Chapter – 2

REVIEW OF LITERATURE

The related literature reviewed for better understanding of the problem and to interpret the results systematically are presented in this chapter. The reviews were collected from various sources like books, journals, and periodicals and from websites to provide background information to the study and help us to understand several types of testing of physical fitness.

The literature in any field forms the foundation upon which all future work will be built. If one builds upon the foundation of knowledge provided by the review of literature, the investigator might not miss some similar work already done on the topic. The reviews of the literature have been classified under the following headings:

2.1. Studies on Physical Fitness Tests

Barrow [1954] conducted a study to develop an easily administerable test of motor ability for college men. Expert’s opinion was used in the validation process and 8 factors of motor ability and 20 items measuring those factors were chosen. The selected tests were administered to 222 college men and in statistical analysis items reliability, men and in statistical analysis items reliability, objectivity, correlations with the criteria, and inter-correlations were studied. Two test batteries including one short indoor test was recommended. Test scores should indicate performance in relation to norms which have been established for the particular groups for the classification. Such norms were
provided for both battery number one and battery number two for the following two groups: (a) college men on an unclassified basis and (b) physical education major children. The test’s raw scores were recorded on a score card. The raw scores were converted into ‘T’-scores and weighted standard scores. The weighted standard scores were summed and a general motor ability was obtained. This score was referred to the appropriate table of norms and the children’s motor ability rating was found.

**Fleishman [1963]** conducted a study on thirteen tests measuring eight physical fitness factors which were administered to over 20,000 children between the ages of 12-18 in 45 cities distributed throughout the United States. The results of this study provided (a) normative table by which individual program one could be evaluated by test, age and sex and (b) ‘growth curves’ which showed the development of the different physical proficiency components during the adolescent and sub-adult period. Finally, the recommendations were made for batteries of tests which provided a more comprehensive and efficient coverage of physical factors.

**Reet Mohinder Singh (1986)** prepared physical fitness norms for high school boys of Punjab State. Data were collected on five thousand subjects from various schools in the State. The test administered consisted of eight items i.e., standing broad jump, sit and reach test, agility run, knee bent sit-ups, 50 metres dash, push-up (chairs), cricket ball throw and 600 metres run-walk. The percentile norms for physical fitness tests were found to be valid and suitable to assess the physical fitness level of the high school boys of 12 to 15 years of age.
Johnson[1970] in his study proved that AAHPER youth fitness test is a partial indicator of both motor and cardio-respiratory fitness. He administered these two tests on 47 women physical educator major. Significant relationship was found between the ’t’ score total of the AAHPER test and both the distance covered and fitness categories of Cooper's 12 minutes run/walk test. Other significant relationships were found between each items of AAHPER battery a ‘t’ score total of the 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 minutes run-walk test.

The Canadian Association of Health, Physical Education and Recreation Youth Fitness program [1966] was started in 1964. The battery consists of the following six items, for boys and girls at the age Group of 7 to 17 years:

1. One minute speed sit-up
2. Standing broad jump
3. Shuttle run
4. The flexed arm hang
5. 50 yard run
6. 300 yard run

Falls et.al.developed physical fitness test batteries by the factor analysis technique. Utilizing the Pearson’s Product Moment correlation, a matrix of inter-correlation among 53 variables was obtained. The data were then subjected to factor analysis, utilizing the principal axis from the preliminary solution.
Two separate rotations of the axis were carried through one orthogonal and the other oblique. For the orthogonal rotation Kaiser's Varimax criterion was used. A regression equation was developed for each isolated factor so as to make possible estimation of a subject score on the factor items having low beta weights were dropped from the equations in order to reduce the number of variables on each extracted factor were utilized as the validity correlation, utilizing the factor loadings of a variables on each extracted factor in the orthogonal solution, on the criterion coefficients. Multiple regression techniques were utilized to develop a test battery for the isolated factors.

In order to construct a scientifically designed evaluative instrument to assess the motor fitness, boys in the primary grades Dinnuci1973, purported 30 test items to measure muscular strength, muscular endurance cardiovascular endurance, Power, Speed, Agility, Flexibility and Balance were administered to an incidental sample of 238 boys aged six to nine years. An inter correlation matrix was constructed for the factor analysis of the data using the principal axes method. Seven factors having values above 1000 and accounting for 67.17 per cent of the variance were isolated. The first of the two test batteries developed including the test items which loaded highest on each factor and were as follows Clerk's strength composite, McClay's endurance ratio, Well's sit and reach; Base balance on a stick length wise; Wrist flexion and extension flexibility: arm flexion on the back flexibility and modified push-ups. The second test battery developed for more administrative feasibility, including the item which loaded high on each factor and eliminated composite scores and ratio. The items in test battery II were grip strength,
300 yards run, Well's sit and reach, Base balance on a stick length wise, Wrist flexion and extension flexibility, arm flexion and the back flexibility and modified push-ups.

