal government of Greater Shanghai took the lead sponsoring the following national athletic meet in the central part of its recently built new native city. A magnificent athletic field of beautiful architecture was constructed. Many foreign guests were profoundly impressed by the careful organization of the meet and especially by the skill of the women athletes.

The following developments were also results of the convention of physical education held in 1932: (1) the appointment by the Ministry of Education of a national director of physical education and of a national physical education advisory committee; (2) similar appointments by the provincial and city bureaus of education; (3) the organization of physical education divisions in the Ministry of Education, and in the provincial and city Bureaus of Education; (4)
the sponsoring by the Ministry of Education of summer schools for the teachers in service; (5) the building of large athletic fields in several provincial capitals and of playgrounds in many cities; (6) the construction of a physical education curriculum for both primary and middle schools; (7) entrance in the World Olympic games in 1936;¹

¹ When China entered the World Olympic Games, she also sent a groups of experts, both men and women to demonstrate the "national exercise."

and (8) the sending of delegates to the International Recreation Congress in Hamburg and of a body of investigators to study physical education in some of the European countries in 1936.

When Western sports were first introduced into the schools of China, parents often objected to them for the following reasons: (1) physical activities were associated with the coolie class; (2) physical activities were considered harmful to health; (3) physical activities were thought to be a waste of time. Now the point of view toward physical activities is greatly changed. Parents look at physical activities as a means of exercising the body. The effort of the Chinese government in the promotion of a nation-wide program of physical education has caused a wide-spread interest in Western sports among the Chinese. Western sports are as natural to the Chinese children as they are to the Western children. This condition often surprises the foreign visitors in China, as shown by the following comment made by Antice, who tells us that Chinese boys participate in sports as eagerly as their foreign cousins, and that Chinese girls participate in sports as eagerly as do the boys. With physical education having been made an essential part of the school curriculum and with the co-operation of
the parents, the Chinese people have become definitely athletic conscious. Soccer matches frequently attract fifteen to twenty thousand spectators, both men and women; the national athletic meeting at Shanghai in 1935 drew a daily attendance of one hundred thousand. The enthusiasm for sport, continues Antice, "is a most hopeful portent for China's future."(1 p. 41)

The increased interest in physical education at all levels of the school system have, on the one hand, definitely marked an important period in the history of physical education in China and, on the other hand, augmented the already existing problems of the lack of an adequate number of well-trained teachers. If these problems can be solved, many related problems will also be solved. When leaders are scarce, there is always a lack of professional stimulation and inspiration to progress and improvement. This condition in turn results in an inferior curriculum of physical education.

Modern physical education has advanced from one stage to another with surprisingly high speed. At the conclusion of the war it should enter another stage of development. This new stage should be the stage of experimentation and teachers' training on a large scale.

Conclusion

The foregoing historical sketch of physical education in China has indicated:

1. Such activities as the Chinese "national exercise," archery, soccer, and dancing have occupied significant places in either the educational system or the life of the people. They can also contribute to the objectives of the physical education of China;
therefore they should not only be preserved but emphasized in the curriculum of physical education as implicated in the aim of education in China.

2. With the introduction into China of the physical education emphases of Germany and the United States, China has taken on many of both the strong and weak points of the emphases. Consequently, thorough examination of these "copied" procedures is desirable.

In short, China has her own needs and her own problems. To meet the needs and to solve the problems demand leadership and unceasing effort to seek an adequate foundation of facts through research, which was one of the items listed in the blueprint of the national program of physical education. So far, little has been done in this direction. Thus, the pertinence of the present study; certainly the post-war reconstruction projects in education and industrialization should mean that physical education in China will have the opportunity to proceed with experimentation and teachers' training on a large scale.
The Development of the Activities of the Ancient Physical Education*

Hwang-ti to Shang Dynasty (2967-1122 B.C.)
- Development of civilization in all fields.
- Archery
- Dancing
- Hunting
- Swordsmanship
- Tsu-chu
- Wrestling

Chou Dynasty (1122-249 B.C.)
- Educational system developed.
- Boxing ("national exercise")

Brilliant Epoch of Chinese civilization

Chin Dynasty (249-206 B.C.)
- Unification of China.
- Destruction of both books and military instruments and massacre of scholars.

Han Dynasty (206 B.C.-221 A.D.)
- Literary development in one generation and military emphasis in another generation.
- Known for its literary achievement.

Three Kingdoms 221-265 A.D.
- "Age of Chivalry"
- Fighting

Tsin Dynasty to Sui Dynasty (265-620 A.D.)
- A period of wealth, culture, literature, war, extravagance, etc.

Tang Dynasty (620-907 A.D.)
- Hunting among emperors.
- Wrestling continued.
- Archery on horseback.
- Swordsmanship by women.
- Tsu-chu modified rules like soccer.
- Polo introduced from India.

Further Development
- Archery as a branch of education.
- Archery meet.
- Charioteering as a branch of education
- Wrestling.
- Bare-handed wrestling in the army of Shih Hwang-ti.

Decline
- Swordsmanship.
- Horsemanship.
- Professional wrestler.
- Professional dancer

*Adopted from Physical Education in China, by Gunsen Hoh.
**The date of origin is unknown.
# The Development of the Activities of the Ancient Physical Education

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<td>Five Dynasties</td>
<td>Same as Tang Dynasty</td>
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<td>Swordsmanship continued. External boxing further developed-women experts.</td>
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<tr>
<td>(907-960 A.D.)</td>
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<td></td>
<td>Archery in military examination. Swordsmanship further developed-women experts.</td>
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<tr>
<td>Sung Dynasty</td>
<td>Age of philosophy</td>
<td></td>
<td>Hunting popular. Dancing by men and women in imperial ceremony. Archery on horseback.</td>
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<td>Yuan Dynasty</td>
<td>Military Achievement</td>
<td></td>
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<tr>
<td>(1280-1368 A.D.)</td>
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<td></td>
<td>Archery on ground and horseback. Swordsmanship. Weight lifting. These three events included in the military examination.</td>
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<td>Ming Dynasty</td>
<td>Literary examination elaborated</td>
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<td>Boxing prohibited in 1900.</td>
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<td>(1368-1644 A.D.)</td>
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<td>Ching Dynasty</td>
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Chapter III
FOUNDATION MATERIALS: PHYSIOLOGICAL

One of the objectives of physical education is to help promote the efficient functioning of the body. In some instances the realization of this objective may call for an exercise program which will maintain a given level of strength and endurance. In other instances it may call for the elimination of activities that are physiologically detrimental, or for the introduction of a program to enhance strength and endurance.

In this chapter the writer has endeavored to bring together both the experimental evidence and the controversial views in those areas of physiology which appear to have a bearing on curriculum construction for physical education in China. The reader is cautioned not to confuse the physiological facts and the suggested working assumption. As new discoveries are made, some of the physiologic assumptions, which now appear logically tenable, may have to be modified or even completely revised.

Skeletal Musculature

It is a well-known fact that exercise can bring about an increase in the size of skeletal muscles. This possibility is especially true of heavy exercise, such as gymnastics or weight lifting. The increase in muscle size is due to an increase of the volume of muscle cells already present, which increase in turn, is due to an increase in the amount of sarcoplasm.¹

¹ Human beings acquire their full number of muscle cells by about the sixth fetal month.
From the standpoint of physiology, the increase in the size of skeletal musculature is a concomitant histologic phenomenon of exercise. The primary objective in exercise is not to increase muscle mass but to strengthen the muscle sufficiently to enable the individual to perform adequately the work demanded of him.

Cardiovascular System

In an earlier day the term, "athletic heart," was applied to an unduly enlarged heart which was thought to have been caused by too much demand upon the heart muscle through participation in competitive athletics. This designation implied that a person who engaged in athletics developed a larger heart than he would otherwise have developed.

The question of the increase of the size of the cardiac muscle due to exercise has been much debated. The experimental evidence on men is still not conclusive. Most of the data appear to favor the theory of hypertrophy. Consequently the working deduction is made that the heart increases in size with strenuousness of exercise. Since exercise increases the size of the skeletal muscle cells and since the heart muscle is essentially the same as the skeletal muscle cells, similar principles apply to both.

The auricles of the heart are weak and thin walled, while the ventricles are stronger and heavier than the auricles. The right ventricular wall is of intermediate strength and thickness. The left ventricular wall which is stronger and thicker than the right ventricular wall, exerts a pressure of approximately 150 mm. of mercury, which pressure represents a considerable amount of work demanded of its fibers.

If a given individual has a normal heart, participation in
athletics may cause a harmless increase in the size of the heart. If, however, an individual's heart has been affected by such disease conditions as rheumatic fever, infected teeth, and recurrent tonsilitis, athletics may have an unfavorable influence on the heart.

Much has been written on the development of the heart of the child. Muffitt(53 p. 342) in a textbook discussion of the heart during adolescence has stated: "At the time of this rapid growth of the heart, there is a rather slower growth of the blood vessels, and so there is a greater blood pressure than could be wished, making the strain on the heart greater than it would otherwise be." This statement was apparently drawn from a study made by Beneke.(3) Karpovich(34) checked the study of Beneke on the ratio of the volume of the heart to the size of the blood vessels, and found that the areas of the cross section of the aorta and of the pulmonary artery showed a close proportionality to the volume of the heart at the different age levels. Karpovich's position was that the data of Beneke were correct, but had been misinterpreted by both Beneke himself and by others. Karpovich added that such an interpretation has created an unfounded fear among people and has also misled teachers of physical education. In his interpretation of the data of Beneke he has shown that there is no discrepancy between the development of the heart and the cross section of the largest arteries at the different age levels. Therefore, exercise should be gradually increased with age.

In the United States, studies of the influence of exercise upon the heart to date have yielded results which, although interesting and suggestive, are inconclusive. Wilce has called attention to the advisability of a more extended period of observation. This would
involve co-ordinated training systems at both high school and college levels, and co-ordinated observation and interest on the part of physicians, health administrators, and physical education personnel throughout the project period of study.\(^{(73)}\)

It is well known that training - systematic exercise performed for a period of weeks or months - causes several major physiologic changes in the cardiovascular system: (1) lowered pulse rate, (2) increase in stroke volume, (3) less fragile blood corpuscles, (4) increased coefficient of oxygen utilization, and (5) increased alkali reserve.

There has been a tendency on the part of some to assume that physical training alters the increase in heart rate due to exercise. However, it has been conclusively demonstrated that the increase in heart rate due to exercise remains about the same, regardless of the individual's state of physical training. What does happen is that since the resting rate becomes significantly lower with training, the maximum rate obtained from a standard exercise is less. If, however, the increase in rate is considered, this is found to vary but little with the state of physical training.\(^{(70)}\)

Experimentally it has been shown that there is a low correlation between the increase in heart rate due to exercise and the resting rate. Thus, in two trained individuals whose resting heart rate is fifty beats a minute, the same amount of exercise may result in an increase of sixty beats in one and of only twenty-five in the other. Nor may it be concluded from this that one heart is better than the other. What is of central importance is the type of response, not the amount of increase; that is to say, the criterion of the good heart is whether or
not there is an increase in rate promptly in response to exercise, and reduction in rate promptly after exercise.(70)

A common belief concerning the blood pressure of a trained person, also needs correction. There are many who assume that the blood pressure at rest of a trained person is lowered. Actually the blood pressure of an individual is relatively fixed, being affected only by profound changes such as occur with age or with certain morbidity states. Generally speaking, physical training does not modify this basic mechanism. Except for a few isolated cases, no significant changes in either systolic or diastolic blood pressure have been shown to result from physical training.

Women have on the average five hundred thousand fewer red blood corpuscles (10 per cent fewer) per cmm. of blood than males. It follows that women have two grams less of hemoglobin per 100 cc. of blood than men. The specific gravity of blood, therefore, is lower in women than in men.

According to a study made on Cambridge undergraduate men and on workhouse boys, a high specific gravity of blood is associated with a "good" physique and a low specific gravity with a "poor" physique.(23 p. 68)

Both young and adult women have higher pulse rates than do men because the size of women is smaller than that of men. Studies made on the physical efficiency of high school boys(68 p. 21) and of college freshman women(4 p. 22) showed that the ratio of the pulse rate after exercise to the normal pulse rate is higher in freshman women than in high school boys. In these investigations the relationship of the pulse ratio to the standardized ratio was given as an index of physical efficiency, which was higher in high school boys than in college.
freshman women; that is, the heart rate of the college freshman women increased more rapidly with the exercise and required a longer period to return to normal than that of high school boys.

**Respiratory System**

The effects of training on the respiratory system are: (1) increased breathing capacity, (2) increased time in breath holding, (3) greater absorption of oxygen per liter of ventilation, and (4) increase in alveolar absorptive surface.

Although training increases breathing capacity, it does not follow that breathing capacity is a basis for distinguishing the adequately trained individual from the untrained. As a matter of fact, the breathing capacity can be increased by the practice of deep breathing alone.

