7-1-1976

A Critical Analysis of the Aapher Youth Fitness Test

Lee Nagel

A CRITICAL ANALYSIS OF THE AAPHER YOUTH FITNESS TEST

by
LEE NAGEL

BACHELOR OF SCIENCE, DICKINSON STATE COLLEGE, 1972

AN INDEPENDENT STUDY

SUBMITTED to the FACULTY

UNIVERSITY of NORTH DAKOTA

in partial fulfillment of the requirements

for the degree of

MASTER of EDUCATION

Grand Forks, North Dakota

July
1976

This independent study submitted by Lee Nagel in partial fulfillment of the requirements for the Degree of Master of Education from the University of North Dakota is hereby approved by the Faculty Advisor under whom the work has been done.

W.C. Koenig

Permission

Title A CRITICAL ANALYSIS OF THE AAPHER YOUTH FITNESS TEST

Department Physical Education

Degree Master of Education

In presenting this independent study in partial fulfillment of the requirements for a graduate degree from the University of North Dakota, I agree that the Library of this University shall make it freely available for inspection. I further agree that permission for extensive copying for scholarly purposes may be granted by the professor who supervised my independent study or, in his absence, by the Chairman of the Department or the Dean of the Graduate School. It is understood that any copying or publication or other use of this study or part thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University of North Dakota in any scholarly use which may be made of any material in my independent study.

Signature Lee Nagel

Date July 29, 1976

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

The writer wishes to express his sincere appreciation to Dr. Walter Koenig for aiding in the completion on this study.

Thanks is expressed to the Langdon High School students who willingly cooperated to make this research study possible.

Finally, thanks to my mother and father, whose constant guidance and help made my education possible.

CHAPTER I

INTRODUCTION

Review of Literature

The AAPHER physical fitness test is a part of many physical education programs in the schools today. A problem many physical educators face each year is the physical fitness testing of uninterested children. The students who aren't interested in the fitness test are usually those who are poor achievers and because of their body type, are unable to score at a comparable average with their peers. The AAPHER youth fitness test was adopted in 1957 by the AAPHER research council. It is a practical test which is easily administered. The test involves a series of practical test items which measure different components of fitness. Norms have been established on the basis of nation wide sampling and are included in the test booklet. The AAPHER youth fitness program has an award system based on the established norms and how each student rates with the norms for his or her age group (1). The norms in the test booklet are set up according to age. When the students can't score at a respectable position in the norm scale for their age group, they become disinterested about the test and the importance of fitness, plus becoming failures to their peers. This is especially true at the junior high level. An example of this could be a 200 lb. wrestler scoring full pull-ups and a 120 lb. wrestler scoring eight pull-ups. According

to the AAPHER youth fitness test the 120 lb. boy is better fit than the 200 lb. boy and even more damaging is the fact the 120 lb. boy can now receive merit badges or awards and the bigger boy is left out.

A study by Bolonchuk (2) in 1971 revealed that the AAPHER youth fitness test is practical and easy to administer. The reliability of the test has been examined by several investigators (2,3,4,5,6) and is established. The validity of the AAPHER youth fitness test was challenged by Bolonchuk (2) in the 1971 study. It was found that the items included in the AAPHER youth test did measure components of physical fitness however some of the components were misstated in the AAHPER youth test manual. Overall the test items represent specific measures of components of physical fitness therefore accepting face validity for the test.

Reviewing of literature concerning the methods of establishing norms to rate fitness test results reveals similar methods. Johnson and Nelso (7) suggested local norms be developed from their elementary school physical fitness test. The norms were supported by age groups of within two years for each group.

The army and navy fitness test made up their group norms supported by only one group which is 18 years or older (7). The AAHPER youth fitness test supports its norms by age classification.

Other investigators have revealed that weight is a factor in the outcome of physical fitness results.

Garrity (8), in a study concerning the relationship of somatotypes of college woman to physical fitness performance, revealed that somatotype groups high in the ectomorphic component exhibit relationships that are inconsistant with the total group. This study discovered the strong endomorphic component appeared to be a limiting factor in the performance of physical fitness tests as compared to the ectomorphic component.