Meeks 1966 administered AAHPER youth fitness test to 264 girls at Homan Junior High school St. Ann. Missouri. The 27 girls who scored the highest on the test were designed as the 'unfit group'. These groups were compared in academic achievement by grade point average, personality by the California Test of personality, and social acceptance among their peer group by a socio metric design. The physical fit children had better personalities, made better grades and were more socially accepted by their peers than the physically unfit children.

Walker 1982, conducted a research on 50 Blacks and 50 white females 10th grade children who were randomly selected and compared on the AAHPERD youth fitness test. The Black children scored significantly higher (P 0.05) than the white children on leg power (M=44.6% and 31.2% respectively) and speed (M=57.8% and 30.1% respectively). The white children performed significantly higher than the Black children on abdominal strength (M=31.5% and 27.7% respectively). No other comparisons were significant.

Stein1964 determined the reliability coefficient for all the items. He found that Pull-ups, Broad jump, Sit-ups, 50-yard run and Soft ball throw have high reliability coefficient ranging from 0.90 to 0.98. Shuttle run and 600 yard run / walk have reliability ranging from 0.74 to 0.83 only. The entire reliability coefficients were significant beyond 0.001 levels.
Joseph 1983, analyses the relationship of power, agility, flexibility and measurements of selected body segments to Volleyball playing ability testing thirty Volleyball players are found that power was the most reliable single variable in predicting playing ability Volleyball. Arm length and leg length were also reliable. Flexibility and agility showed significant relationship to the playing ability.

To find out the relationship of speed, strength and agility with the playing ability in Soccer, twenty Male Soccer players of KendriyaVidyalaya, Calcutta were selected as subjects. The finding of the study indicated that speed of the subjects was a very reliable variable for predicting players’ ability of male Soccer players as the correlation value between speed and playing ability (ratings judged by a panel of 3 experts for each subject during the game) obtained was 0.597. It further revealed that the correlation values between standing broad jump, agility and playing ability was 0.444 and 0.526 respectively. All the above mentioned values were found significant at 0.05 level of confidence. Further, the correlation values between sit-ups, pull-ups, push-ups and playing ability obtained were 0.102, 0.258 and 0.430 respectively. These values indicated low positive relationship Chaudhary, 1999.

To construct a specific test battery of Motor fitness for Football players, the subjects were 50 male Football players of LNIPE, Gwalior. The Pearson’s Product Moment Correlation (r) was used to know the contribution of all items of motor fitness to Football performance. The result of the study showed that kicking for distance, 70 metre
run, 1 mile run and WM agility run with ball contribute much to playing ability in Football among Motor fitness Singh 1999.

A study on simple physical fitness test battery for Elementary School children was conducted for 152 boys and 150 girls of KendriyaVidyalaya School, Gwalior studying from grades one to five. All the subjects and the assistants were oriented to the test battery comprising 50metres dash, 600metres run and walk, straight leg strides, vertical jump, 4 x10m shuttle run and modified push up. The subjects were given practice in these items so that they were able to give the correct performance in each item. The assistance was properly oriented to record measurements accurately, so that mistake could be avoided. Test items were administered to the subjects on two days, three items each day. After one day rest, the same children were tested again for establishing the reliability. The value of ‘r’ obtained was 0.87, which showed that the subjects have achieved consistency of performance in the test items. The data were collected during forenoon session. Norms were computed for the six physical fitness items. The norms used for classifying children into ability groups by observing their physical fitness.
Robson 1978.

A study on the relationship of selected fitness variables to the performance in Basketball was intended to determine the relationship of selected physical variables namely, speed, power, cardiovascular endurance and agility to performance in Basketball. The players from professional College of Physical Education were selected as
the subjects and AAHPER physical fitness test was administered to collect the data.