The increased time in breath holding is regarded by many not only as an index of respiratory development, but also as an index of good health. A trained person should be able to hold his breath for approximately seventy seconds.\(^{(70)}\)

Experiments in which healthy young men were subjected to prolonged periods of training have yielded no significant changes in resting respiratory rate. No changes have been found to occur regardless of the extent and effectiveness of the physical training program.\(^{(70)}\)

**General Motor Capacity**

No study has been made on sex differences at the different age levels in general motor capacity. The studies made on sex differences at the different age levels in some of the qualities which constitute the general motor capacity, such as motor educability, agility
and co-ordination, and power (force and speed), may give some indication concerning sex differences in general motor capacity. Sex differences in motor educability, as tested by the Iowa Revision of the Brace Test, (52 p. 55) in agility and co-ordination by the Burpee Test, and in power by the Sargent Jump (43 p. 361 and 362) are shown in the following table:

<table>
<thead>
<tr>
<th></th>
<th>Motor Educability</th>
<th>Agility and Co-ordination</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Iowa Revision of</td>
<td>Burpee Test</td>
<td>Sargent Jump</td>
</tr>
<tr>
<td></td>
<td>Brace Tests</td>
<td>in Number of Points</td>
<td>in Centimeters</td>
</tr>
<tr>
<td></td>
<td>Score Points</td>
<td>in Number of Times per Min.</td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>Girls</td>
<td>Boys</td>
<td>Girls</td>
</tr>
<tr>
<td>Elementary</td>
<td>24.6*</td>
<td>5.8</td>
<td>5.8</td>
</tr>
<tr>
<td>J. H. S.</td>
<td>27.7</td>
<td>6.0</td>
<td>5.8</td>
</tr>
<tr>
<td>S. H. S.</td>
<td>31.1</td>
<td>6.8</td>
<td>5.5</td>
</tr>
</tbody>
</table>

*These scores represent the average score.

The above table shows that: (1) in motor educability and power boys increase with age, and girls cease to increase at the end of the junior high school level; (2) in agility and co-ordination both sexes cease to increase at the end of the elementary level; (3) in motor educability girls exceed boys at the elementary and at the junior high school levels, and in power boys exceed girls at all school levels; and (4) in agility and co-ordination there are practically no sex differences. Boys exceed girls in power more at the senior high school level than at any other school level; this function alone may be sufficient to explain why boys exceed girls in general motor capacity. The conclusion may be drawn that general motor capacity increases, in the case of boys, with the advance of age during the school ages, in the case of girls, only to the junior middle school level.
Strength

It is recognized that strength is needed for the performance of work. According to an experiment by Weber, physiologic efficiency is temporarily lowered when a person taxes himself to the limit of his strength. Consequently, each individual should be trained to possess strength in excess of his customary daily requirement.\(^1\)

\(^1\) In China the number of middle-class people without servants is growing steadily because of the high cost of living and because of the decrease in the number of laborers due to the war conditions and to the fact that the government is popularizing mass education in an attempt to raise the status of the laboring class. Hence the number of middle-class people who require more strength than formerly to do the household labor is steadily increasing. Such a condition has already taxed the energy of many people who are accustomed to having most of their household labor done by others. If this class of people had developed more strength than the daily demands required, they would not have been so exhausted when they were forced to do their household labor.

Training (regular and progressive exercise) not only increases the strength of the skeletal muscle but also the strength of the heart. In short, it builds up physiologic resources which may be drawn upon in the case of an emergency. In this progressive development, the exercise should be so graduated as to be strenuous enough to make a demand on the organism which is always slightly greater than that of the previous normal exercise load.

It is known that the heart can make new adjustments in stroke volume and rate when the amount of work is gradually increased. Experiments have shown that after the heart rate and the stroke volume reach a constant value for a given amount of work, if the subject returns to a lighter load, his heart rate becomes less accelerated and the stroke volume greater than formerly for a similar amount of work.
Strength is an essential factor for speed. Other factors being equal, a person can perform strenuous activities with greater speed when he applies more force. The relationship of body strength to speed of muscular contraction is not a linear one; rather speed increases with the square root of strength. When a muscle contracts, a great amount of strength is needed to overcome the internal resistance. When more speed of contraction is desired, a larger number of muscle fibers need to be called into contraction. The more fibers that are called into action, the greater is the degree of the internal resistance. In other words, the proportional amount of the total possible force for external available work varies inversely with the velocity of movement. It follows that the available force rises as the rate decreases. Since too high a rate of contraction is disadvantageous to muscular efficiency, an increased amount of strength of individual fibers will be needed to minimize the handicap produced in any performance in which speed is either the goal or is highly desirable.

Power is the rate of work, or the product of force and speed. Certain physical activities, such as basketball, American football, sprint runs, jumps, and throws require more power than some other physical activities. Hence more strength is needed in such activities than is needed in activities which are based primarily on skill.

For the skillful execution of certain movement the specific co-ordination of various muscles are needed. If these muscles are not adequate for the task, extraneous muscles may be called into play and cause the movement to be unnecessarily awkward.

It is well established that at all ages from three years into adulthood the strength of the grip of the typical male exceeds that of the typical female. (50 p. 116) No study has been made on sex
differences in total strength at different age levels. Data on the
strength of different muscle groups in adults of each sex together
with data on the strength of the grip, the upper back and the leg at
the different age levels, indicate a general tendency that the develop­
ment of strength is timed differently in the two sexes. For instance,
the maximum adolescent acceleration in grip strength occurs more than
two years earlier in girls than in boys. Prior to the senior high
school level girls are close to boys in the strength of grip and upper
back. From the senior high school level to that of young adults, the
discrepancy increases steadily with the advance of age. (2 p. 152)

Ellis, referring to a study made by Kellog on two hundred
women, drew the conclusion that the flexors of the arm and the
pronators and the supinators of the forearm are the weakest, that
the abductors and the adductors of the thigh are the strongest, and
that the chest muscles and the back muscles are weak. (23 p. 289)

In a comparative study on the strength of men and women by
Kellog the data showed that the muscles of the lower extremities in
both sexes were more nearly equal in strength than the muscles of the
upper extremities and of the trunk.1 According to all the muscles

1 Personal communication of McCloy with Kellog.

studied, adult women have only 63.8 per cent of the strength of men
for every pound of weight.2 Brady's study on the strength of the grip,

2 Ibid.

the upper back, and the legs of children from the ages of eleven to
fourteen years showed that at the ages of eleven and twelve years the strength of girls was 82 per cent of that of boys per pound of weight; at the age of thirteen years the percentage rose to 84; and at the age of fourteen years it dropped to 82. (7 P. 9)

**Endurance**

Endurance may be defined here as the ability to sustain physical exercise above the steady state for a prolonged period. Many people have probably experienced the fact that endurance can be achieved by the extended practice of appropriate exercise, which demands an increase in the supply of oxygen and nutrition and the efficient removal of waste products.

No study has been made on sex difference in endurance at the different age levels. For the adult, sex differences in endurance were recently studied by Metheny. (51 P. 318) The subjects were seventeen trained college women and thirty untrained college men. Walking was used for moderate exercise, and running for strenuous exercise. In walking, both men and women performed the same amount of work per kilogram of body weight per hour for the same length of time. In running, both sexes did the same amount of work per kilogram of body weight per second, but the length of time was determined by the ability of the subjects to continue running. In walking, the sex differences in the physiologic reaction to exercise indicated that the cost of the physiologic exertion was higher in the women than in the men; in running, the men were able to continue twice as long as the women before reaching exhaustion. These facts, combined with the sex difference in the cost of physiologic exertion in walking, indicated that men were more fitted for strenuous work than women. In running,
the endurance of eight "best" trained women equalled in every way the performance of the ten "poorest" untrained men, and in walking, the former showed slightly greater fatigue than the latter.

Perhaps girls of average endurance should not be expected to perform long-distance running and swimming, while girls with endurance above average may be able to perform these events without exertion. It should not be overlooked, however, that certain studies indicate that moderate exercise practiced daily can cause a great increase in endurance through the adjustment of the respiratory and circulatory mechanism.

Strength helps a person to attain skill, as discussed under the section of strength, and skill in turn helps a person attain endurance. It follows, then, that endurance may be increased not only through a program of general exercise but also through specific attention to such co-ordination as will permit a given task to be accomplished with a minimum of wasted work.

**Menstruation and Related Problems**

**Menstruation**

Observations have been made on the various physiological changes (e.g., pulse rate, temperature, number of red corpuscles, blood and digestive acidity, muscular efficiency) during the menstrual period. The results of these studies are, for the most part, inconclusive. For instance, whether or not there are changes in muscular efficiency during menstrual period is not clearly known.

An experiment conducted on twenty-two women by the Industrial Fatigue Research Board showed that 41 per cent of these women were less efficient, 23 per cent remained the same, 36 per cent
Duntzer conducted an experiment on 111 women athletes; 45 per cent were less efficient during the menstrual period, 55 per cent showed no measurable decrease in physiological efficiency in their sports activities. In seven cases better records were made during the menstrual period. (18 p. 817)

Tuttle and Frey, using the pulse-ratio test on a number of college women, found that physical efficiency was higher during the pre-menstrual and the menstrual periods than during the period of post-menstrual and the period of rest. (69 p. 22)

In China the question of whether or not girls should undertake moderate exercise during their menstrual periods has not been considered to be a problem. The general practice has been to encourage moderate exercise during the menstrual period. The further question of whether girls should be allowed to participate in interscholastic competition during their menstrual periods has become a problem for teachers of physical education, for the girls themselves, and for the school. Some Chinese authorities in the field of physical education do not believe that girls should participate in interscholastic competition during this period.

Since the national, the provincial, and the local athletic meets are sponsored by the government, the public schools are encouraged to participate. The general regulation of the schools is that no girls may participate during the menstrual period; hence exclusion often creates a serious handicap to the team. When a girl is scheduled to play during the menstrual period, she is in a position which the Chinese proverb expresses as 遲退兩難, which corresponds to the American saying that the girl must make a
choice between the two horns of a dilemma - disregard the school regulation or withdraw from the team temporarily. She generally chooses to disregard the school regulation. Some teachers consider each case separately. Other teachers never permit the girls to participate during menstruation. This latter practice tempts some students to participate without reporting their menstrual condition to the teacher. If such cases are discovered later, the offending student is charged with breaking the school regulation. Such a position is difficult for the students as well as for the school administrators.

Since one of the purposes of the program of physical education and the national and the local athletic meets is to promote the physical well-being of those who participate, the elimination of all such temptations for breaking rules and possibly injuring health seems to be imperative. The first step toward such an attempt ought to be in the direction of finding out whether participation in interscholastic competition during menstruation is injurious to health.

Although there is evidence that moderate exercise during the menstrual period is beneficial, there is no evidence at present that strenuous competition during this period is either safe or unsafe. The writer may offer some of her own experiences with high school and college students in connection with this problem. Having been educated in the United States, she at first reluctantly let her students participate in interscholastic competition during their menstrual periods. However, for nine consecutive years she made use of the athletic meets and tournaments for her observation of the effects of the participation in interscholastic competition during the menstrual period. Her practice was to make adjustments according to the
individual conditions in relation to the situations occurring on the athletic field on that particular day, such as the type of activity, the degree of skill of the opponents, and the amount of the activity. In addition, use was made of the records of the college physician.

Although the writer has collected no systematic or controlled data concerning the effect of participation in interscholastic competition during the menstrual period, she has gained insight into the problem in the following ways: (1) experiences with her own students, (2) the watching and judging of the same athletes year after year, (3) informal interviews with many teachers of physical education, and (4) knowledge of the health of some athletes after their graduation from both middle schools and colleges. These experiences have led her to take the position that participation in interscholastic competition during the menstrual period is not, at least for the Chinese girls, detrimental to health under the following conditions; (1) if the health of the individual students at the time is good according to a physician's judgment, (2) if hygienic rules, such as those of sleep, nutrition, and regularity in health practices are observed, (3) if the teacher of physical education does her best to gain a thorough knowledge of the conditions of the athletic field in relation to the individual differences by close co-operation with the physician and constant observation of the situations of the athletic fields, and above all, (4) if the teacher of physical education, as well as the school authorities, have no desire to win at the expense of the health of the students. It must be made clear here that in China athletic meets and tournaments are so common that students do not take winning or losing very seriously; there is not much more emotional strain in athletic competition than in any other kinds of competition in other life situations.
Broader Aspects of Female Health

Although physical educators differ considerably as to what physical activities girls should engage in, on the whole they tend to limit girls' participation in certain athletics which they think may be harmful to the health of girls.

The writer, in a study, which was made in 1938, of the women's physical education program in five colleges and universities and in two high schools in the Bay area of California, found that track and field events were taught in only one institution. The reasons given for the exclusion were: (1) track and field events are too competitive; (2) some of the track events are too masculine, (3) track and field events have no carry-over recreational value, and (4) certain track and field events may have injurious effects on the growing heart and the pelvic organs of girls.

