Chapter II

REVIEW OF RELATED LITERATURE

Physical fitness is one of the main objectives of physical education and the evaluation of physical fitness has been a constant challenge to this profession. General test norms have been evolved to assess the physical or motor fitness throughout the world. Numerous normative studies confirm the need of norms for specific target populations. The scholar has made an attempt to go through the related literature and the abstracts of such literature are included in this chapter.

Colgan\(^1\) conducted a study to compare the AAHPER Youth Fitness Test and a proposed fitness test to determine the tests that measured the same fitness components. Boys and girls 326 in number from St. John’s English School in Waterloo, Belgium (Grade 5-12) were evaluated in both the tests.

The fitness components used were the six items of the AAHPER Youth Fitness Test and three items recommended by ARAPCS Committee. Both the test batteries when satisfactorily treated revealed that the AAHPER Youth Fitness and the proposed test were measuring different components of fitness.

It was concluded that AAHPER Youth Fitness Test Battery measures “motor performance”, while the proposed fitness test measures fitness and endurance. AAHPER Youth Fitness Battery measures the same components for males and females, but age interacts with performance to a greater extent in females.

Klesius² conducted a study to consider the effect of correlating various combinations of measures collected in the administration of the AAHPER Youth Fitness Test Battery in context of a test-retest reliability to determine the reliability of the selected items and relative efficiency of the performance measures.

The test items were administered on 150 tenth grade male students at Peom Senior High School, Florida. The tests were

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administered in the following order: standing broad jump and 50 yard dash - three trials each, shuttle run and soft ball throw - three trials each, pull-ups, sit-ups and 600 yard run/walk - one trial each.

Through the statistical analysis it was found that with the exception of the sit-ups, all the items were reliable. In case of sit-up and shuttle run the first run, itself gave satisfactory indices of performance.

Stein\(^3\) conducted a study to ascertain the reliability of individual test items of the youth fitness test. Tenth and eleventh grade students of Wake Field High School were selected as subjects. The AAHPER Youth Fitness Test was administered and the reliability co-efficient for all the items was determined. He found that five of the seven test items (pull-ups, broad jump, sit-ups, 50 yard dash and soft ball throw) have shown reliability co-efficients ranging between 0.90 and 0.98. The other two items (shuttle run and 600 yard run/walk) showed average to high relationship ranging between 0.74 and 0.83. All the reliability coefficients were significant beyond 0.01 level.

Gross and Casciani\(^4\) conducted the seven tests reported in the AAHPER Youth Fitness Test Manual on more than 13,000 secondary school children to determine the value of age, height, and weight as a classification device. An IBM type 650 Magnetic Drum Data Processing Machine was used to calculate simple correlations, multiple correlations and regression co-efficients for the ten variables of age, height and weight and seven tests for each of the four groups of senior high school girls, junior high school girls, senior high school boys and junior high school boys. In general, age, height and weight have negligible value for classification purposes in all the four groups. The present study indicates that if classification indices are used, they should be calculated for the specific selected events.

Ikeda\(^5\) compared physical fitness of children in Iowa and Tokyo. The Iowa test of Motor Fitness was given to 395 Tokyo children and 355 Iowa children, 9 to 12 years of the age. The test battery included sit-ups, standing broad jump, shuttle run, pull-ups for boys, bent arm

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hang for girls and 50 yard dash. Anthropometric measurements in height, weight and leg length were taken.

The results indicated that Iowa children were heavier, taller and had longer legs than Tokyo children but Tokyo children scored better in all motor performance tests except in sit-ups.

Sloan⁶ conducted the Harvard Step Test on male students of physical education and male sophomores not specialising in physical education in Cape Province (South Africa), North Carolina and England. A modified Harvard Step Test was performed by corresponding groups of women. Assessed by this test, the fittest male physical education students were the English, and the South Africans were fitter than Americans. English female students of physical education were not as fit as South Africans but were fitter than Americans. No correlation was found between fitness index and height, weight or time devoted to organised physical training.

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Bos\(^7\) prepared percentile norms tables for selected measures of strength, power, agility, flexibility, body composition and muscular endurance from data collected in five schools of the unity of Christian School system at Hudsonville.

Zuti and Corlin\(^8\) conducted a research on physical fitness norms for college freshmen. They took 3000 freshmen at Kansas State University ranging age from 17.6 to 19.5 years. Tests were conducted for strength, flexibility, and cardio-vascular fitness. The results appeared to indicate that the college freshmen at Kansas State University were above average and the standards were appropriate for the use of American College - age population.