Laubach and McConville (9) researched the relationship between muscle strength, flexibility and body size of adult males. The study involved forty-five men with an average age of 20.7 years old. The men were divided into body types and given both strength strength tests and flexibility measurements. This study concluded that body types and flexibility had no significant correlations. The study revealed that the body type mesomorphy was the only type to correlate significantly with muscle strength.

Laubach and McConville (10) investigated the relationships between various aspects of flexibility and selected anthropometric measurements of college men. The study involved a sample of sixty-three men with an average age of 19 years. The study revealed body fat, as measured by skinfold calipers, yielded fairly high significant negative correlations with the flexibility measurements. The correlations between the flexibility measurements and somatotype were insignificant. The correlations between lean body mass, as calculated from skinfold measurements, and the flexibility measurements were insignificant.

A study, concerning anthropometrical observations on obese and nonobese young mean undergoing a program of vigorous physical exercise, was done by Dempsey (11) at the University of Alberta, Canada. Dempsey found, after observing a sample of obese and nonobese young men partake in a physical fitness program for 18 weeks, that overweight subjects experienced significant losses of body fat and didn't perform as well as the nonobese subjects in the fitness skills.

Gross and Casciani (12) did a study to determine the value of age, height and weight as classification indexes for secondary school students in the performance of the seven tests reported in the AAHPER youth fitness test manual. In this study 16,000 students were used as samples. Norms were established by age groups and the results of the performances were similar to the norms in the AAHPER test manual. The study substantiated that the factors of age, height, and weight have negligible value for classification purposes in the seven youth fitness tests. The study also concluded in certain youth fitness tests such as the softball throw, broad jump, and 50 yard dash for junior high boys, formulating classification indexes of age, height, and weight may be of some value.

A study concerning the relationship of physique and developmental level of physical performance was investigated by Wear and Miller (13). The sample used was composed of junior high boys performing four of the AAHPER youth fitness tests. The tests were pull-ups, 50 yard dash, standing broad jump and softball

throw. The boys were divided into categories by their physique and developmental level which was measured by the Wetzel Grid Chart. The study concluded that the subjects who were medium in physique and normal in development were the best performers. The subjects with heaviest weight were poorer performers. This would seem to indicate the need for a restudy of classification methods, particularly when norms are to be used for evaluating performances.

Definition of Terms

Wetzel Grid:	A chart developed by Norman C. Wetzel to establish body type, and growth development.
Somato Type:	Individual body type
Endomorphy:	A somatotype which tends toward roundness of body form.
Mesomorphy:	A somatotype which tends toward muscle, bone, and connective tissue.
Ectomorphy:	A somatotype which tends toward fragility and linearity.

CHAPTER II

METHODOLOGY

Thirty 15 year old boys were identified as the non-probability sample used in this study. These boys were students attending Langdon High School. The AAHPER youth fitness test is required to be taken by all boys at Langdon High School each school year. Thirty 15 year old boys finished the AAHPER youth testing program.

The AAHPER youth fitness test was administered as it is described and illustrated in the AAHPER publication (1) on Monday May 3, Wednesday May 5, and Friday May 7, 1976. The items tested were as follows:

1. pull-ups,
2. sit-ups,
3. standing broad jump,
4. shuttle run,
5. 600 yard run - walk,
6. 50 yard dash.

The description of the AAHPER Youth Fitness Test items is as follows:

Sit-ups

Objective: To measure the efficiency of the abdominal and hip flexor muscles.

Equipment: Mat or floor

Directions: The subject lies on his back with his legs straight and about two feet apart. His hands are placed behind his neck with the fingers interlaced. A partner holds the subjects ankles so that his heels are in contact with the floor or mat at all times. The subject sits up, twisting his trunk to the left to touch his right elbow to the left knee. He then returns to the starting position, making sure that his elbows are flat on the floor or mat before sitting up again. The subject sits up and twists to the right in order to touch his right kness with his left elbow. The subject then repeats the exercise, alternating to the right or left each time. The fingers must remain in contact throughout the exercise, and the back should be rounded with the head and neck leading so as to curl up. The knees should remain on the mat or floor as the subject sits up, but they may bend slightly when the elbow touches the knee.

