

# A View on the Validity of the Korean Youth Fitness Test

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## 1. Introduction

Physical fitness has been part of our society for many years. The development of youth fitness is one of the important roles of the government as shown in the U.S.A. and Korea where a nation wide youth fitness test is used and normed annually.

Numerous studies have been conducted to identify the meaning and the components of fitness, and develop fitness test. However, there is still the lack of agreement what are the basic components of youth fitness and the best test for each component among physical educators and exercise specialists.

The Korean Youth Fitness Test(KYFT), introduced in 1970 and nationally used in 1972 (Yun, 1979), has been revised and is still being used to evaluate youth physical fitness and a part of entrance examination for high school and university. Thus, the meaning and the components of youth fitness, the history and the contents of the KYFT is reviewed in order to investigate the problems and solutions based on the validity of the KYFT. The findings of the study will be referenced when the KYFT is revised or a youth fitness test battery is developed.

## 2. Youth Fitness

There has been a growing interest in fitness in the schools and society. It is generally believed that one of the important objectives of physical education is to develop and maintain students' physical fitness (Nixon and Jewett, 1980).

Physical fitness is basically related to muscular strength and endurance, flexibility, and cardiorespiratory endurance(ACSM, 1980). However, it may be divided into a motor related fitness which is primarily related to moving ability and a health related fitness which is primarily related to functional capacity (Safrit, 1981; Baumgartner and Jackson,

1982). The concepts of motor ability and functional health have played a major role in the development of physical fitness tests. However, there are many and varied opinions as to what is physical fitness. Johnson and Nelson(1974) stated that the difficulty in selecting test items is due to the lack of agreement on what is physical fitness.

These different concepts regarding physical fitness are historically explained. Before the middle of the 1970's most of the physical fitness tests were basically developed to measure motor fitness components. Some of the popular fitness tests were Kirchner(1970), and AAHPER(1976). In the early 1970's the President's Council on Physical Fitness and Sport in America defined physical fitness as:

"Physical fitness is the ability to carry out daily tasks with vigor and alertness, without fatigue and ample energy to engage in leisure time pursuits and to meet the above average physical stress encountered in energy situation." (Clarke, 1971:1).

With increasing questions about the need for motor related fitness, health related fitness has been emphasized after the middle of 1970's and many health related fitness tests have been developed. Some of the popular health related fitness tests are the Texas Test, the South Carolina Test, and the AAHPERD Health Related Physical Fitness Test (Baumgartner and Jackson, 1982). The AAHPERD Health Related Physical Fitness Test(1980) is the most popular of the three tests. The committee that developed the test stated that:

"Physical fitness is a multifaceted continuum extending from birth to death. Affected by physical activity it ranges from optional abilities in all aspects of life through high and low levels of different physical fitness, to severely limiting disease and dysfunction." (p. 3).

Pate(1983) stated that motor fitness includes components regarding movement factors for athletic ability but health related fitness includes components regarding disease and/or promote health for everyone. However, Baumgartner and Jackson(1982) stated that the terms "physical fitness and motor fitness are often used interchangeably, but motor fitness is actually the broader concept, including both physical fitness and motor ability factors" (p.242). Recently in the United States health related fitness tests like the AAHPERD Health Related Physical Fitness Test have been recommended for students more than motor related fitness tests like the AAHPER Youth Fitness Test which has been traditionally used.

### 3. Components of Physical Fitness

Although physical fitness has been clearly defined (Clarke, 1971; AAHPERD, 1980; Baumgartner and Jackson, 1982), the components of physical fitness are not agreed upon by all physical educators as shown in numerous physical fitness tests. The classification of physical fitness test as either health or motor related has played a major role in distinguishing and defining the components of physical fitness.

There is considerable overlap between the two types of tests in terms of cardiorespiratory endurance, and abdominal muscular strength and endurance. Agility, muscular power, speed, and neuromuscular coordination are found only in a motor related fitness test, where skinfold and other items related to functional capacity are found only in a health related fitness test (Safrit, 1981; Baumgartner and Jackson, 1982).

To identify each component of physical fitness, factor analysis has been utilized and factors related to physical fitness have been interpreted in many different ways, depending on the nature of the study and the investigators.