In Germany, track and field events are participated in more by girls than they are by girls in the United States. The "modern" physical education of China was derived from that of the United States and Germany. When certain types of problems arise in China, the physical educators sometimes tend to draw their conclusions from the philosophies of physical education of the countries in which they studied; as a result, China has often been the battlefield for American and German philosophies of physical education, particularly in the program of physical education for women. The battles stimulate some leaders in the field of physical education to search for the valid evidence.

The first and the second reasons given for the exclusion of track and field events in the program of physical education of the institutions of the Bay area of California were based upon such opinions as will vary with the time, the place, and the customs.
Therefore they will not be discussed. The third reason is correct as far as the recreational objective is concerned. Only the fourth reason, that certain track and field events have injurious effects on the growing heart and on the pelvic organs of girls, is within the concern of the present discussion. Among all the track events, two types of events are questioned by the majority of women physical educators: (1) jumping events, and (2) "long-distance" running events.

**Jumping Events.** Studies on the effect of jumping events on the pelvic organs of girls are scarce. One study made in the United States (44 p. 269) concluded that the female pelvic organs are well protected and that jumping events have no detrimental effect upon them, unless the organs have been previously either injured or infected. This conclusion was drawn from the following sources: (1) anatomical studies on female pelvic organs in various jumps, (2) gynecologic experiences concerning the jumping activities and the displacement of the uterus, and (3) an experimental study on landing shock for the female pelvic organs in various jumps. The shock in landing is negligible. The landing shock in the running broad jump is only as great as that of stepping off a stair 16.5 cm. in height.

**Running Events.** No study has been made concerning the maximum distance girls of average endurance should run. In China the longest distance for girls is the two-hundred-meter run. From the observation of athletes of school ages during successive years, and from interviews with many teachers of physical education/school physicians in China, the writer believes that the two-hundred-meter run is not harmful to female participants if their hearts are healthy."
As a judge at the end of a two-hundred-meter run, the writer found that Chinese girls did not have enough strength in the last fifty meters to overcome the inertia of the hips. It is not a settled question whether the run should be shortened or whether the girls should be trained to have more strength and run faster than they do.

It is generally believed that physical activities themselves, with the exception of such sports as football and wrestling, have no harmful effect on girls. However, the amount of the effort exerted by girls in physical activities should always be considered. This fact, of course, holds true with boys also.

Summary and Conclusion

It appears relevant to bring this chapter to a close in a two-edged manner. First, the major physiological materials, elaborated in the earlier section of this chapter, will be epitomized. Secondly, the opportunity for the curriculum of physical education to contribute to physiological health will be indicated and to some extent delimited.

Summary

Regular exercise improves the functions of the muscular, cardiovascular, and respiratory system, therefore, improves the capacity to work.

Although there are many factors constituting the physical efficiency of an individual, the efficiency of the heart as indicated by its prompt increase in rate in response to exercise and by its prompt return to normal rate after the exercise is over is a rather good index of the condition of the individual.

Study has shown that there is no discrepancy between the development of the heart and the cross section of the largest arteries
at the different school levels. The exercise should be gradually increased with age without any undue fear of the harmful effect on a NORMAL heart.

Any problem concerning the exercise and the heart should be referred to the school health service or physicians available.

Although studies made on motor capacity, strength, and endurance between boys and girls are either incomplete or absent, the studies available all imply that girls have less motor capacity, less strength, and less endurance. Whether these differences between the two sexes are entirely inborn or whether they are partly affected by the present program of physical education is not known. Further studies in China should be made with the increasingly intensified program of physical education as caused by the "physical fitness" consciousness of the people.

There is no need to determine the scope of physical activities for girls in China, for there is no evidence that any activity in which boys participate is not physiologically healthful for girls. According to the opinion of many people in the United States, girls should not participate in football and wrestling. Football, unlike other games, is not practiced at all in China among boys, and wrestling is not taught in the schools; therefore, these games are not concerns of the problem under consideration.

Since strength and endurance are needed in life and since they may be obtained through proper training, as specified in the discussion of this chapter, the curriculum of physical education should be given due attention to these qualities according to the needs of the individual with reference to the present conditions of China.
The question as to whether or not participation in interscholastic competition by Chinese girls is physiologically healthful cannot be settled, for there are no experimental studies available. However, the experience gained from the observation of many girl athletes in China seems to indicate that the individual health conditions and the various conditions of the athletic field should be considered before any fast rule is made as to whether participation in interscholastic competition during the menstrual period is healthful or not.

Physiological Health Through the Physical Education Curriculum

As shown in Chapter II, physical education was first introduced into China at the time of the "national humiliation" through foreign aggression and during the period of the decline in Chinese national power and political status. In order to prevent further internal deterioration and external aggression, China began to aim toward modernization, and toward the restoration of her national power. Western physical education was, therefore, warmly welcomed. In fact, for about forty years, physical education, whether of American or German origin, had a single meaning for the Chinese, namely "tsao-lien shen-ti" or "exercise of the body." When the new philosophy of physical education in the United States arose (that is, education through physical education), China adopted the new philosophy. She did not, however, abandon the purpose of "tsao-lien shen-ti," but simply broadened the purpose of her physical education. The new emphasis, therefore, did not cause much controversy among the professional leaders, and even at present the greatest emphasis is in the direction of the original purpose of exercise, or "tsao-lien shen-ti." This fact is shown by
the national program of physical education.

Statements are found, moreover, in the literature of Chinese physical education that health should not be an objective of physical education. The argument of the Chinese who object to health as an objective of physical education is that the mechanisms whereby specific immunity is built up are inherited and cannot be developed through physical exercise. Although there is no doubt concerning the validity of the reason cited, there is justification for believing that physical exercise may contribute to health in other ways. The controversy has arisen, undoubtedly, from the terms involved. The term "health" allows many interpretations and definitions. An equally vague term is that of "physical exercise."

From the standpoint of the use of physical education in the schools, the term "health" may be considered from two points of view; "negative health," or, simply, freedom from disease, and "positive health," or the increased functional capacity to work.

The teacher of physical education as such is not concerned with the relationship of exercise to the recovery from illness. Such therapeutic uses of exercise should always be under the supervision and direction of physicians. The teacher of physical education in the schools should insist that only such pupils are turned over to him as are adjudged by competent physicians to be in sufficiently good health to undertake the program. Pupils returning after an illness to the school physical education program should be certified for physical education classes by a physician. At present most of the schools in China cannot practice this. However, such regulations should be encouraged in the schools where there are school physicians.
The teacher of physical education endeavors to promote every aspect of constructive, hygienic living, and his exercise program is for the adequately healthy; its health implications are in the field of promoting what we call "positive health," or the capacity to function more efficiently.

While numerous individuals have stated that they feel that regular participation in moderate exercise increases their resistance to disease, no objective experimental evidence to this effect has been produced. Hence this aspect of the possible contribution of exercise to health will not be discussed.

The type of exercise is not of too great importance; all exercises of similar dosage have much the same physiologic concomitants. The physical activity program here proposed may be understood to mean: (1) programs of sufficient severity of dosage to stimulate the organisms to physiologic improvement up to the level deemed adequate for the life functions of the person considered; (2) programs not so severe at any time as to overtax the organism of the participant at the stage of his development; (3) programs progressively graded to the constantly improving functional capacities of the pupils.

As has been stated above, positive health implies more than freedom from disease; it means raising the functional capacities of normal organs and of the total organism. Among the possibilities may be listed the following:

1. Physiologic improvement of the functional capacities of the vital organs. It is generally accepted by physiologists that physical activities cause both histologic change in the vital organs and an adaptive alteration of their function.
2. Increasing the "margin of safety" in readiness to meet the emergencies of life—significantly more strength, endurance, and general vitality than are demanded by the ordinary tasks of everyday living. The physical activities stimulate the cardiovascular, respiratory, and hemic mechanisms to become more effective, and the skills learned cause the performance of a given amount to work to demand a smaller consumption of oxygen.

3. Improving the ability to work. This may be by an improvement in strength and endurance so that fatigue may be postponed. It may also be aided by an improvement in mental and emotional adjustments in order to remove the handicaps of poor habits of work or of poor emotional adjustment; or it may be by an improvement of the muscular development of the "key parts" of the body, such as the feet and postural muscles.

4. Development of certain aspects of mental health, such as a lack of feeling of inferiority because of inadequate physical development, dissipation of worries and nervous tension through regular participation in sports, and a general feeling of well-being.

From the foregoing discussion the conclusion may be drawn that physical activities are one of the means for the fulfillment of the requirements of good health, namely, exercising one's abilities, improving one's possibilities, using one's resources, and developing one's mind and body.

The proposition that physical activity is very probably one of the means of contributing to the positive phase of health should never be interpreted as meaning that physical activities are responsible for all of the contributions to health or that all kinds
of lacks of positive health are attributed to the lack of exercise.

The inclusion of health as one of the objectives of physical education simply means that physical education through the physical activity pro-
gram can make a constructive contribution to the positive aspect of health or to the ability to function and work more effectively.
Chapter IV

FOUNDATION MATERIALS: ANATOMICAL

Introduction

Do anatomical differences in body size or in proportionate relations of body segments, influence motor performance? In what respects does physical activity stimulate the growth of the body? Are there anatomical sex differences which should be taken into account in constructing a physical education curriculum for Chinese children and young adults?

Sex Differences in Body Size

Two restrictive conditions have been placed upon the treatment of sex differences in body dimensions. First, only those dimensions are discussed which are considered pertinent. Secondly, discussion is limited to the age period from six to early adulthood. Whenever possible, research findings on Chinese children are presented.

Among the studies made on Chinese children in China, the most recent and the most extensive study is that by Wu and Soong. This study includes the children of all parts of China and gives findings for stature, body weight, and sitting height.

Stature

The findings on average stature from Wu and Soong are shown in the following tabulation:
Table I

Stature of Chinese (Centimeters) (75 p. 363)

<table>
<thead>
<tr>
<th>Mean Age</th>
<th>Males Cases</th>
<th>Mean</th>
<th>Females Cases</th>
<th>Mean</th>
<th>Male Mean minus Female Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1238</td>
<td>108.5</td>
<td>882</td>
<td>107.2</td>
<td>1.3</td>
</tr>
<tr>
<td>7</td>
<td>1291</td>
<td>114.2</td>
<td>1045</td>
<td>113.6</td>
<td>0.6</td>
</tr>
<tr>
<td>8</td>
<td>1416</td>
<td>120.1</td>
<td>1095</td>
<td>118.4</td>
<td>1.7</td>
</tr>
<tr>
<td>9</td>
<td>1647</td>
<td>125.3</td>
<td>1333</td>
<td>124.6</td>
<td>0.7</td>
</tr>
<tr>
<td>10</td>
<td>1620</td>
<td>129.6</td>
<td>1239</td>
<td>128.0</td>
<td>1.6</td>
</tr>
<tr>
<td>11</td>
<td>1608</td>
<td>133.4</td>
<td>1091</td>
<td>132.8</td>
<td>0.6</td>
</tr>
<tr>
<td>12</td>
<td>1456</td>
<td>138.0</td>
<td>950</td>
<td>140.3</td>
<td>-2.3</td>
</tr>
<tr>
<td>13</td>
<td>1040</td>
<td>144.0</td>
<td>693</td>
<td>145.9</td>
<td>-1.9</td>
</tr>
<tr>
<td>14</td>
<td>527</td>
<td>151.9</td>
<td>381</td>
<td>149.6</td>
<td>2.3</td>
</tr>
<tr>
<td>15</td>
<td>307</td>
<td>158.8</td>
<td>213</td>
<td>152.6</td>
<td>6.2</td>
</tr>
<tr>
<td>16</td>
<td>209</td>
<td>163.4</td>
<td>53</td>
<td>154.6</td>
<td>8.8</td>
</tr>
<tr>
<td>17</td>
<td>215</td>
<td>165.4</td>
<td>52</td>
<td>155.1</td>
<td>10.3</td>
</tr>
<tr>
<td>18</td>
<td>264</td>
<td>166.3</td>
<td>37</td>
<td>155.5</td>
<td>10.8</td>
</tr>
<tr>
<td>19</td>
<td>462</td>
<td>166.4</td>
<td>58</td>
<td>154.8</td>
<td>11.6</td>
</tr>
<tr>
<td>20</td>
<td>641</td>
<td>166.8</td>
<td>115</td>
<td>154.5</td>
<td>12.3</td>
</tr>
</tbody>
</table>

These findings indicate a similar pattern of sex relationship in Chinese children to that found for White children, (e.g., Collins and Clark\(^{(15)}\)). In boys there is a period of slow growth between six and twelve years of age, a period of rapid growth from twelve to fifteen years, and a period of slow growth after fifteen years. The rapid growth begins and terminates two years earlier in girls than in boys.

In certain games sex differences in stature have been considered an important factor, and some of the official rules for the two sexes are different. For example, in China the net for girls' volleyball is set lower than that for boys'. This rule is soundly applied for children of the senior middle school\(^1\) and for adults.