Scoring: Each movement of sitting up, touching elbow to knee, and returning to the mat counts one point. The boys are scored by the number of sit-ups they can do in sixty seconds. Any sit-up in which the fingertips come apart, or the knees bend, or the subject pushes

off the floor from an elbow is not counted, and the subject should be told of the infraction.

Standing Broad Jump

Objective: To measure explosive power of the leg extensors and the athletic power of the legs in jumping forward.

Equipment: A mat, outdoor jumping pit, or perhaps simply the floor itself can be used. Marking material (tape or chalk) is needed for the starting line, along with a tape measure to mark off increments of distance along the landing area.

Directions: With the feet parallel to each other and behind the starting mark, the performer bends his knees and swings the arms and jumps as far forward as possible.

Scoring: The number of inches between the starting lin and the nearest heel upon landing is the score. Three trials are permitted, and then the test trial is recorded as the score.

Shuttle Run

Objective: To measure speed and change of direction.

Equipment: Each station needs two blocks of wood 2 by 2 by 4 inches, and a stopwatch. A 30 foot running area is needed. The width of a volleyball court is appropriate.

Directions: The subject starts from a standing position behind one of the lines. Behind the other line are placed two blocks of wood. At the starting signal, the subject races to the blocks, picks one up, and runs back to the starting line. He places not throws the wooden block behind the starting line, runs back and picks up the remaining wooden block, then carried it across the starting line. In all, the distance is crossed 4 times making a total distance of 120 feet or 40 yards. Two trials are given with some rest between trials.

Scoring: The time to the nearest tenth of a second of the better of two trials is the score for the event.

Six Hundred Yard Run - Walk

Objective: To measure cardiovascular efficiency.

Equipment: A stopwatch and a track, football field, or similar open area are needed to accommodate this test. The AAHPER Youth Fitness Test Manual shows diagrams of three suggested areas: (a) a football field on which four flags are placed at the end line of the end zone 30 yards apart. These markings make a rectangular course 120 x 30 yards, and twice around equals 600. (b) Any open area in the form of a square measuring 50 yards on each side can be used. Twice around measures 600 yards. (c) The inside circumference of

a 440 yard track may be used. In this arrangement the tester might start the runners and they may walk 160 yards down the track to the finish line.

Directions: It is possible to have as many as a dozen runners at a time in this event. Each runner is assigned a spotter. The subject uses a standing start. The tester gives the commands, "Ready? Go!" The subject is told that he may walk whevever he feels it is necessary. Each spotter positions himself at the finish line where he can hear the timer, who begins counting aloud the times every second as the runners cross the finish line. The spotter watches his partner and remembers his announced time. The spotter must be impressed with the importance of paying close attention and not talking to anyone until they give their partners' time to the recorder.

Scoring: The time in minutes and seconds is recorded as the above.

Pull-ups

Objective: To measure the muscular endurance of the arms and shoulder girdle in pulling the body upward.

Equipment: The equipment needed is a horizontal bar (1½ inches in diameter) raised to a height so that the tallest

performer cannot touch the ground from the hanging position. If standard equipment is not available, a piece of pipe or a rung of a ladder can be used.

Directions: The performer should assume the hanging position with the overhand grasp (palms forward) and pull his body upward until the chin is over the bar. After each pull-up, he should return to a fully extended hanging position. The exercise should be repeated as many times as possible.

Scoring: The score is the number of completed pull-ups.

Fifty Yard Dash

Objective: To measure speed.

Equipment: Two stopwatches, or a watch with a split-second timer is needed. A suitable running area to allow the fifty yard run plus extension for stopping is required.

Directions: It is advised that two subjects run at the same time. Both start from a standing position. The commands, "Are you ready?" and "Go!" are given. At the command to go the starter drops his arm so that the timer at the finish line can start timing. The subjects run as fast as possible across the finish line.