Resmussen\(^9\) conducted a study in South Dakota High School Activities Association. For this study, one school was selected to represent each region or section, the number selected from each school was in proportion to the school enrollment. AAHPER Youth Fitness Test was administered on 1,000 South Dakota boys in grade 7 through


10. Norms were established by computing every fifth percentile. The scores of the South Dakota boys were compared with those of national boys using the age only. He found that medium scores of South Dakota boys at all ages were higher than those for national boys on all items except the pull-ups, the shuttle-run and the 50 yard dash.

True\textsuperscript{10} administered the AAHPER Youth Fitness Test to a sample of 56 boys including 20 athletes and 36 non-athletes and the regular programme of physical education was administered to all classes. The test was again administered after which the classes were exposed to an accelerated programme of conditioning. Significant increase was shown in case of both groups as a result of the accelerated conditioning programme in the pull-ups, push-ups, and 600 yard run/walk. The non-athletic group showed significant improvement from the accelerated programme in all the tests except in standing broad jump.

Robbins\textsuperscript{11} conducted a normative study for Alabama students of 1 to 9 classes. About 2,545 boys and girls, aged 6 to 14 years were given


AAHPER Youth Fitness Test and AAHPERD Health Related Fitness Test. The percentile tables were constructed for each item and, based on age and sex, Alabama and national means were compared. Alabama students scored better on events measuring agility, speed, and cardio-vascular endurance but the national scores in abdominal, muscular endurance and flexibility were better.

A physical fitness norm for South African boys was prepared. Their physical fitness level was compared with that of Canadian boys by Andrews.¹² He administered the AAHPER physical fitness battery. The mean scores of the South African and Canadian boys were compared. The South African boys performed significantly than Canadian boys.

Haley¹³ explained the effect of age on physical performance of elementary school boys in grades one through six. Thirty subjects were randomly selected from each class. The age of subjects ranged from 5 years 9 months to 12 years 2 months. Twelve tests were conducted to test the motor performance of the subjects. The study showed that (1)

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motor performance score increased with age and (2) flexibility tended to decrease with age.

Knuttnen\textsuperscript{14} conducted the study of comparison of fitness of Danish School children with American School children. AAHPER Youth Fitness Test was administered on 319 male and 134 female Danish School children. The results of the testing were compared to the American standards, which were compiled in terms of both age and the Nelson-Cozens Classification Index. It was found that approximately 70\% of the boys scores and 86\% of the girls' scores exceeded the various American mean scores.

\textsuperscript{17} Backford\textsuperscript{15} conducted this study to evaluate the physical fitness level of Navajo girls 14-16 years old. AAHPER Youth Fitness Test was administered on the subjects selected from seven schools of the region to measure the physical fitness level. Also, norms were established on the basis of the scores obtained from test results from these schools. These norms were compared to national norms found in the manual accompanying the AAHPER Youth Fitness Test. The results of the


study gave an indication of the overall fitness level of 15 to 16 years old Navajo girls. Of the seven test items and it was observed that the Navajo norms were below the national norms on five items and above on the softball throw and 600 yards run/walk.

The physical fitness norms for Nigerian boys and girls of 11 to 18 years of age were computed by Anyanwn. The included test items were: shuttle run, push-ups for boys, chair push-ups for girls, flexed knee sit-ups, 45 meter dash, standing long jump, pull-ups for boys, flexed arm hang for girls, nine minute run/walk for students of 11-12 years and 12 minute run/walk for subjects of 13-18 years. A comparison of the mean score of the United States and the Nigerian Youth showed that at the upper age levels, the United States youth had better physical fitness status than their Nigerian counterparts, whereas at the lower level there was not much difference.

Falck prepared the percentile norms for girls of age 12, 13, 14 and 15 on the North Caroline AAHPER tests. The norms were prepared for each of the five test items: sit-ups, side stepping, standing

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broad jump, modified pull-ups and squat-thrusts. The sit-up item provided effective differentiation on the percentile scale for each age group. The concentration of scores in the middle of the distribution for the side stepping test on the squat-thrust test resulted in effective discrimination in the centre of the ranges for all age groups. The standing broad jump test provided the greatest ranges and the best differentiation of scores on the percentile scale for the age groups. The modified pull-up test failed to differentiate the lower and of the distribution for all age groups but did discriminate above the 20th percentile.