\(^1\) Middle school in China corresponds to high school in the United States.
In the junior middle school the rule is not justified, for during this period the average girl is taller than the average boys, and immediately before and after the period the average statures for the two sexes are about the same. If Chinese children are to continue to learn volleyball in the junior middle school, as they have been, the present regulation concerning the height of the net requires modification. Certainly the net for boys' volleyball should not be higher than that for girls. Since the difference in mean stature between boys and girls is less than an inch (girls being the taller), probably the net should be of the same height for two sexes.

Moreover, during the junior middle school years, where other considerations are equal, boys and girls can well participate together in those physical activities in which height is an important factor. This fact also holds true in the senior middle school for girls taller than average for their sex and for boys of average stature for their sex.

Weight

The findings from Wu and Soong on average weight are as follows:
Table II
Weight of Chinese (Kilograms) (75 p. 363)

<table>
<thead>
<tr>
<th>Mean Age</th>
<th>Males Cases</th>
<th>Males Mean</th>
<th>Females Cases</th>
<th>Females Mean</th>
<th>Male Mean Minus Female Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1238</td>
<td>17.8</td>
<td>882</td>
<td>17.1</td>
<td>.7</td>
</tr>
<tr>
<td>7</td>
<td>1291</td>
<td>19.5</td>
<td>1046</td>
<td>18.5</td>
<td>1.0</td>
</tr>
<tr>
<td>8</td>
<td>1416</td>
<td>21.6</td>
<td>1095</td>
<td>20.8</td>
<td>.8</td>
</tr>
<tr>
<td>9</td>
<td>1647</td>
<td>23.9</td>
<td>1333</td>
<td>22.7</td>
<td>1.2</td>
</tr>
<tr>
<td>10</td>
<td>1620</td>
<td>25.4</td>
<td>1239</td>
<td>24.3</td>
<td>1.1</td>
</tr>
<tr>
<td>11</td>
<td>1608</td>
<td>27.5</td>
<td>1091</td>
<td>26.9</td>
<td>.6</td>
</tr>
<tr>
<td>12</td>
<td>1456</td>
<td>29.7</td>
<td>950</td>
<td>32.1</td>
<td>-3.2</td>
</tr>
<tr>
<td>13</td>
<td>1040</td>
<td>33.5</td>
<td>693</td>
<td>35.7</td>
<td>-2.2</td>
</tr>
<tr>
<td>14</td>
<td>527</td>
<td>39.9</td>
<td>381</td>
<td>40.8</td>
<td>- .9</td>
</tr>
<tr>
<td>15</td>
<td>307</td>
<td>44.6</td>
<td>213</td>
<td>43.3</td>
<td>1.3</td>
</tr>
<tr>
<td>16</td>
<td>209</td>
<td>48.8</td>
<td>53</td>
<td>45.6</td>
<td>3.2</td>
</tr>
<tr>
<td>17</td>
<td>215</td>
<td>51.0</td>
<td>52</td>
<td>48.3</td>
<td>2.7</td>
</tr>
<tr>
<td>18</td>
<td>264</td>
<td>52.7</td>
<td>37</td>
<td>50.3</td>
<td>2.4</td>
</tr>
<tr>
<td>19</td>
<td>462</td>
<td>52.9</td>
<td>58</td>
<td>48.1</td>
<td>4.8</td>
</tr>
<tr>
<td>20</td>
<td>641</td>
<td>54.0</td>
<td>115</td>
<td>48.8</td>
<td>5.2</td>
</tr>
</tbody>
</table>

The trend of sex differences in body weight of these Chinese children is similar to that for the stature; that is, the sexes alternately exceed each other. From the age of six to eleven years boys slightly exceed girls; from twelve to fourteen years girls exceed boys, and from fifteen years on, boys exceed girls again. The relationships are similar to those of Collins and Clark for White children.

It is pertinent to refer to the traditional belief that in combating contests and contacting games girls and boys should not participate together for fear the girls may be injured. Apparently during the junior middle school years there might better be a fear that the boys may be injured. Clearly, the girls exceed the boys in weight during this period. It is the writer's considered view that during the years from six to twelve are not sufficiently marked to segregate the sexes in combatative games.
Chest Girth

In the absence of dependable averages for chest girth on Chinese children, averages for White children are presented from Boynton.(6)

Table III

<table>
<thead>
<tr>
<th>Mean Age</th>
<th>Males (6 p. 84)</th>
<th>Females (6 p. 24)</th>
<th>Male Mean Minus Female Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cases</td>
<td>Mean</td>
<td>Cases</td>
</tr>
<tr>
<td>6</td>
<td>93</td>
<td>55.4</td>
<td>82</td>
</tr>
<tr>
<td>7</td>
<td>108</td>
<td>57.4</td>
<td>86</td>
</tr>
<tr>
<td>8</td>
<td>98</td>
<td>60.0</td>
<td>72</td>
</tr>
<tr>
<td>9</td>
<td>95</td>
<td>62.3</td>
<td>86</td>
</tr>
<tr>
<td>10</td>
<td>79</td>
<td>63.5</td>
<td>91</td>
</tr>
<tr>
<td>11</td>
<td>72</td>
<td>65.7</td>
<td>85</td>
</tr>
<tr>
<td>12</td>
<td>74</td>
<td>67.4</td>
<td>93</td>
</tr>
<tr>
<td>13</td>
<td>91</td>
<td>70.3</td>
<td>109</td>
</tr>
<tr>
<td>14</td>
<td>102</td>
<td>73.7</td>
<td>123</td>
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<tr>
<td>15</td>
<td>113</td>
<td>77.5</td>
<td>135</td>
</tr>
<tr>
<td>16</td>
<td>123</td>
<td>80.6</td>
<td>129</td>
</tr>
<tr>
<td>17</td>
<td>125</td>
<td>82.5</td>
<td>101</td>
</tr>
<tr>
<td>18</td>
<td>88</td>
<td>83.9</td>
<td>76</td>
</tr>
</tbody>
</table>

It can be seen from this tabulation that the average of the girth of the chest for boys exceeds that for girls at every age under consideration. The discrepancy between the two sexes is much greater after the age of thirteen years, than prior to this age.

It is commonly believed that the girth of the chest is associated with the size of the lungs, heart, and musculature on the trunk. That is, with increasing its girth of the chest there is thought to be a tendency to increasing size of heart and lungs, and to greater strength of the upper back and the chest. Although there is no study demonstrating such correlations, it does not appear unreasonable to make such a deduction. The smaller girth of the chest in girls than in boys may account for the lower physical efficiency in girls than in boys.
Shoulder Width

Averages for the width of the shoulders (bi-deltoid diameter) are presented from Boynton for girls\(^6\) and Meredith for boys\(^{47}\).

Table IV

<table>
<thead>
<tr>
<th>Mean Age</th>
<th>Male Mean (47 p. 17)</th>
<th>Female Mean (6 p. 15)</th>
<th>Male Mean Minus Female Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>268 26.7</td>
<td>143 26.9</td>
<td>0.8</td>
</tr>
<tr>
<td>7</td>
<td>612 27.7</td>
<td>182 27.0</td>
<td>0.0</td>
</tr>
<tr>
<td>8</td>
<td>472 29.0</td>
<td>163 28.0</td>
<td>0.1</td>
</tr>
<tr>
<td>9</td>
<td>459 30.0</td>
<td>168 29.3</td>
<td>0.7</td>
</tr>
<tr>
<td>10</td>
<td>356 31.1</td>
<td>173 30.4</td>
<td>0.6</td>
</tr>
<tr>
<td>11</td>
<td>360 32.0</td>
<td>172 31.6</td>
<td>0.4</td>
</tr>
<tr>
<td>12</td>
<td>328 33.1</td>
<td>176 33.1</td>
<td>0.0</td>
</tr>
<tr>
<td>13</td>
<td>338 34.2</td>
<td>148 34.5</td>
<td>-0.3</td>
</tr>
<tr>
<td>14</td>
<td>332 35.3</td>
<td>128 35.6</td>
<td>-0.2</td>
</tr>
<tr>
<td>15</td>
<td>372 37.3</td>
<td>135 36.2</td>
<td>1.1</td>
</tr>
<tr>
<td>16</td>
<td>335 38.7</td>
<td>117 36.3</td>
<td>2.4</td>
</tr>
<tr>
<td>17</td>
<td>286 39.9</td>
<td>113 36.4</td>
<td>3.5</td>
</tr>
</tbody>
</table>

The opinion has been expressed in Chinese literature on physical education that the width of the shoulders is related to achievement in throwing events. The belief is that girls have narrower shoulders than boys, and, consequently, have a shorter available radius in angular movements and are at a disadvantage in throwing events.

While the general belief that the width of the shoulders is greater in boys than in girls holds for the years from six to ten and from fifteen years on, it clearly does not hold between eleven and fourteen years. It is still an open question as to whether the fairly pronounced discrepancy between the two sexes above fifteen years of age is an anatomical sex difference which necessarily results in a difference in achievement in throwing events.
**Hip Width**

Averages for width of hips (bi-iliae diameter) are presented on White children from Boynton.\(^{(6)}\)

**Table V**

<table>
<thead>
<tr>
<th>Mean Age</th>
<th>Males (6 p. 82)</th>
<th>Females (6 p. 14)</th>
<th>Male Mean Minus Female Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cases Mean</td>
<td>Cases Mean</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>82 19.1</td>
<td>69 18.6</td>
<td>.5</td>
</tr>
<tr>
<td>7</td>
<td>87 19.8</td>
<td>74 19.7</td>
<td>.1</td>
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<td>8</td>
<td>75 20.6</td>
<td>58 20.5</td>
<td>.1</td>
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<td>9</td>
<td>81 21.4</td>
<td>71 21.1</td>
<td>.0</td>
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<td>10</td>
<td>65 22.2</td>
<td>72 21.9</td>
<td>.3</td>
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<tr>
<td>11</td>
<td>58 22.7</td>
<td>71 23.0</td>
<td>-.3</td>
</tr>
<tr>
<td>12</td>
<td>60 23.4</td>
<td>74 24.3</td>
<td>-.9</td>
</tr>
<tr>
<td>13</td>
<td>51 24.5</td>
<td>92 25.8</td>
<td>-1.3</td>
</tr>
<tr>
<td>14</td>
<td>93 25.6</td>
<td>106 26.9</td>
<td>-1.3</td>
</tr>
<tr>
<td>15</td>
<td>105 26.6</td>
<td>117 27.7</td>
<td>-1.1</td>
</tr>
<tr>
<td>16</td>
<td>115 27.5</td>
<td>111 28.1</td>
<td>-.6</td>
</tr>
<tr>
<td>17</td>
<td>118 27.9</td>
<td>69 28.3</td>
<td>-.4</td>
</tr>
<tr>
<td>18</td>
<td>82 28.1</td>
<td>65 27.9</td>
<td>.2</td>
</tr>
</tbody>
</table>

It has been believed that the wider the width of the hips in girls produces slower leg-swinging movements. The explanation has been that the long radius from the center of motion reduced the angular velocity of the motion. However, only between about twelve and fifteen years of age does the width of the hips (i.e., the innominate bone) appear to be appreciably greater in girls than in boys. Even at these ages the sex discrepancy does not seem marked enough to produce greater inertia upon the reaction of the swinging motion of the legs of girls. Probably the fat pads of older girls which develop over the innominate and upper femur bones play a much more significant role in adding inertia to the swinging of the legs than do sex differences in skeletal hip width.
**Leg Length**

Sex differences in leg length have been studied on White children by Meredith.\(^{(49)}\)

**Table VI**

Length of Leg (Centimeters)\(^{(49} p. 136)\)

<table>
<thead>
<tr>
<th>Mean Age</th>
<th>Males Cases</th>
<th>Males Mean</th>
<th>Females Cases</th>
<th>Females Mean</th>
<th>Male Mean Minus Female Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>113</td>
<td>56.1</td>
<td>107</td>
<td>56.4</td>
<td>-0.3</td>
</tr>
<tr>
<td>8</td>
<td>107</td>
<td>59.9</td>
<td>100</td>
<td>59.5</td>
<td>0.4</td>
</tr>
<tr>
<td>9</td>
<td>103</td>
<td>63.4</td>
<td>95</td>
<td>65.0</td>
<td>1.6</td>
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<tr>
<td>10</td>
<td>105</td>
<td>66.2</td>
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<td>0.1</td>
</tr>
<tr>
<td>11</td>
<td>96</td>
<td>69.0</td>
<td>113</td>
<td>69.7</td>
<td>-0.7</td>
</tr>
<tr>
<td>12</td>
<td>90</td>
<td>72.0</td>
<td>120</td>
<td>72.9</td>
<td>-0.9</td>
</tr>
<tr>
<td>13</td>
<td>103</td>
<td>75.5</td>
<td>114</td>
<td>75.1</td>
<td>0.4</td>
</tr>
<tr>
<td>14</td>
<td>158</td>
<td>79.2</td>
<td>154</td>
<td>76.5</td>
<td>2.7</td>
</tr>
<tr>
<td>15</td>
<td>163</td>
<td>80.9</td>
<td>165</td>
<td>76.5</td>
<td>4.4</td>
</tr>
<tr>
<td>16</td>
<td>172</td>
<td>82.5</td>
<td>155</td>
<td>76.6</td>
<td>5.9</td>
</tr>
<tr>
<td>17</td>
<td>154</td>
<td>83.2</td>
<td>152</td>
<td>76.5</td>
<td>6.7</td>
</tr>
</tbody>
</table>

It will be seen that up to the age of thirteen years there are no appreciable differences between boys and girls in leg length. At ages above thirteen the differences between the two sexes in leg length may relate to marked differences in achievement in such activities as sprinting, high jumping, and broad jumping.