Scoring: The elapsed time from the starting signal until the runner crosses the finish line is measured to the nearest tenth of a second.

The Wetzel Grid (14) is one of the most extensively used devices for plotting and evaluating growth in the last quarter century. This chart and record form was developed by Wetzel on the principle that normal, healthy development proceeds in an orderly manner in keeping with an individual's natural physique. Using this chart a child serves as his own standard of comparison.

Wetzel designated nine different body types on his chart. These are identified on the chart by the corresponding channels A_4, A_3, A_2, A_1, M_1, B_1, B_2, B_3, B_4. The M channel represents the average or medium build; along with A_1 and B_1 it forms a central group of good physical status. Essentially three groups are developed from this chart of nine body types which are large A_2, A_3, A_4, medium A_1, M_1, B_1, small B_2, B_3, B_4. The grid is used to determine body type by placing the child's height and weight on the chart and then plotting and intersecting line which will cross in one of the three basic channels.

Procedure

A sample of 30 students, fifteen years of age, was given the AAHPER Youth Fitness Test May 3, 5 and 7, 1976. The boys' age, height, and weight were recorded on the first day of testing. The test was given as prescriped in the AAHPER Youth Test Manual. Each

boy was given two trials at each of the six testing stations with the best score counting as official. This method established reliability in the testing program. All the scoring data for each class were recorded on a fitness data sheet and grading book. Each subject was also labeled a body type which was determined by the Wetzel grid chart.

The Experimental Design

A single group, non-probability sample was used in this study. The subjects were all students attending Langdon High School. The samples were all males and fifteen years of age.

Total mean scores were calculated by averaging the scores of all 30 samples in each event. Mean scores were also calculated from the medium group, large group and small group in each of the six tests. The mean scores of each of the three body types were compared to the mean scores of the complete age classification group.

The Pearson product-moment correlation was employed to calculate an estimate of reliability of the AAHPER Fitness Test by the test retest method. The T-test was used to calculate a significance difference between the mean scores.

The following null hypothesis was established to test the significance of difference between the mean scores of the age classification group and the body type classification groups.

H_0 - There was no significant difference between the mean scores.

CHAPTER III

RESULTS

The items in the AAHPER Fitness Test for youth were tested for reliability by using the test retest method. The Pearson moment correlation was used to calculate the reliability. The results of the reliability test is shown in Table I.

TABLE I

TABLE OF MEANS, STANDARD DEVIATIONS AND RELIABILITIES OF THE AAHPER TEST ITEMS

Test	Test 1 Mean	S.D.	Test 2 Mean	S.D.	r
Sit-ups	47.47	4.93	47.13	5.14	.80
Pull-ups	4.9	2.85	5.2	2.74	.93
Standing Jump	78.4 in.	7.15	79.2 in.	6.7	.99
Shuttle Run	10.03 sec.	.788	9.89 sec.	.738	.94
50 Yard Dash	6.75 sec.	.454	6.63 sec.	.471	.94
600 Yard Run-Walk	124.7 sec.	15.50	123.6 sec.	14.28	.96

The thirty samples were placed on the Wetzel Grid chart and all received body types of small, medium, or large. Eighteen subjects channeled in the medium group, eight in the small group and four in the large group. A sample of the grid chart is in

appendix A, of this study. The three groups resulting from the Wetzel grid were compared to the age group in terms of test results. The following tables show the means, standard deviations, and T values for each of the three groups, in relation to the age group in all six tests of the AAHPER youth test battery.

TABLE II

TABLE OF MEANS, STANDARD DEVIATIONS AND T-VALUES FOR THE SIT-UPS

Body Types	Mean(A)	S.D.(A)	Mean(B)	S.D.(B)	T-score
Small	46.5	3.43	48.13	4.43	0.9044
Medium	49.27	5.46	48.13	4.43	-0.7203
Large	46.25	2.96	48.13	4.43	.7629
(A) Group = Three body types small, medium and large					
(B) Group = The age group					

Since the T-values were not greater than the tabled value, the relationship between the mean scores of the four groups were not significantly different. The large body type group had the lowest mean score of the four groups.