Bitcon\textsuperscript{18} undertook a normative study for high school boys in the State of Iowa. He selected four items, used correlation technique with the AAHPER Youth Fitness Test and established validity and reliability. The four items test and the AAHPER Youth Fitness Test was conducted on 84 High School boys. The degree of relationship between the two tests was found by computing and correlating the composite scores. The reliability of the four items test was determined by test-retest technique. The co-efficient of correlation between AAHPER

\textsuperscript{18} Lawrence Engene Bitcon, "Validation of a Four Item Physical Fitness Test and Norms for High School Boys in the State of Iowa," \textit{Dissertation Abstracts International} 26 : 7 (January 1966): 3741-42.
Youth Fitness Test and composite score, and between the test-retest composite scores of the four items test were 0.934 and 0.961 respectively. Percentile norms were computed for each of the items and composite scores.

Taddonio\(^{19}\) conducted a study to compare the physical fitness of the public school students from economically deprived areas with national norms. The study also compared the physical fitness of public school students from high poverty areas with those from low poverty areas.

Analysis of the data revealed that (1) the great majority of differences between students from economically deprived areas and the 1975 national norms and between students from high poverty and low poverty areas were not statistically significant and (2) poverty level was not related to the thickness.

Humphrey\(^{20}\) conducted a study to investigate the physical fitness levels of third-grade pupils taught by specialists and non-specialists.

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\(^{20}\) Mary Ann Maxine Humphrey, "A Comparison of Fitness Levels in Elementary Children as Taught by the Specialists and as Taught by the Non-specialists," *Dissertation Abstracts International* 44:6 (December 1983): 1724-A.
Using the American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD) Lifetime Health Related Physical Fitness Test (HRPFT) for the first time in a comparative study of this nature. It was selected and administered to 100 non-specialist pupils and 100 specialists pupils from 20 randomly selected schools. Analysis of the data showed that the specialist group had significantly higher scores on nine of the twelve tested components.

Barbanti\textsuperscript{21} established physical fitness norms for Brazilian School children. In the physical fitness test battery he included sit-up test, nine minute run, twelve minute run, fifty meter dash and standing long jump. The tests were administered on 2342 school boys and girls.

Carl\textsuperscript{22} compared the norms of boys and girls of Delaware with national norms. The Delaware norms were equal to or higher than national norms between the 25th and 85th percentiles except for shuttle run. The Delaware norms also tended to be higher at the 50th and 100th per centiles.


Watson\textsuperscript{23} conducted a study to evolve norms for Nebraska boys and girls. The test items for the NEBELE physical fitness test were standing long jump or vertical jump, and 50 yard run. The items for secondary test were pull-ups or flexed arm hang, 50 yard dash, standing long jump, sit-ups, side-step, and 1 mile or 9 minute run or 12 minute run. A random sample of schools in Nele (1\%) was selected to participate in the establishment of these norms. Norms were established for each test item for girls and boys grouped according to the chronological age. Percentile tables were prepared. Based on the results of the investigation, the following recommendations were formulated. There should be a test item included in ELE test, grade 1-6, to evaluate shoulder girdle strength. Norms need to be established for the 1\frac{1}{2} mile or 12 minute run. There was a need to establish norms for the girls chin-ups.

\textsuperscript{Q} Johnson\textsuperscript{24} in a study proved that AAHPER Youth Fitness Test was partial indicator of both motor and cardio-respiratory fitness. He administered these two tests on 47 women physical education majors.


\textsuperscript{24} Karle Ruth Johnson, "The Relationship Between the AAHPER Youth Fitness Test and the 12 Minute Test," \textit{Completed Research in Health, Physical Education and Recreation} 12 (1970): 150.
Significant relationships were found between the ‘t’ score and the total of the AAHPER test and both the distance covered and fitness categories of Cooper’s 12 minute test. Other significant relationships were found between each item of AAHPER battery and the total scores of battery. Five of these items i.e. 600 yard run/walk, soft ball throw, standing broad jump, shuttle run and bent arm hang were found to be significantly related to 12 minute run/walk test.

Herman\textsuperscript{25} administered the AAHPER Youth Fitness Test on 100 rural and 100 urban boys. The urban boys were superior to the rural boys and the difference was significant at .01 level. The two samples were weaker on the same components of physical fitness.

Alston\textsuperscript{26} made a comparison between the performance of girls on the Virginia Physical Fitness Test, AAHPER Youth Physical Fitness Test and North Carolina Physical Fitness Test. She found the correlation between the Virginia and the AAHPER test to be 0.89 between the AAHPER test and North Carolina test 0.80. The mean

\textsuperscript{25} Boone Herman, “A Comparison of the Physical Fitness Level of Urban and Rural Boys,” \textit{Completed Research in Health, Physical Education and Recreation} 10 (1967): 86.

differences gave essentially equivalent results for assessing physical fitness of high school children.