Barry and Cureton (1961) reported three factors of physical fitness related to motor performance by analyzing physique and performance data for ninety five boys from ages seven to eleven. The factors were identified as power, endurance, and dynamic shoulder strength. The factors related to physique were identified as ponderosity, leg-trunk development, lankiness, segmental limb development, and androgynous growth. They concluded that there was essentially no relationship between morphological and performance measurements.

Ponthieux and Baker (1963) extracted three factors from the data of 1335 male college students measured on the seven items of AAHPER Youth Fitness Test. The first factor explained by the pull-up, and 600 yard run-walk was interpreted as circula-respiratory endurance. Gross body coordination identified by throwing for distance and muscular explosiveness explained by the broad jump, 50 yard dash, and shuttle run were extracted as the second and the third factors.

Falls et al. (1965) defined the domains of physical fitness by nine isolated factors from factor analysis of 53 physical fitness variables. The factors were characterized as athletic fitness, maximum aerobic rate, respiratory capacity, basic height of blood pressure, heart rate response to exertion, expiratory capacity, pulse pressure response, force efficiency,

and resting heart rate.

Baumgartner and Zuidema(1972) identified three domains of physical fitness for college students. The domains for the male students were upper body; strength and endurance, leg strength and endurance, and cardiorespiratory endurance, whereas trunk strength and endurance were found for the college female. In the second study, Zuidema and Baumgartner(1974) supported four hypothesized domains of physical fitness for the college men and women which were upper body strength and endurance, trunk strength and endurance, leg strength and endurance, and cardiorespiratory endurance. They also concluded that "the fitness components of trunk strength and endurance and possibly the component of leg strength and endurance are not identifiable for college men and women by the same fitness test" (p. 256).

Tiburzi(1979) hypothesized a theoretical model comprised of twelve factors as the structure of the domain of physiological fitness and factor analyzed the data from twenty four tests of 56 male and 106 female undergraduate students. The robust factors were interpreted across the solutions obtained by the four different models of factor analysis with orthogonal and oblique rotations. The identified factors for the females were: 1) leg explosive strength, endurance and speed, 2) balancing on the ball of one foot, 3) leg and trunk flexibility, 4) arm explosive strength and endurance, 5) body fatness. The factors for the males were: 1) leg explosive strength, endurance and speed, 2) static balance, 3) leg and trunk flexibility, 4) arm explosive strength and endurance, 5) body fatness, 6) upper body strength and endurance, 7) upper body flexibility.

Thus, there are problems defining physical fitness by general terms. However, the defined domains, using the terminologies from Clarke(1971), and Baumgartner and Jackson(1982), are as follows:

1. Muscular endurance of arms and shoulder girdle.
2. Muscular endurance of the abdominal muscle.
3. Cardiovascular endurance.
4. Agility.
5. Speed.
6. Flexibility.
7. Body composition.

#### 4. The Korean Youth Fitness Test

Since the first research report about the fitness of Korean Youth documenting the weakness of youth in fitness and suggesting a nationwide fitness test in 1966, the government has began to consider how to develop youth fitness(Yun, 1979). The ministry of education conducted a study to construct a nationwide fitness test for the youth and to develop norms in 1969. The Korean Youth Fitness Test(KYFT) was introduced in 1970 and nationally used in 1972(Yun, 1979). To emphasize the importance of physical fitness and motivate students to develop their fitness level, the test has been administered as a part of the entrance examination to high schools and universities since 1973(Yun, 1977).

The test battery, originally based on the AAHPER youth physical fitness test, consisted of nine test items: dash(100m for boys and 60m for girls), standing long jump, distance run(600m for elementary, 800m for female secondary school and 1,000m for male secondary school students), shuttle run, pull-up for male or flexed arm hang for female, sit-up for 30 seconds, toe-touch, baseball throw for distance, and grip strength. The toe-touch and the grip strength were deleted, and an artificial hand bomb was used for the throw instead of a baseball in 1976(Yun, 1977). The shuttle run was dropped and the artificial hand bomb throw was changed to a rubber ball throw for distance in the KYFT revised in 1980(the ministry of education, 1984).

The test items of the KYFT are 100m dash, standing long jump, sit-up for 1 minute, softball throw for distance, distance run, pull-up for male and flexed arm hang for female students. The KYFT is still being used annually to evaluate the fitness of youth and as a part of entrance examinations.