TABLE III

TABLE OF MEANS, STANDARD DEVIATIONS AND
T-VALUES FOR THE PULL-UPS

Body Types	Mean(A)	S.D.(A)	Mean(B)	S.D.(B)	T-score
Small	5.12	2.47	5.53	2.84	0.5892
Medium	6.27	2.78	5.53	2.84	-1.0630
Large	3.25	3.67	5.53	2.84	2.2618

(A) Group = Three body types small, medium and large

(B) Group = The age group

The highest mean scores were produced by the medium build body type. The large body group produced the lowest mean scores. The small body group types didn't score as high as the complete age group but were not significantly different according to the T test. The null hypothesis was rejected for the large body group because of the T-score value.

TABLE IV

TABLE OF MEANS, STANDARD DEVIATIONS AND
T-VALUES FOR THE 50 YARD DASH

Body Types	Mean(A) sec.	S.D.(A)	Mean(B) secs.	S.D.(B)	T-score
Small	6.56	.392	6.61	.442	0.2690
Medium	6.53	.369	6.61	.442	0.5975
Large	7.02	.740	6.61	.442	01.6285

Table IV -- continued

(A) Group = Three body types small, medium and large

(B) Group = The age group

The small and medium body types scored better than the age group and large group. The large body type again scored the lowest or slowest mean time in the 50 yard dash. None of the body types mean scores were significantly different than the age group mean scores.

TABLE V

TABLE OF MEANS, STANDARD DEVIATIONS AND T-VALUES FOR THE SHUTTLE RUN

Body Types	Mean(A) secs.	S.D.(A)	Mean(B)	S.D.(B) secs.	T-score
Small	10.01	.670	9.86	.751	-0.5139
Medium	9.18	.545	9.86	.751	0.3761
Large	10.12	1.41	9.86	.751	-0.5215

(A) Group = Three body types small, medium and large

(B) Group = The age group

The medium body type scored higher than the age group in the shuttle run. The small and large body types were both slower in the shuttle run than the age group. None of the body types were significantly different than the age group in the shuttle run test.

TABLE VI

TABLE OF MEANS, STANDARD DEVIATIONS AND T-VALUES FOR THE STANDING LONG JUMP

Body Types	Mean(A)	S.D.(A)	Mean(B)	S.D.(B)	T-Score
Small	7'11"	5.33	6'10"	6.09	0.5353
Medium	6'11"	4.59	6'10"	6.09	1.3279
Large	6'8"	11.24	6'10"	6.09	0.5515
(A) Group = Three body types small, medium and large					
(B) Group = The age group					

The small body types scored the best in the long jump test. The large and medium mean group scored below the age group mean scores. None of the body types scored significantly different in relation to the age group.

TABLE VII

TABLE OF MEANS, STANDARD DEVIATIONS AND T-VALUES FOR THE 600 YARD RUN

Body Types	Mean(A) min-sec	S.D.(A)	Mean(B) min-sec	S.D.(B)	T-Score
Small	2.00	12.66	2.06	14.93	.48035
Medium	2.01	11.69	2.06	14.93	.5297
Large	2.135	27.13	2.06	14.93	-1.7050
(A) Group = Three body types small, medium and large					
(B) Group = The age group					

The small group scored the highest in the 600 yard run. The medium group scored better than the age group but the large body types scored the slowest in the run. The large group scored significantly different from the age group score in the 600 yard run.

CHAPTER IV

DISCUSSION

In considering performance according to body type very few significant differences were found between mean scores when the subjects were classified by body type and by age. The Wetzel grid chart channeled the 30 boys in three basic body types. The medium group body types were found to be the best performers in all of the fitness tests except the 600 yard run and the standing long jump. The small body types scored close to the age group score in all the tests and even scored higher in the 600 yard run and the standing long jump. The Wetzel grid channels a tall thin boy into the small group, and this body type can do well in the jumping event. In general, the small and medium body types performed almost exactly with the performance of the age group. The large body types group scored the lowest on all the fitness tests. The large body types were significantly different as calculated by the T-values in the pull-ups and the 600 yard run. In the other events, the large body type group were somewhat poorer than the other groups but not significantly different. The greatest difference in mean scores occurred in the pull-ups and 600 yard run test.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Excess weight, is definitely a handicap to performance in the AAHPER Youth Fitness Test. Excess weight is a characteristic of the large body type group studied in this research. The small body type also perform at a lower level than do the medium body type groups.