Beltora\textsuperscript{27} conducted a study on the AAHPER Youth Fitness Test on 232 Brazilian girl students. The results were compared with the standards for girls in the United States. The comparison of ‘Median’ scores within each age group showed that Brazilian girls had consistently better results in the standing broad jump and 600 yards run/walk than the girls represented by the standard. The United States girls had a higher ‘Median’ score in the soft ball throw in every age group. No consistent differences were found in the other test items.

The Indiana Physical Fitness Test\textsuperscript{28} for high school boys and girls included four items to measure components of motor fitness. The test items were not time consuming. They were easy to administer. The items includes staddle-chins, squat-thrust, push-ups and vertical jump. A physical fitness score was obtained by multiplying the sum of the scores on the first three items by the score of the verticle jump.


\textsuperscript{28} State of Indiana, \textit{Physical Fitness Manual for the High School Boys} (Indiana: Department of Public Instruction, 1944), pp.5-13.
Norms were base upon classification index divisions for boys and girls. The norms were established for each six classification groups.

A physical fitness test with 19 items was conducted by Karvener\textsuperscript{29} on Finish Secondary School Children. The test battery included balance, flexibility, agility, strength, power and endurance. Several tests were of pass fail type. The following major results were obtained:

1. Balance test, squat stand and dizziness recovery were the tests that were included in the study.

2. Tests like floortouch, man lift and endurance hops were very easy and extended press-up was found very difficult.

3. The standing broad jump showed improvement with age. The test battery on the whole was not satisfactory.

Barrow and Mc Gee\textsuperscript{30} have reported that Glover constructed a physical fitness test battery for primary grade children. The items were:

1. standing broad jump, 2. shuttle run, 3. seal crawl, 4. Sit-ups. The test

\textsuperscript{29} M.J. Karvener, "Physical Fitness of Finnish School Children," \textit{International Research in Sports and Physical Education (Springfield, Illions, Bannerstone House, 1964}.

was meant for measuring essential components of motor qualities. The norms were prepared for four items and were also used for classifying the children into ability groups by assessing the physical fitness.

Shore\textsuperscript{31} constructed a motor fitness test battery with thirty test items for lower classes of elementary school boys. Two test batteries with seven items' each were developed on the basis of the rotated factor loading of the test items. The first test battery were consisted of highest loaded test items for each factor: 1. Clarke's strength composite, 2. Mc Cloy's endurance rate, 3. Well's sit and reach, 4. Bass's balance on stick, 5. Leg flexion and extension flexibility, 6. Arm flexion or the back flexibility, 7. Modified push-ups. The second test battery was consisted of more feasible test items: 1. Grip strength, 2. 300 yards run, 3. Well's sit and reach, 4. Bass balance on stick lengthwise, 5. Leg flexion and extension flexibility, 6. Arm flexion or the back flexibility and 7. Modified push-ups.

In another study Miyashita and Sadamata\textsuperscript{32} found differences in physical fitness of Japanese children compared to that of European and North American children.

Eighteen different power tests predicted to measure anaerobic power, were administered to 31 college men by Manning, Manning and Perrison\textsuperscript{33} Factor analysis extracted five factors, but none of the five factors agreed with the hypothesis criterion of anaerobic power. The results also revealed that un-related aspects exist among the variables and that they were not measuring similar qualities thus emphasizing ambiguity.

Gayle and Dairss\textsuperscript{34} conducted the study to examine their suitability for assessing strength in children. Three static and two dynamic tests were administered to 148 public school students' ages 9-12 years. Results suggested that (1) modified pull-ups and right angle push-ups tests did not adequately discriminate between strong and


weak children in strength; (2) body size was related to better performance on static tests and weaker performance on dynamic tests; (3) to obtain a truer measure of absolute strength, a static test should be used instead of or in addition to, dynamic test like modified pull-ups. Field tests of dynamic and static strength in children, ages 9-12 years.

Beard\textsuperscript{35} conducted a study to investigate the effects of a 10 weeks physical training (aerobics) and nutrition education/counseling programme on body fat was conducted on 443 children attending Tarrant Elementary School. The students participated in regular physical education classes or aerobics classes students found to be obese at the program’s beginning were given nutrition education/counseling by either handouts or lectures for their parents. Skinfolds were taken prior to and following a treatment period of 10 weeks. ANOVA was used to determine: (1) differences made in body fat between treatment and regular groups, and (2) differences in body fat between obese children receiving handouts or lectures, and non-obese children receive no nutrition education/counseling.