#### 5. A Criticism on the Validity of the KYFT

The problems of the KYFT based on the validity of the KYFT and each component or test item are criticized after reviewing the meaning and components of youth physical fitness test.

The different concepts and domains of a motor fitness and a health related fitness have been well defined, all of the items in the domains of the two types of tests can not be administered in school because of the number of students and administrative problems

such as limited time and facilities. If physical educator should select a fitness test, a health related physical fitness test is recommended in school as the movement of sport for all is more emphasized than the elite sports in our society nowadays.

Just as the component of physical fitness varies from test to test, test items for measuring each component of physical fitness also vary among fitness tests. However, some test items in the KYFT are questioned from the reviewed test items for measuring each component of youth fitness.

First, the softball throw for distance was frequently found in the fitness tests which were developed before the 1970s. The softball throw is used to measure upper body (arm and shoulder girdle) muscular strength and power, and a motor ability which is related to the coordination of muscular strength and neuron as explained by Smith(1972). Thus the test is a motor ability test not a fitness test as concluded by Smith.

Second, standing long jump and dash(100m) are similar tests, although the first and the second test is used to develop muscular power of lower body and speed, respectively. There is a significant relationship, ranged from .54 to .91, between the two test as shown in many studies(강재성, 1972; 강갑동, 1981; Ponthieux & Baker, 1963; Baumgartner & Zuidema, 1974). Thus, one of these can be delimited in a youth fitness test if there are administrative problems.

Third, a test to measure body composition like percent body fat should be included in a youth fitness test. It is justified that weight control is one of the *most common and important* reasons for beginning an exercise or fitness program and maintaining ideal weight has become an important objective related to mental and physical health in this society. An obese person has more chances than a nonobese person to have hypertension, cardiovascular and the other disadvantages related to health or well-being(Pollock, et al., 1978). Also, the degree of percent body fat can be used to interpret the physical fitness as shown a significant negative correlation between the sum of skinfold fat and all motor performance test scores(Cureton, et al., 1975).

As a conclusion, the followings are recommended as the KYFT is reviewed.

1. The KYFT should be revised as a health related fitness test, especially for high school students.
2. The softball throw for distance can be deleted.
3. One of the standing long jump and the dash(100m) can be deleted if there are administrative problems.

4. A test for measuring body composition like percent body fat should be added as obesity is an important factor of functional health.

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## 學生體力檢査의 妥當性에 관한 一考

金 鍾 澤

현대사회에서 규칙적인 운동의 의미는 신체적·정신적으로 건강한 삶을 위한 스트레스 해소나 체력의 증진에서 찾아진다. 初, 中, 高生을 위한 學生體力檢査는 건강한 청소년의 육성을 위한 한 방안으로 體力向上은 물론 운동과 건강에 대한 바른 認識이나 건전한 生活習慣의 誘導 등 교육적인 효과가 기대된다. 학생체력검사의 많은 문제점을 고려할 때 보다 합리적이고 타당한 체력검사의 운영을 위한 측정평가와 관련된 諸般問題의 해결을 위한 연구가 요망된다. 그리고 조속한 시일내에 체력검사가 입시를 위한 判別의 수단이 아닌 教育的 診斷의 목적으로 사용될 수 있는 教育與件이 조성되어야 한다.

본 연구에서는 청소년 체력, 체력검사의 구성요인, 그리고 한국의 학생체력검사의 문헌 고찰을 통해 현행 학생체력검사의 타당성과 체력검사 종목별 타당성을 살펴보았다. 연구결과는 현행 학생체력검사의 수정 혹은 새로운 청소년 체력검사의 개발시 기초 자료로서 활용가치가 기대된다.

현행 학생체력검사의 타당성과 관련된 문제점은 다음과 같다.

1. 현행 학생체력검사는 운동능력 관련 체력장으로서 건강관련 체력장으로 수정되어야 한다.
2. 공던지기는 운동기술 검사종목으로 체력검사에서 제외되어야 한다.
3. 제자리멀리뛰기나 100m달리기는 유사한 종목으로 체력검사의 실시상의 어려움이 있을 때 한 종목을 제외할 수 있다.
4. 정상인의 건강정도 혹은 체력정도의 간접적인 지수로 활용되는 비만정도를 측정하는 검사종목이 추가되어야 한다.