The AAHPER Youth Fitness tests not only disregards body types in its test and award system but disgraces the performers in front of their peers. The AAHPER program can turn off many of its participants by throwing every child in an age classified norm. Since the average mean test score of the large body type in all six events of the AAHPER test battery is lower than the average age group, should the large body types have to compete with them?

This study indicates a need for separate norms for boys who may be considered over-weight. It may be that no norms should be established at all for the over-weight boy until his weight has been brought down within the normal age weight.

The age group classification norms also do injustice to the average weight boy. The over-weight boys included with the average weight boys tend to lower achievement scores for the whole group and therefore gives higher percentile scores to boys of normal weight who should be expected to perform better.

This writer also recommends that other studies of this nature be researched with a larger member of subjects.

APPENDIX I

Individual Test Score Sheet

Name _____ Age _____

Grade _____ Sex _____

Test	Trial I	Trial II
Sit-up		
Pull-up		
50-yd Dash		
600 yd Dash		
Shuttle Run		

APPENDIX II

Test Restul Information Sheet

Name
Age
Weight
Height
Body Type
Sit-up
Pull-up
Standing Long Jump
50 yard Dash
600 yard Dash
Shuttle Run

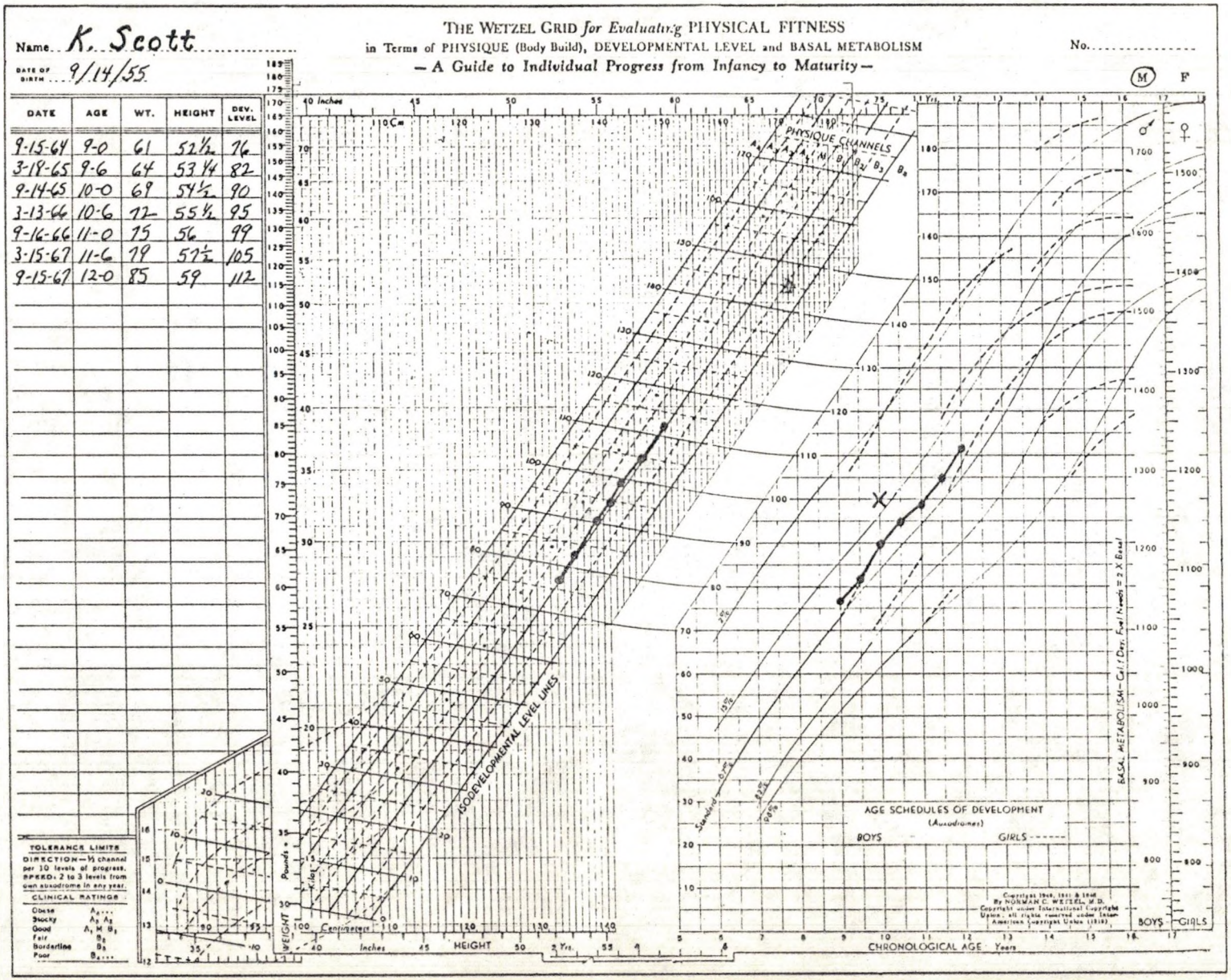

Figure 18-5. The Wetzel Grid

REFERENCES

1. AAHPER Youth Fitness Test Manual NEA Publications-Sales, Washington, D.C., 1965 edition.
2. Bolonchuk, Bill, A Critical Analysis of the AAHPER Youth Fitness Test, U.N.D. HPER Library Summer, 1971.
3. Gulsvig, J., An Investigation of the Reliability and Validity of the Grand Forks Fitness Test as administered to forty-two Central High School Boys, unpublished Masters Thesis, University of North Dakota, 1969.