**Transverse Measurements of the Upper and Lower Extremities**

In average girth of the upper arm boys slightly exceed girls at all ages with the exception of the period from the age of ten to fourteen years. Boys slightly exceed girls in average girth of the forearm at every age under consideration. Similarly in the width of the elbow boys slightly exceed girls at every age under consideration.

For the lower extremity, girls exceed boys in girth of the thigh at every age under consideration. Probably this larger measurement in girls than in boys is due to the fat pads on the
thighs of girls. In the girth of the calf boys and girls are nearly equal to each other. In the width of the knee boys exceed girls in every age under consideration. However, the discrepancy between the two sexes in this measurement is smaller than that of the width of the elbow.

It will be readily recognized that the three transverse measurements of the leg of girls approach or exceed those of boys to a greater extent than the three parallel measurements of the arm on each sex. The strength of the legs for girls also approaches that of boys more nearly than does the strength of the arms for each sex. These sex relationships may be significant. Since girls are apparently built more ruggedly in the legs than in the arms, they should be able to participate in those activities which require leg strength to a greater extent than is generally thought.¹ Soccer and "competitive walking," which have been always considered in China to be the physical activities for boys could probably be introduced to girls in good health without harm.

Size of the Heart

While several studies have been made on the size of the normal heart, there is not yet agreement regarding which measurements best represent the organ. It is generally believed that the heart of the typical woman is smaller than that of the man. The same relationship may hold for children.

Much has been written on the possible effect of physical

¹ These facts and relationships were first integrated by McCloy.
activities on the heart of the child at different age levels. These studies have usually been based on a ratio of a measurement of the heart to a gross measurement of the external body.

Since the determination of the size of the normal heart is not well established, it appears futile to go into a discussion of the possibly favorable or unfavorable effects of physical activities on the normal heart. No more will be attempted than to correct a false though common belief about the effect of physical activities on the heart.

A number of years ago, Holt presented a table on the ratio of the heart to the weight of the body.(29 P. 557) He neither explained nor in any way interpreted this table. Elsewhere in the literature of both the United States and China this table has been referred to with the conclusion that the ratio of the weight of the heart is the smallest at the age of seven years and that, therefore, physical activities at that age should not be strenuous. Ratios obtained using Scammon's data on the weight of the heart and Meredith's data on the

1

Personal communication, Scammon to McCloy.

weight of the body do not agree with Holt's ratios. Moreover, since the ratio of the weight of the heart to the weight of the body has not been certified as valid an indicator of the condition of the heart, it obviously should not be used in an attempt to determine whether or not strenuous physical activities are favorable or unfavorable at certain age levels.
Several studies have been made on the influence of the program of physical activities on the physical growth of school boys. Pryor (57) has made a very careful study of this problem. He selected four hundred children of similar racial stock from the homes of similar socio-economic standards. The ages ranged from thirteen to seventeen years. Two hundred of them from one school had an eight-year program of physical activities, and the other two hundred from another school had only a one-year program of physical activities. The eight-year program consisted of marching, calisthenics, apparatus, mat work, tumbling, games, relays, rhythm, and intramurals; and in addition to this the high school children had swimming and interscholastic athletics. Prior to the organization of the program of physical activities in the school of the last mentioned group, the children participated in interscholastic competition.

Pryor found that the program of physical activities affected weight, but not stature or a variety of other measurements of lengths, breadths, and circumferences. The stature and weight of both groups are shown in the following tabulation:

<table>
<thead>
<tr>
<th>Age</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>Mean</td>
<td>Cases</td>
<td>Mean</td>
<td>Cases</td>
<td>Mean</td>
</tr>
<tr>
<td>8 P.E.*</td>
<td>36</td>
<td>62.3</td>
<td>40</td>
<td>64.2</td>
<td>43</td>
</tr>
<tr>
<td>1 P.E.**</td>
<td>39</td>
<td>61.0</td>
<td>38</td>
<td>63.3</td>
<td>41</td>
</tr>
</tbody>
</table>

Mean Weight (Pounds)

<table>
<thead>
<tr>
<th>Age</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>Mean</td>
<td>Cases</td>
<td>Mean</td>
<td>Cases</td>
<td>Mean</td>
</tr>
<tr>
<td>8 P.E.*</td>
<td>36</td>
<td>99</td>
<td>40</td>
<td>109</td>
<td>43</td>
</tr>
<tr>
<td>1 P.E.**</td>
<td>39</td>
<td>95.2</td>
<td>38</td>
<td>99.7</td>
<td>41</td>
</tr>
</tbody>
</table>

*Group had eight-year program of physical education
**Group had one-year program of physical education
Pryor found that only the differences in weight at the age of fourteen years were statistically significant.

A second available study on the effects of a program of physical activities with adolescent boys is that of Schwartz. The ages ranged from thirteen to seventeen years. The children of the two groups are comparable in maturity, body build, and racial stock. The experimental group had heavy work in the physical education class while the control group was required to sit quietly and to take as few outside physical activities as possible. At the end of four months the following results were given:

**Average Gain in Stature (Inches)**

<table>
<thead>
<tr>
<th>Age</th>
<th>14 and less</th>
<th>15</th>
<th>16</th>
<th>17 and more</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>Gain</td>
<td>Cases</td>
<td>Gain</td>
<td>Cases</td>
<td>Gain</td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
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<td>-------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Experimental</strong></td>
<td>12</td>
<td>1.1</td>
<td>24</td>
<td>0.9</td>
<td>20</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td>6</td>
<td>.8</td>
<td>12</td>
<td>.9</td>
<td>10</td>
</tr>
</tbody>
</table>

**Average Gain in Weight (Pounds)**

<table>
<thead>
<tr>
<th>Age</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>Gain</td>
<td>Cases</td>
<td>Gain</td>
<td>Cases</td>
<td>Gain</td>
<td>Cases</td>
<td>Gain</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
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<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td><strong>Experimental</strong></td>
<td>4</td>
<td>3.5</td>
<td>8</td>
<td>3.1</td>
<td>24</td>
<td>3.0</td>
<td>20</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td>2</td>
<td>1.0</td>
<td>4</td>
<td>2.0</td>
<td>12</td>
<td>4.1</td>
<td>10</td>
</tr>
</tbody>
</table>

This experiment showed that the program of physical activities affects both the weight and the height slightly.

Rowe has made two similar studies on junior high school boys. In one study extending over a period of four months an experimental group of boys in the class of physical activities increased more in weight (although not in stature) than did a control group not subjected to the class, as shown in the following tabulation:
Average Gain

<table>
<thead>
<tr>
<th>Group Engaged in</th>
<th>Stature (Inches)</th>
<th>Weight (Pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular Class of P.E.</td>
<td>.99</td>
<td>4.9</td>
</tr>
<tr>
<td>Group Excused from Regular Class of P.E.</td>
<td>.93</td>
<td>3.8</td>
</tr>
</tbody>
</table>

In the other study of Rowe, the period of study was a year, and there were three groups: one group took gymnastics, another took swimming, and the third was excused from physical activities. The group which took gymnastics showed the greatest increase in weight. The group which took swimming did not increase as much in weight or stature as did the excused group.

Average Gain

<table>
<thead>
<tr>
<th>Group</th>
<th>Stature (Inches)</th>
<th>Weight (Pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gymnastics Group</td>
<td>1.2</td>
<td>8.9</td>
</tr>
<tr>
<td>Swimming Group</td>
<td>1.1</td>
<td>6.7</td>
</tr>
<tr>
<td>Excused Group</td>
<td>1.2</td>
<td>7.5</td>
</tr>
</tbody>
</table>

While there is evidence that certain curriculum of physical activity may influence weight, further studies are needed on the influences of physical activities on other aspects of the body.
Chapter V

FOUNDATION MATERIALS: PSYCHOLOGICAL AND SOCIOLOGICAL

Do the interests of the child in physical activities follow a definite pattern of change with advance in age? To what extent should the curriculum of physical education follow the interests of the child; and to what extent should new interests for the child be developed through the curriculum? Are many of the results of interest studies made in the United States applicable to China? Should or should not co-recreation be provided for in the curriculum of physical education in China? To what extent should the curriculum of physical education in China stress recreational objectives? It is the purpose of this chapter to bring together materials relating to these questions.

While the present chapter is concerned with psychological and sociological data which pertain especially to those activities that have a place in the curriculum of physical education, it will be helpful at the beginning to give broad consideration to the concepts "play" and "recreation." What is play? Does play differ from recreation? Why do people engage in recreational pursuits? These are questions for which adequate answers are not available. Although many attempts have been made to explain play and to define recreation, none of the results appear completely satisfactory. In this connection, the following quotation from Lehman (38 P. 7) is pertinent:

"Play is the result of so many variables, it appears so commonly and in such a variety of forms, it involves such a large number of those elements of which the ego is compounded, and its results are so subtle and so far-reaching, that any definition of explanation necessarily must be partial and incomplete. Play has an almost unlimited number of aspects. The better-known theories of play have been criticized not so much because of their lack of validity but because of
their incompleteness. The whole truth regarding play cannot be known until the whole truth regarding life itself is known, for play is not an isolated phenomenon; it cannot be satisfactorily explained apart from its background, that is to say, apart from other phenomena."

Owing to this lack of full understanding, the word, "recreation," like that of "play," has been given a variety of definitions, and the viewpoints and emphases of recreational leaders differ widely. Most workers agree that recreation, or play, consists of activities which are pursued for their own sake (this, of course, does not deny that the activities may yield other benefits than personal enjoyment). It is also generally acknowledged that play, or recreation, encompasses a wide range of activities from highly vigorous participation in sport and games to reading fiction, listening to music, or watching a movie.

In China the word, "recreation," implies playful activities, and most of the activities in the physical education curriculum constitute forms of play.

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Recreation as a Human Need

All human beings seek an outlet for enjoyment and self-expression. This may be observed in the sports, dances, music, art, and drama of all cultures.

In China, playful activity has been considered an "extra," not a necessary form of life activity. There has been no philosophy which placed emphasis on the psychological or the sociological value of recreation. The Chinese, however, enjoy recreational outlets just as any other people. For instance, many of the poor people in China, although not earning enough to provide for necessities, have sought pleasure fulfillment through gambling and a variety of recreational activities of similar quality. It appears that recreation is a need
of human beings, old or young, rich or poor. Butler has succinctly expressed this common human need. (9 p 10)

It is the writer's position that recreation should be one of the objectives of physical education in China. While few would disagree with this, many would make it only a minor objective. A few Chinese physical educators feel that recreation should not be as important an objective of physical education in a country of low economic status as in a prosperous country. These educators take the view that the laborers in the United States, with their shorter working periods and higher wages than those of Chinese, can well participate in more recreation than the laborers in China, who must work long hours to earn enough to obtain "a bowl of rice." It should be pointed out to these Chinese educators that the amount of leisure time and financial margin are only secondary factors to the people's need for recreation. The primary reason for an emphasis on recreation is that recreation offers an opportunity for enjoyment and an outlet for self-expression.

The objectives of all education should be based upon the needs of the individual and the society. Physical educators should share the responsibility with others to work toward the raising of the standards of living of the masses so that the fundamental recreational needs of the people can be met through a well-organized curriculum of physical education. When physical educators neglect the recreational objective, they fail to shoulder their full educational obligation.

Recreation takes many forms, both constructive and destructive. The school program should, therefore, include both work and recreation. If recreation is included in education, children and young people will
have opportunity for participation in constructive recreations. (40 p. 17)

This statement may be sufficient to answer the question raised by some people, "Since play is spontaneous, why should the curriculum of physical education give attention to recreation?"

Another question which has been raised is, "Should the curriculum of physical education provide for adult recreational activities?" For an intelligent answer to this question two points must first be made clear; one from the philosophy of education in general and one concerning the scope of recreation in the curriculum of physical education.

Since the aim of education is to prepare individuals for both the present and the future, the curriculum should provide an opportunity for students to master the techniques of adult recreational activities. The national program of physical education should also supply leadership in establishing wholesome adult recreations in specific communities and in society at large.