\textsuperscript{35} Leslie Self Beard, “Effects of a Physical Fitness Programme on Obese Children Ages Six to Eleven,” Dissertation Abstract International 48:9 (March 1988): 2272-
Results were that statistically significant differences were found between body fat of aerobic and regular physical education groups (p < .05). The aerobics group demonstrated significantly great decreases in fat all than the regular physical education group. No statistically significant differences in body fat were found between the three nutrition education/counseling groups.

It was concluded that the aerobics program was more effective than the regular physical education programme for fat reduction. Neither nutrition education/counseling strategies were shown to be effective in reducing body fatness.

Su\textsuperscript{36} made an effort to develop fitness norms for school aged children in Hsinchu, Taiwan. The purpose of the study were: (a) to develop health physical fitness norms for school aged children and youth (ages 7 to 18 years) in Taiwan, and (b) to make age and gender comparison one each of the five physical fitness items. The subjects involved in this study were a randomly selected sample of children and youth ages 7 to 18 (N = 2368) from Hsinchu, Taiwan.

Each subject completed the following test items: (a) bent-knee sit-up test, (b) pull-up test, (c) height and weight measurement, (d) sit and reach test, (e) modified pull-up test, (f) skinfold measurements, and (g) one-mile walk/run or half mile run/walk.

Raw data were converted to percentile. The percentiles for each test item varied by age. Data analysis (p < 0.05) indicated (1) older (16 to 18 year olds) and younger (7 to 10 years old) students tended to be different in the sit and reach test. (2) Male students performance the same in sit-ups after age 10 (3) Male student above age 10 scored higher on the pull-up test than all female groups. (4) Male students above age 12 did not differ on the modified pull-up test. (5) Male students over age did score better than all groups of female students in the one-male walk/run test.

Elnashar\textsuperscript{37} evaluated 399 males and 311 females, aged 9-18 years. enrolled in PE classes in Fayoum, Egypt, using the 6 - item AAHPERD test. Comparisons of the 50% with American norms revealed that the Egyptian sample was substantially below average fitness in both sexes across all age groups. Only pull-ups in males and

flexed arm hang in females in the early age groups were above the American standard. Comparisons between males and females revealed males sig superior across all ages even when age, height, and weight were held constant by ANCOVA. An 8 weeks physical fitness programme produced sig improvements in all tests in both sexes.

Singh\textsuperscript{38} prepared physical fitness norms for high school boys of Punjab state. Data were collected on 5000 subjects from various schools in the state. The test administered consisted of 8 items i.e., standing broad jump, sit and reach test, agility run, bent knee sit-ups, 50 metres dash, push-up (chairs), cricket ball throw, and 600 metres run/walk. The percentiles norms for physical fitness tests were found to be valid and suitable to assess the physical fitness level of the high school boys ages 12 to 15 years. This study showed that motor performance score increased with age.

Kim\textsuperscript{39} conducted a study to investigate the relationship between the Korean Youth Fitness Test (KYFT) and the AAHPERD Health Related Physical Fitness Test (AHRPFT). Three hundred Korean male


\textsuperscript{39} Jong Tack Kim, “Relationship Between the Korean Youth Fitness Test and the AAHPERD Health Related Physical Fitness Test for Male Korean Middle and High School Students,” Dissertation Abstracts International 46:10 (April 1986): 2961-A.
students grades 7th to 11th were subjects. The subjects completed 11 experimental test items and the data were analysed. There was a significant relationship between the KYFT and the AHRFT for the middle and high school students. The highest correlation among the five correlational comparisons was found between the KYFT and the AHRPFT with the modified pull-up added, but the lowest relationship was founded between the KYFT with flexed - leg sit-up and distance run removed the AHRFT.

Singh\textsuperscript{40} conducted a study regarding the formation of physical fitness norms and its construction for male teenagers of Jammu and Kashmir State. He prepared 3 nature of physical fitness norms like: a) Percentile \textsuperscript{16} Scale, b) Hull-scale and c) T-scale. He used the AAHPER Youth Fitness Test and prepared age-wise norms for teenage categories. He further avoted that the mean performances of students belonging to 17, 18, and 19 years of age were better than the other age groups on majority of physical fitness items. the obtained age-wise differences in performances of subjects on different items of physical fitness may be considered as the logical definite differences expected.

between ages because it is assumed that as the age advances from adolescence towards adulthood, an individual gains maturity in muscular form and structure, acquires physiological stability in functions of various systems and develops positive attitude towards physical activity.