4. Askew, N.R., Reliability of the 600 Yard Run-Walk Test at the Secondary School Level, Research Quarterly, 37: 451-54, 1966.
5. Baumgartner, T.A., Stability of Physical Performance Test Scores, Research Quarterly, 40: 257-61, 1969.
6. Doolittle, T.L. and Bigbee, R., The Twelve-Minute Run-Walk: A Test of Cardiorespiratory Fitness of Adolescent Boys, Research Quarterly, 39: 491-95, 1968.
7. Johnson, L. Dave and Jack K. Nelson, "Practical Measurements for Evaluation in Physical Education," Copyright 1974, page 348-374 - Burgess Publishing Co.
8. Wear, C.L. and Kenneth Miller, Relationship of Physique and Developmental Level to Physical Performance, Research Quarterly, 33: 615-631, December, 1962.

9. Bookwalter, Karl W., and others, The Relationship of Body Size and Shape to Physical Performance, Research Quarterly, 22: 271-279, October, 1952.

10. Lauback, Lloyd L., and John T. McConville, Relationships between Flexibility, Anthropometry,and the Somatotype of College Men, Research Quarterly, 37: 241-251, May, 1966.

11. Lauback, Lloyd L., and John T. McConville, Muscle Strength, Flexibility, and Body Size of Adult Males, Research Quarterly, 37: 384-392, October, 1966.

12. Ganitz, H. Marie, Relationship of Somatotypes of College Women to Physical Fitness Performance, Research Quarterly, 37: 340-352, October, 1966.

13. Gross, Elmer A., and Jerome A. Casciani, Value of Age, Height, and Weight as a Classification Device for Secondary School Students in the Seven AAHPER Youth Fitness Tests, Research Quarterly, 33: 51-58, March, 1962.

14. Dempsey, Jerry A., Anthropometrical Observations on Obese and Nonobese Young Men Undergoing a Program of Vigorous Physical Exercise, Research Quarterly, 35: 275-287, October, 1964.