Recreation includes sports, music, dancing, drama, art handicraft, and the like; physical education contributes to recreation only in a limited area, that of physical activities. In other words, physical education can make a definite contribution to recreation, but it does not include all the phases of recreation. Clear recognition of the recreational function of physical education is considered crucial to the construction of an adequate curriculum of physical education. This recognition guides the curriculum committee to organize the curriculum in a definite direction, that is, toward forming in children the habit of participating in wholesome physical activities in childhood and adulthood.
Contributions of Recreation

Recreation contributes to many aspects of the life of an individual and the group. Only selected examples of its major contributions which are significant to the present conditions in China will be discussed.

Recreation and Morale

The word, "morale," has been variously defined. It is generally considered to involve those aspects of personal and group adjustment which are conducive to mental poise and social solidarity. Hence morale is related to mental health. Menninger and Menninger in their article on "Recreation for Morale" wrote that since planned recreation is therapeutically useful, it can also be prophylactic. Group play, for example, is one of the best methods for the prevention of disturbed morale, for it diverts antagonisms and hatred into healthy aggressive outlets. 

Although the Chinese people as a nation have geared their morale to a high standard level over the last seven years, the children brought up during this period of war have suffered many handicaps (such as malnutrition, unhygienic living, nervous strain under constant bombing, loss of home and loss of parents). Their daily experience is destruction, privation, and insecurity, which often are some of the causes of poor mental health and low morale.

Recreation and Reduction of Delinquency

The sociological studies made by Shaw have shown that economic condition, community background, proximity of large industries, and mixture of different cultures are all related to the difficulty of
effective social control and may operate to increase the rate of delinquency. Furthermore, an environment with a high delinquency rate has an unfavorable influence on the non-delinquent children, because delinquent patterns are transmitted just as other social patterns. (61 p. 189; 62)

Although there may be other ways to reduce delinquency, surveys and observation have shown that recreation contributes to the reduction of delinquency. Butler reported that: (1) Sheldton T. Glueck and Eleanor T. Glueck had shown that among 500 delinquent women only 9.7 had had opportunities for constructive recreation, (2) out of a group of eight boys who previously had done $300,000 worth of damage and committed 470 crimes and who over a three-year period had been organized into a Ranger's athletic club under a competent leader, only two had been brought into court - and one of them was proved to be a mental case, (3) the view of probation officers, police officials, and prison authorities is that many cases of delinquency are due to inadequate opportunity for recreation and that the records of juvenile courts afford strong evidence that wholesome recreation has definitely beneficial effects on delinquent children. (9 P. 20)

A recent study made by the Chicago Recreation Commission on 15,000 boys and 8,000 girls ten to seventeen years of age in five Chicago neighborhoods has confirmed the fact that recreation has a definite effect on the reduction of delinquency. Findings are:

1) "Delinquents do not take part in supervised recreation in as large proportion as non-delinquents, and when they do, they prefer competitive sports and non-supervised activities like the 'games room'." (2) "Participation in supervised recreation reduces juvenile
delinquency. Delinquents who did not take part in supervised recreation during the year became repeaters 30 per cent more often than those who did take part." (3) "The proportion of non-delinquents who did not participate in recreation but who became delinquent during the year was three times as high as the similar rate for non-delinquents in the recreational program." (16 p. ix) It seems undeniable that recreation has a definite relationship to delinquency.

After World War I there was a great increase in delinquency in the United States. (32 p. 1) The present war has already begun to bring about a similar increase in juvenile delinquency. According to J. Edgar Hoover, the discontinuance of programs of recreation is one of the causes of this delinquency increase. (33 p. 1)

Although no data are available concerning the increase in delinquency in China,¹ no doubt the rate of increase is high and probably it will be still higher following the war. Hence recreational activities should be emphasized in the curriculum of physical education in the form of "out-of-school activities," for example, intramurals organized by the athletic association.

It should be remembered that after the conclusion of war many of the conditions which foster poor morale and delinquency will not discontinue and recreation will still be needed for its contribution to the maintenance of morale and to the reduction of delinquency.

¹ The writer has communicated with the Division of Science, Education, and Art of the State Department of the United States, Washington D.C., and the Chinese News Service, New York, and various Chinese sociologists in this country.
Economic Reconstruction and Recreation

Although it is very difficult to prophesy what the economic conditions of China will be after the war, most of the opinions expressed, whether by the Chinese Government or by the economists have been based upon the Plan of the National Reconstruction as designed by Dr. Sun Yat-sen, which includes morale reconstruction and material reconstruction. (65)

In order to insure the livelihood of the masses, industrial development is one of the essential measures of economic reconstruction. (66 p. 441) Generalissimo Chiang Kai-shek has stated emphatically that the long waged war has proved that industrial development is indispensable to the national defense of China and that Dr. Sun's Plan for Industrial Development remains the most comprehensive statement of national policy. (11 p. 202) Fong, a noted economist, has written that "China's contribution to world peace after the war must lie in her own rejuvenation as a modern industrialized nation, able to defend herself against foreign aggression and thus to serve as a stabilizing factor in the preservation of freedom and democracy in the Far East." (25 p. 2)

The present war, in spite of its immense destruction, has added much impetus to the projects of reconstruction already underway before the outbreak of the war. This is seen by the following facts;

(1) The Chinese Government has been making an effort to train as many Chinese experts as possible in science and engineering. Of the Chinese students in the United States 36.5 per cent are working in the field of engineering and 26.1 per cent in the field of science. (63)

(2) Although transportation between the United States and China is
restricted, students are being sent to this country to study in fields which are essential to the program of reconstruction.

As China moves in the direction of industrialization, she, like the Western countries, will probably have to face some of the disadvantages as well as the advantages of industrialization. The present discussion is concerned with how recreational activities can prevent some of the disadvantages.

A study of the history of industrialization shows also how commercial recreation developed. The results of industrialization, as far as their effects on recreation are concerned, appear to have been twofold: an increase in the amount of leisure time and an increase in the purchasing power of the masses. These two factors stimulated the desire of the people for amusement, to which desire commercial recreation was quick to cater with a wide variety of recreational commodities, both good and bad. In 1930 the total bill for recreation in the United States was ten billion dollars; only three per cent of this amount represents the effort of society to provide more wholesome recreations. Ninety-seven per cent of this amount was spent for various forms of commercial recreation, which represents in large measure inadequate recreation.

If there is to be any profit from a study of history, China should note carefully the needs which were concomitant to the development of industrialization in the United States and make an effort to meet these needs. This means that the Chinese government, through the schools and other community agencies, should make adequate provision for wholesome recreation which will keep pace with the advance of industrialization. According to Lindeman, any nation, especially an
industrial nation, which does not find ways for people to use their leisure positively will have a cultural deficit. (41 p. 15)

The combined efforts of various fields are needed to institute such a social program. To share the responsibility of promoting this program, the national program of physical education in China has three related functions: (1) to provide ample opportunity for the children to get sufficient recreation through a well-organized program of physical education, (2) to prepare children to appreciate the use of physical activities as constructive recreation and (3) to promote recreation in the form of physical activities in the recreation program of the community so that such recreation facilities will be available beyond school ages.

Interest in Various Recreational Activities

Studies of participation in recreational activities for both children and adults show that there are common interests at different age levels in all sections of the United States. Lehman studied the "Psychology of Play Activities," utilizing over ten thousand boys and girls ranging in age from eight years to early adulthood. He found that among a list of two hundred activities selected for the study, the following were the activities most commonly engaged in by all the ages studied: reading the Sunday "funny" paper, newspapers, magazines, and books; listening to the radio; riding in an automobile; and, going to movies. (38 p. 51) A parallel study made by Dimock, on two hundred adolescent boys drawn from classes and clubs of the Y.M.C.A. and churches, showed similar results. (19 p. 39)

A study on the recreational activities of five thousand men and women of various occupational groups, and for the most part
living in cities, was reported by the National Recreation Association. (39 p. 1) As in the investigations by Lehman and by Dimock, it was found that inactive recreation, such as reading, listening to the radio, conversation, auto-riding, visiting, and going to the movies were the most commonly occurring activities.

Similar studies were carried out on college women of about a dozen institutions of the Midwest (67) and graduate men and women attending the State University of Iowa. (24) The results were similar to those obtained previously. It is important to note that in all the foregoing studies the subjects expressed a DESIRE to participate more in outdoor recreational activities.

It is striking to find that for five different samples and for various parts of the United States, there accrues a common pattern of favorite recreation. Such a unanimous result indicates that the recreational activities of America are greatly affected by environmental provisions. If similar studies were made in China, the results would undoubtedly show that the most recurrent recreational activities would be different. Since environmental provisions are apparently forceful determining factors, the curriculum of physical education of China should share the responsibility for helping provide attractive environmental facilities for recreation, and the responsibility for helping interest children in carrying on wholesome physical activities into adult life.

The fact that the foregoing studies reveal that the curriculum of physical education has made little contribution to adult recreation, should not detract from the fact that it has contributed to character training, health, motor skills, and recreational enjoyment
at the school ages nor should it deter the curriculum from emphasizing sports.

Sports are an excellent form of recreation for children because (1) they offer an opportunity for big-muscle activities, (2) they have an inherent appeal to children, and (3) their organization involves group enterprises, which are believed to be highly valuable in personality development. Besides sports, however, the curriculum of physical education should provide an opportunity for Chinese children of the middle school level to practice those adult recreational activities, which are interesting to children and which do not require expensive equipment, large areas, or many participants. Activities, such as ping-pong, deck tennis, and croquet might well be provided for at home. The Chinese "national exercise," and gymnastics, would also have recreational value for those who like them. They are adaptable to home situations and other surroundings where the provision for sports is impossible.

The program of physical education should make an effort to form in the children an appreciation for inexpensive forms of recreation by a presentation of activities, for example, as hiking, ping-pong on the dining room table, and deck tennis with a sand bag and laundry rope.

Interests in Physical Activities

There are few studies available that relate to the activities in which children would be most interested. There is some evidence showing a close relationship between the physical activities voluntarily participated in, and those children state they like best. (22 p. 51; 8 p. 66; 19 p. 47; 38 p. 51, 55, 57) The discussion
which follows will be based upon both voluntary participation and expressed preference in physical activities.

The studies of Drom(22 P. 54) Lehman(38 P. 51) and Burley(8 P. 9, 58, 59) agreed that either baseball or playing catch or both were popular among children at the elementary school level.

Schwendener, in her study of the preference in physical activities of ten thousand fourth-grade children in six public school systems of the different parts of the United States, found that among about three hundred games recommended for the curriculum of physical education of fourth-grade children; baseball, tag, dodgeball, jumping rope, soccer, hide and seek, black tom, and rubberman held a high interest among these children. Baseball headed the list of these games.(60 P. 6, 24)

At the junior high school level, boys not only participated in team sports more than at other school levels, but team sports are also the most popular games.(8 P. 79) The studies of Dimock and Lehman, although including mostly passive activities, showed that team sports headed the list of the activities "like best".(19 P. 48; 38 P. 55) Participation in team sports reached its climax at this period for girls.(8 P. 9) However, unorganized activities of an active type are much more popular than highly organized team games during this period.(8 P. 85, 88)
At the senior high school level, team sports still have the best appeal among boys (8 p. 70; 38 p. 55) and unorganized activities of an active type among girls. (8 p. 75) However, the extent of the participation in these activities decreased as compared with the preceding school levels.

Burley’s study shows that swimming was the only sports participated voluntarily by seventy or more of boys and girls of every grade.

In Drom’s study a significant fact concerning the influence of the curriculum of physical education on the recreational activities of the children was revealed. Her study was made over a period of two years. When the curriculum for the second year was modified, the extent of voluntary participation in the same kind of physical activities was also modified. This shows that the curriculum of physical education plays an important role in directing participation in the desired kind of recreational activities.

**Behavior in Participation**

It has been found that there are four elements in games preferred by children of the fourth grade: "(1) general bodily activity plus certain specific bodily activities, (2) strenuous and general participation, (3) competitive behavior, (4) social organization of the two-group type." (60) These elements are the satisfying and pleasing elements, and the presence of them make a game popular. According to Schwendener the selection of activities should not be based primarily upon either season or tradition, but rather upon an understanding of the inclinations of the children and the environmental factors favoring the use of certain games.
All the popular games, such as team sports, and playing catch, also have these elements; consequently it may be concluded that these elements are common to all the popular games.

The studies made on the participation in recreational activities, including both active and passive activities, have shown that there is a gradual increase and decrease in the number of participants in certain activities with the increase of age; while in certain other activities there is a constant number of participants. (19 p. 41, 43, 47; 38 p. 54) Lehman stated that the most commonly participated in and the "best liked" play activities have a constant number of participants.

Dimock found that only about one-third of the play activities studied changed in the number of participants. (Incidentally, Dimock called attention to the fact that the absence of any change of interest in the majority of play activities is as important as the small percentage of changes of interest.) (18 P. 55)

Both the studies of Drom and of Burley tend also to show a constant interest in certain activities and a change of interest in other activities. Baseball and playing catch were two activities favored by children of nearly all ages studied.

The variety of recreational activities decreases with advance of age. (19 p. 51; 38 p. 68) The traditional belief is that young children play more individual games than older children. The findings from the studies of both Dimock and Lehman yield the opposite to hold. The older the children, the more they engaged in the individual types of activities.
In the past much emphasis was placed on sex differences in physical activities, not only from the standpoint of physiology but also from the standpoint of interest. In the present it has not been demonstrated that such differences are as marked as they have been thought to be. Since the interest of the child is a result of many variables, the present differences for participation in physical activities may partly be the result of environment (as is shown in the study of Drom). Sex differences in voluntary participation in physical activities may be decreased by the modification of the curriculum of physical education.

During the last two or three decades Western games have been taught in the Chinese schools. Although the Chinese "national exercise," shuttle cock, to-lo (similar to diabolo), and various other games are still practiced, they are not as popular as the Western games. The Western games have wide interests among school children and the people as a whole. The studies made in the United States may partly be taken to carry implications as to the interests of Chinese children or may be partly regarded as a substantial groundwork to similar studies which must be conducted in China.

Co-recreation

Co-recreation involves the same psychological principles as co-education. At different stages of development children have different love objects: (1) the love objects of very young children are adults of the same or opposite sex; (2) when children grow older, their love objects are persons of the same age and same sex; (3) during adolescence the love objects are persons of opposite sex (Cole, p. 108).

It is believed that for adolescents to have a normal sex
interest, they must have social contact with children of the opposite sex. Otherwise aberration may occur and married life may not be happy. To support the statement that "without social contact with the opposite sex aberration may occur," some have cited the high rate of sex perversion in the segregated schools. (13 p. 104; 28 p. 137; 55 p. 164) In support of the statement that "without social contact with opposite sex married life may not be happy," there is no study comparing the rate of divorce and other domestic infelicities among the alumni of co-educational institutions and of sex-segregated colleges. However, Hollingworth is of the opinion that there would be less infelicity among persons who have attended co-educational institutions than among those who have attended sex-segregated colleges. (28 p. 136) The statistics in England and in Scotland, as given by Howard, tend to support the opinion of Hollingworth. Co-education has taken root deeper in Scotland than in England and the divorce rate of Scotland is lower than that of England. (31 p. 48)

According to Dr. Andrew Woods, formerly a leading psychiatrist in China, the rate of divorce cannot be regarded as a satisfactory criterion for the success of co-education (as compared with non-coeducation), unless the co-educational activities are intelligently guided. Many divorces or unhappy marriages may occur among the alumni of co-educational schools as a result of a careless selection of mates, for in some schools co-education simply means that boys and girls enroll for many of the same classes, with no provision being made for supervision and guidance in a wider scope of co-educational activities. This condition may be as undesirable as for mates to be selected by parents, a practice formerly observed in
China and still followed in some parts of China. Co-education wisely conducted gives boys and girls training and experience in understanding each other. The element of mystery is taken away from sexual differences.

1

Personal communication with Dr. Andrew Woods.

Although Dr. Woods has offered no quantitative evidence showing that the students of co-educational schools have a happier marriage than those of segregated schools, he is definitely of the opinion that a well-supervised and guided program of co-educational activities in China will give a sound opportunity for boys and girls to understand each other and to grow toward making good adjustments in adult life.

In the early stage of co-education in England, because of strong objections to co-education from the point of view of pedagogy and administration, a commission was appointed to study the results. The report was in favor of co-education in every respect. (31 p. 56)

Howard, an English schoolmaster, has succinctly answered many of the questions of parents and others regarding co-education. The two major questions, together with the answers, will be presented for the purpose of a promoting a better understanding of the sex interest of the adolescent and for indicating the important part played by co-education.

Question: "Will the attention of boys or girls be distracted by a 'sex-lure' in a co-educational school?" (31 p. 59)

Answer: "The 'sex-lure' can be most effectively counteracted in the co-educational school. The parent who wants to solve the moral problem will never solve it until he faces it....

"....to segregate large numbers of either sex to cut them off from the society of the other, is not a natural proceeding, and imposes
a high degree of strain upon them. Under the strain their code of morals will sometimes collapse, and immorality in one form or another will result. The immorality may take various forms — impurity of thought, indecent language, masturbation, or something worse." (31 p. 59)

Question: "Whether it is fair to introduce an extra complication into the life of a boy or a girl at the age of adolescent? Would it not be simpler to postpone it?"

Answer: "Of course it would. If human beings were of one race, one language, one sex, life might be simplified enormously. But the human race does not happen to be homogeneous. And in the same way the incidence of sex-problems cannot be postponed. It can be ignored; but one cannot postpone by ignoring. It is not the co-educationist who introduces the complication, it is Nature. Nature has put the age of puberty in the middle of the child's school career and we have to meet the position as it is.

"Teachers in all types of schools are aware of the special dangers of the age, and they try to meet them as far as they can by directing the growing impulses and energies of the adolescent into other and more fruitful channels than those of sex........but they are only partially successful. Nature is a little too strong even for headmasters. You may drive her out with a pitch fork, but she will return. The educationist believes that it is a better plan to cooperate with Nature instead of trying to thwart or sidetrack her. And if the boy’s thought cannot be diverted it is dangerous to attempt to suppress them. Suppression may form complexes which do grave injury, all the graver in that their existence may not be suspected until the bad effects become apparent later in life. So that the real problem for the parent is not 'How can I protect my son from the disturbing influence of girls? or 'How can I protect my daughter from the disturbing influence of boys?' but 'How can I find, wisely and safely, that companionship with boys which she needs for her normal and harmonious development?' He is helped greatly, of course, if the girl gets the benefit of the company of both sexes at home; but he is helped still more if he sends her to a co-educational school where she will meet boys in the normal course of things and on equal terms, where she will work with them as well as talk to them, and where the supervision and guidance which the school will provide will give him some guarantee that girl will be able to make her adjustments under safe conditions.

"The truth is that so far from bringing a disturbing factor into the girl's life he is bringing a stabilizing one. For it is essential to understand that the co-educational school does not place its emphasis upon sex. Its most striking feature is its almost entire absence of sex-consciousness. It is not thinking about sex. It is thinking about games, about Debating Society,.....................

"It is sometimes difficult for an outsider to realize the full extent of this freedom from sex-feeling. Books about co-education are obliged to mention sex on every page; adults discuss earnestly the sex-problems involved; but these problems exist in the minds of the adult rather than in the minds of the children........
"Wherever else sex-strain is to be found, it will not be found within the walls of the ordinary mixed school. For the atmosphere of such schools closely resembles that of home.

"The first result of mixing boys and girls, then, is to remove glamour and to cause them not to bother about each other...."(31 p. 65)

Beginning with the junior high school level, in China boys and girls are segregated in physical education classes. This appears to be partly because of physiological and psychological differences assumed between sexes, and partly because of the influence of the social custom.

The first formal introduction of co-education into college was in 1920. (20 p. 155) It was then introduced to the middle schools more for reasons of economy and convenience than as a result of advancement made in education. There was practically no provision made for educating two sexes together, besides the provision of large class-rooms to teach boys and girls jointly.

Most of the administrative authorities of the co-educational schools were either extremely conservative or extremely "liberal." It was not uncommon for students to go to the "extreme" and even for tragedies to result. The uneducated public and the parents often blame co-education and the poor discipline of the schools.

Ignorance of the psychology of adolescence on the part of some of the authorities of the segregated schools, coupled with the criticisms made by the public, has made many of these authorities extremely conservative in co-educational activities.

In spite of severe disciplinary measures in many schools, some boys and girls, whether in the "co-educational" or segregated schools, went ahead to make friends with the opposite sex. Some of
them even thought that the time was ripe for the traditional social system to be broken up and that it was their duty to be pioneers in making changes. Such swift changes in attitude were due chiefly to the increased influences of Western countries, for example, the study of Western social customs and the adoption of Western social customs by Chinese students trained in those countries.

Although boys and girls in China occasionally engage in sports together, the introduction of co-recreation has been opposed by most of the school authorities for the following reasons: (1) the deep rooted influence of the old Chinese doctrine of the "absolute segregation of men and women," (2) the lack of understanding of the sex interest of the adolescent, (3) the fear that undesired results may occur through the informal participation of boys and girls in physical activities together, and (4) the overlooking of the educational responsibility as a result of an overconcerning for the maintenance of the reputation of the "moral standard" of the school.

A pertinent question to be raised is whether or not the informality of physical activities would bring undesired results. No study has been made to answer this question. Expert opinion and experience, however, both in the United States and in England, can be called upon. According to Boyd, if in informal social activity boys and girls behave spontaneously, they will not later be an enigma to one another and will have a stabilizing foundation for solving new problems incidental to marriage. (5 p. 2) Collins and Cassidy, (14 p. 54) Lee, (37 p. 126) and Wayman (71 p. 182) have stated that certain physical activities used as co-recreation contribute to the experience of boys and girls, and to their adjustment. In England some reports have been
made on the desirability of boys and girls participating together in physical activities in the secondary school. (74 p. 63, 121)

It seems needless to say that the activities which should be introduced are those which do not put undue pressure on girls or retard the learning of boys. These activities are tennis, badminton, peddle tennis, folk dancing, hiking, ice skating, and others. There should be an emphasis on how the activities are participated in.

Prior to the war, the custom concerning the relationship of boys and girls differed more between the coastal cities and the inland than between the coastal cities and Western countries. Since the outbreak of the war two changes have been brought about: (1) the social customs of the inland have been changed gradually because of the migration of the people from the coastal cities to the inland and (2) education is becoming more universal than it was formerly. China and the Western countries are increasingly coming to a closer relationship, partly because of the many Chinese students sent to the United States to study. After the conclusion of the war many technical experts will be invited from the Western countries to assist China in her industrial development, and a still larger number of students will be sent to Western countries to study.

These conditions will bring the social custom concerning the relationship between boys and girls of China closer to that of Western countries than formerly. The introduction of co-recreation will gradually come to meet less and less opposition.
In the construction of a curriculum of physical education for China, what educational principles should be taken into account? What criteria should be employed in determining objectives and in selecting content? By what procedures are activities most adequately introduced in order to motivate and facilitate learning? To what extent and under what conditions can transfer be expected? What provisions should be made for individual differences in interest, in motor capacity, in learning rate? Then, finally, what are the educationally sound methods through which achievements in motor skills and character manifestations should be rewarded or reinforced?

Learning Process

Learning may be considered from two points of view: (1) as a process or activity, and (2) as a result or product. These two aspects necessitate clear recognition in the planning and directing of learning activities. One must know both the changes that are desired, and the procedures by which these changes may be most advantageously affected. (26 p. 3)

Role of a Goal

Learning depends upon a goal. "A goal is a locus in the stimulus-situation to which the organism is responding." (72 p. 246) Learning will not take place unless there is a will to learn. "Will to learn depends upon an understanding of definite and explicit instruction." (72 p. 246) This principle should be applied especially in teaching the Chinese "national exercise," for most of the exercises
have a definite purpose which should be made known to the students before the exercises are taught.

Method of Learning

Learning should begin with some "undifferentiated whole and proceed toward mastery of detail." (72 p. 297) Each "whole," of course, must be graded so as to fall within the zone of complexity which the participants are able to comprehend. Some physical activities appear best learned as wholes, with only transitory or "in play" reference to details (for example, each exercise of the Chinese "national exercise"). Other activities appear best learned by the whole-part-whole method (for example, football and basketball).

The curriculum should provide that whenever a new physical activity is introduced it should be demonstrated as a unit. The purpose of visual aid in the demonstration of the whole at the time of the introduction of a new technique is to give the students an opportunity to get the configuration of the thing to be learned. At later stages visual aid may help the students to see the interrelationships of the details. The objective should be to enable the student to grasp the "(1) general feeling of regularity, plan or principles, (2) general awareness of the direction in which the plan is to be worked out, (3) the specific nature of direction and (4) the specific relationships of details." (72 p. 296)

In China, school children have ample opportunity to watch a number of games and athletic events before the activities are taught in the schools. Such opportunity offers the children a chance to get the configuration of these games, and probably facilitates learning. In other activities, however, the children have no opportunity for
previous acquaintance with the activity, and demonstration is needed. This is especially true with the lower grade children. A whole game at this level may seem very simple to the adult, but for the child it may appear quite complicated. It should be demonstrated.

Role of Motivation

Motivation should be applied with great care so that (1) the child is not overstimulated, and (2) the reward does not take the place of the goal.

Motivation can be obtained by providing for (1) desirable learning conditions (such as physical setting and adequate equipment), (2) definiteness in assignment and in diagnosis of errors, (3) encouragement by the teacher, (4) social approvals of achievement, and (5) knowledge of success and failures. (26 p. 340)

There are two dangers in an overuse of motivation: (1) over urging a child may lead to the point of exhaustion, and (2) motivation irrelevant to the task may result in the establishment of substitute goals, and defeat its own end. (72 p. 419)

Kilpatrick, in this discussion of rewards and character training, states: "the definite concreteness of reward may actually interfere with the satisfaction of the good activity on its own account. We are all, youth and adult alike, easily led to ignore the less tangible, if a more tangible is at hand and available." (36 p. 140)

In physical education, rewards have been often used for the winning of a game, or for achieving the championship of a game. Attention should be given to rewards issued on such bases.
Role of Practice

"Repeating the learning experience under varying conditions at not too long intervals is frequently necessary to make one master of the new idea or fact or skill." (36 p. 94)

Wheeler pointed out that in learning situations an individual never faces the same situation twice, and that therefore the response is not repeated. (72 p. 351) What is valuable is repetition under "varying conditions." Kilpatrick has illustrated this by the learning of a golf stroke. He states that at first the stroke is poorly done and that "mere repetition of this bad stroke is not what is needed, but a kind of practice which varies the stroke in order that progress may be made, largely by trial and error, to a more desirable form. This practice is, emphatically, not mere repetition." (36 p. 94)

Since the mastery of skill is a primary objective of physical education, the curriculum of physical education must carry the new interpretation of repetition, and its related factors of maturation and interest.

Role of Maturation

Maturation is a basic condition of learning. (72 p. 245)

Practice is useless unless the child is at a level of maturation where he can profit from practice. Unfortunately, studies are not available on the age at which children are sufficiently mature (both physiologically and psychologically) for the introduction of different physical activities. Investigations along these lines will have to be made in order to find out whether any given technique is well suited to the maturation level of the students.

During the learning of a technique, rest periods should be
given to allow for the maturation of insight. In other words, paced practice facilitates the maturation of insight. "The rest period over, the learner approaches his task with more energy and a more highly differentiated system. This permits him to perceive the goal and the path to the goal in a greater detail to relationships than at any previous time." (72 P. 341)

Unconsciously many teachers of physical education have overlooked the maturation of insight in the teaching of techniques. In order to facilitate learning the teacher should be reminded of this point in the "Hints and Notes" section of curriculum materials.

Role of Interest

The content should be psychologically oriented. (35 P. 294) The psychological organization of content is grounded in pupil interest. (26 P. 372) Closely associated with pupil interest, as factors conditioning learning, are the past experiences and the background of the pupil, the environmental and social settings in which the learning takes place, and the type of encouragement and instruction which the pupil receives.

Role of Participation

"Self-activity is essential to learning." Learning does not take place unless the child shares in initiating, directing, and controlling the process. (26 P. 7) In classes of physical education children have rich opportunity for self-activity. They should also be given opportunity to make suggestions to evaluate their work together, to make plans for its improvement, and to select certain projects (such as demonstrations, intramurals, and intermurals).
Problem of Transfer

Teaching should be planned to facilitate the process of transfer.(17 p. 261)

"Most studies support either the identical theory of Thorndike or the generalization theory of Judd. The theory of identical elements assumes that transfer is dependent upon the similarity of the practiced and unpracticed function. It holds that training is specific, and that abilities manifest themselves as relatively distinct entities. The theory of generalization proposes that transfer is dependent upon the degree to which information and skills may be consciously generalized, that abilities are general rather than specific and that every experience contributes toward the individual's general fund of knowledge and intellectual adaptability. The two theories describe different elements in the transfer process and necessarily compliment each other. The theory of identical elements tends to describe the process in terms of specific skills and facts while theory of generalization emphasizes purposive thinking and problem solving."(17 p 271)

The transfer of almost identical motor elements from one game to another is generally agreed upon. At the other extreme the transfer of certain character manifestations from game situations to life situations is open to greater question. Consequently, a curriculum for physical education cannot be considered adequate if it assumes that transfer is always operative. It must make teachers conscious of varying degrees of transfer.

In conclusion a statement of Caswell concerning transfer will be cited, namely, that "(1) transfer is possible but not automatic, (2) the amount of transfer depends upon the intelligence of the child, the nature of the learning experience, and the technique of the teacher."(10 p. 109)
Adapting the Curriculum to Individual Differences

There are wide differences in all qualities of an individual, including the mental, physical, and emotional aspects. The teacher of physical education must be made conscious of the fact that it is not the physical child who comes to class, but the whole child. Teachers should be supplied as much information as possible concerning individual differences, and be encouraged to become broadly acquainted with each child through school records, other teachers, parents, and direct observation. Particular attention should be given to individual differences in the "Hints and Notes" section of the curriculum. Here attention should be called to individual differences in such items as health, posture, skill, strength, endurance, body size, and interests. Such a procedure will serve three purposes: (1) it will remind the teacher that the curriculum should be made flexible to meet the individual's needs, (2) it will impress upon the teacher that he is a strategic person in making the curriculum effective, and (3) it will assist the teacher in gaining co-operation from the school authorities in providing for health examinations.

Individual differences in body size are sometimes striking. Marked differences in stature and weight are readily recognized by teachers and often are important in grouping children for physical activities. The attention of the teacher should be called to this point.

That children should be classified for physical activities on the basis of health has been advocated since the time Western physical education was first introduced into China. Such practice is, however, far from universal. Very few schools provide health
examinations; therefore it is difficult to classify students according to health status; nevertheless, teachers should be reminded of the limitations imposed by variation of any group of children in health.

Not all children need postural correction. It should be recommended that a postural test, perhaps the Iowa posture test (43 p. 259) should be given to detect students with poor posture. Those individuals needing special exercise should be grouped together so that their needs may be met.

General skill in sports, or general motor ability, is a developed capacity through the process of practice and learning. Different people can develop their capacities to different levels, depending upon their own effort and upon the effectiveness of the curriculum. There are wide individual differences, however, in the maximum development that can be obtained. It should be recommended that whenever possible students be classified according to their general skill or general motor ability, and be encouraged to participate in physical activities commensurate in difficulty with their ability.

There are, of course, wide individual differences in strength and endurance. The teacher should be reminded that strength varies with age, weight, and sex; and that endurance varies probably with age and sex; and that an absolute standard should not be imposed.

Individuals differ considerably in their interest in play activities. In the "Hints and Notes" section of the curriculum, teachers should be reminded of this point so that appropriate effort will be made to meet individual interests in physical activities.
In the measurement of results the taking of individual differences into account (that is, the measurements of results relative to the individual's capacity) is essential for two reasons: (1) it serves as a measure of the program itself, and (2) it insures that the individual will not be penalized for handicaps beyond his control nor be forced to overexert himself in attempting to meet some absolute standard.

**Principles of Curriculum Construction**

Statements of guiding principles in curriculum construction vary from single, highly generalized paragraphs to extended and extremely detailed statements. It is the writer's judgment that a committee on curriculum construction for physical education in China would be best helped through a series of guiding principles which are reasonably explicit, though not too minutely elaborated. The general principles to be presented below have been largely selected or adapted from Draper. (21 p. 32)

**Curriculum Construction Should Preserve Those Portions of Social and Cultural Heritage Which Are Currently Significant**

The "Aim of Education of China" states that education should seek "to keep alive the cultural traditions," which have present significance. This principle carries on-going implications. Society is dynamic. Provision must be made for frequent revisions of the curriculum. The heritage that is currently significant for one decade may differ from the heritage that could be so considered for the next.
The Curriculum Should be so Constructed as to Stimulate Local adaptation and Responsibility for Effectiveness

It is believed that a well-informed local committee should be appointed to adapt the curriculum to each school system. Such committees should be definitely encouraged, and urged to pool local experiences and thoroughly adjust the curriculum to local conditions. It should also be made clear that the effectiveness of any curriculum depends upon first-class teaching. Suggestions should be made in an attempt to stimulate improved teaching. Teachers should be provided flexible materials, and alternative choices in method. They should be encouraged to understand their students, experiment in the local situation, and check upon their own strength and weakness.

It is obvious that many local conditions necessitate modifications. Some of these are: (1) the financial condition of the school, (2) the size of the school plant, (3) the amount of equipment in the school plant, (4) the professional training of the teachers, also their aptitude and community interests, and (5) number, background and abilities of students.

Curriculum Construction Should Be Based on a Recognition of the Need for Appropriately Graded Material and for Articulating Units for Different School Levels

Since continuity is a basic principle of education, the curriculum should be built to facilitate full application of this principle.
Curriculum Construction Should be Grounded on a Broad Base of Relevant Scientific Investigations, Studies, and Reports

The curriculum committee must be familiar with the best thinking on curriculum construction and with the basic facts concerning the child, his environment, his health needs, and his recreational interests. The present study furnishes a substantial synthesis of materials pertinent to this principle.

Curriculum Construction Should Begin with a Clear Statement of Objectives

In the construction of a curriculum there are several ways to select and to validate the objectives to be achieved. For example, study of the needs, deficiencies, and activities of children and adults; analysis of existing courses of study, professional journals, and books; the pooling of opinions of experts. In China only the last mentioned method appears currently applicable. In the construction of a curriculum of physical education for China the proposed objectives should be checked against a series of principles. Five of the seven principles presented below have been selected from Draper. (21 p. 201)

1. Is the objective consistent with the expressed "Aim of Education" for China (as adopted in 1928)?

2. "Does the objective occur frequently in present life activities that fall within this subject-matter field?"

3. "Will these objectives occur frequently in the future life activities for which this subject-matter can adequately prepare students?"

4. "Has the objective a high degree of cruciality? Certain activities occur infrequently in life and yet are so important that
life may depend on a mastery of these skills, knowledge, etc."

5. "Will the children be interested in realizing this particular objective?" There are divergent opinions as to the value of this principle. Some believe that the interest should be followed, and others that interest should be guided and developed.

6. "Can the objective be achieved by the students?"

7. Is this objective "capable of suggesting possibilities for continued growth?"(30 p. 91)

Curriculum Construction Should be Based on Well-Defined Principles of Content Selection

Content is the medium for the realization of the objectives. It should, therefore, receive careful evaluation. The following principles have been selected largely from Draper.(21 p. 252)

1. "Will these activities or learning experiences contribute definitely to the achievement of the objective?"

2. "Does the content under consideration have a high degree of utility in present social activities?"

3. "Will the content have a high degree of utility in the future lives of the students?" This principle is derived from the fact that the society is dynamic and the philosophy that education is a continuing process.

4. "Can pupils at this particular grade level attain mastery of these facts, activities, etc.?"

5. Does the content "articulate" with the preceding and the succeeding level?
6. Does the content have the greatest relative value? (30 p. 144)

This principle implies that the activities which have the greatest contribution to the objective should be of first choice.

7. Does the activity integrate with other school subjects? (30 p. 147)

This principle is applied to the lower grades rather than to the upper grades. For example, folk dancing of various countries may be integrated with the social studies.
Chapter VII
EXEMPLARY IMPLICATIONS OF THE FOUNDATION MATERIALS IN CURRICULUM CONSTRUCTION

The preceding chapters have presented foundation materials pertinent to the construction of a curriculum of physical education for China. In this chapter an attempt will be made to illustrate how the facts and principles amassed are of direct use in curriculum construction.

Sex Differences and Co-recreation

Can basketball be used as co-recreational activity? At certain ages, it appears that this question can be answered in the affirmative. Over the years from the primary school level to the junior middle school level, sex differences are neglected in those factors which are essential in basketball playing, such as motor capacity, strength, endurance, stature, and weight. From the senior middle school level into adulthood, differences increase steadily.

Physical Growth and the Objective of Physical Education

In the construction of a curriculum of physical education may the statement be made that one objective is "provision for the stimulation of physical growth?" It will be recalled that the existing studies do not show that a well-planned curriculum of physical education stimulates the growth of the body of the child. Except for a slight increase in body weight, it has not been shown that a systematic program of physical education during childhood can generate an increased rate of growth in any aspect of body size. While additional research on the problem is needed, it is indicated that for the present at least
the effectiveness of a program of physical education should be
judged by criteria other than the extent to which it has stimulated
physical growth.

Calisthenics or the Chinese "National Exercise"?

If a choice is to be made between calisthenics and the
Chinese "national exercise," which should be selected? The answer to
this question appears to be the "national exercise." According to
accepted principles for selection of curriculum content, the
activities selected should have the highest relative value. It follows
that if one type of activity has more contribution than another, it
should be selected. The "national exercise" has several advantages
over calisthenics. First, the movements of the "national exercise"
involve many parts of the body and one movement flows into another.
From the point of physiology there is greater possibility to
stimulate organic function than through calisthenics. Secondly, from
the standpoint of interest the writer has found that many people
trained in both activities prefer to practice the "national exercise"
as a recreation. For the most part, these people feel that interest
would run high if the teacher explained the purpose of each exercise
and demonstrated the total picture of it. Since good teaching method
and psychological arrangement of material can direct the interest of
the students, they should be used to the fullest extent in teaching
the "national exercise." Thirdly, the "national exercise" has more
possibility for training in skill than has calisthenics.

Finally the "national exercise" should be chosen in preference
to calisthenics, for it is a type of exercise which belongs to the
cultural heritages of the Chinese.


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