(Hasrani, 1989)

To construct norms for health related physical fitness variables for High School boys of 15 years in Andhra Pradesh, 1005 subjects were selected from various schools in Andhra Pradesh. The following variables were selected for this study: aerobic endurance, body composition, muscular strength and upper body strength. Calculation of mean, standard deviation and hull scale were the statistical techniques used in this study. As per the qualification grading after the constructed norms, in aerobic endurance, 182 subjects were poor, 194 subjects were fair, 319 subjects were average, 182 subjects were good, 84 subjects were very good and 58 subjects were excellent. In flexibility, 170 were poor, 259 were fair, 242 were average, 210 were good, 72 were very good, 52 were excellent. In muscular strength/endurance, 334 were poor, 249 were fair, 202 were average, 97 were good, 68 were very good and 55 were excellent. (Rao, 1993)

Moorthy1982 conducted a survey of minimum muscular fitness of school children of age groups six to eleven years and compared the influences of selected yogic exercises and physical exercises on them. In that study, 1000 children (571 boys and 429 girls) from second standard to seventh standard attended at three schools. Ninety boys and ninety girls from the total strength were randomly selected for experimental purposes. They were divided in to three equal groups each group consists of thirty subjects Thirty boys and thirty girls were randomly allotted to Experimental Group – I (Physical exercises) Experimental Group–II (Yogic exercises) and Control group III The
Experimental groups undergone the treatment for period of six weeks. Whereas control group not involved any exercise program other than their day to day activities. From the results of the study both experimental groups showed significant improvement after six weeks training when compared to control group. The percentage of improvement was seen much greater in yogic group than in physical exercise group.

James 1992 conducted a survey of physical fitness of higher secondary school children age between sixteen and nineteen years at low, medium and high altitudes in Tamil Nadu. For the purpose of this study he has selected 315 school boys studying XI to XII standard from nine schools at low, medium and high altitudes for this survey, the scores made by these subjects at each level of altitudes was compared with other level of altitude. Physical fitness, emotional, social, spiritual and mental fitness tests were conducted. The data collected at different altitudes analysed by using one way analysis of variance (ANOVA).

1. The medium altitude children of the age 16 to 19 years performance better in pull ups and 50 yards run than low and high altitude children of same age group.
2. The same subjects at high altitude performed well in standing broad jump, 600 yards run walk than the low and medium altitude children.
3. They have done well at low altitude in shuttle run than the other two level of altitude.

Resmussen (1970) conducted a study on South Dakota high School boys. For this study one school was selected to represent each region or section, the number of subjects selected from each school was in proportion to the school enrolment. The AAHPER
Youth Fitness Test was administered to 1000 South Dakota boys in grade 7 through 10. Norms were established by computing every fifth percentile. The scores of South Dakota boys were compared with those of national boys only on age. He found that the median scores of South Dakota boys at all age were higher than those for national boys on all items except the pull-ups, the shuttle run and the 50 yard dash.

2.2. Studies on Construction of Norms for Physical Fitness

Elnashar 1982 conducted a study on 399 males and 311 females aged 9-18 years enrolled in physical education classes in Fayoum, Egypt and were evaluated using the 6 item AAHPER Youth fitness test. Comparison of 50% with American norms revealed that Egyptian samples were substantially below average fitness in both sexes across all age groups. Only pull-ups in males and flexed arm in females in the early age group were above the American Standard. Comparison between males and females revealed males significance superior across all ages even when age, height and weight were held constant by ANCOVA. An eight week physical fitness programme produced significant improvement in all tests in both sexes.

Barrow and McGee 1971 have reported that Glover constructed a Physical Fitness test battery for boys and girls for primary grade children. The items included in this test were: (1) standing broad jump (to measure power and leg strength), (2) shuttle run (to measure leg strength, speed and endurance), (3) seal crawl (to measure arm and shoulder girdle strength, endurance and speed). The test measured the essential components of motor qualities of primary grade children. The norms were prepared for
the four items and were also used for classifying the children into ability groups by assessing their physical fitness.

The Amateur Athletic Union of U.S.1974, constructed A.B.C. Physical fitness and proficiency test and has published standards designed to motivate boys and girls to increase athletic sports participation for the development of physical fitness. Certificates of achievement are available for youngsters, who meet the standards in five required and one optional event. The requirement events were sprints, walk and run, sit-ups, and standing long jump. The optional items were push-ups, soft ball throw for distance and running high jump. The distance varied according to age groups in running and walking items, and modified pull-ups and press-ups were prescribed for girls and for boys less than 10 years of age. Separate standards were prescribed for boys and girls, in two years age categories from 6 to 15 and in final grouping for 16 to 18 years old.

Elizabeth 1960prepared norms for girls aged 12, 13, 14, and 15 years on the North Carolina AAHPER Tests. Norms were prepared for each of the five test items, sit-ups, side stepping, standing broad jump, modified pull-ups and squat thrusts. The sit-ups item provided differentiation on the percentile scale for each age group. The concentration of scores in the middle of the distribution for the side stepping test and 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 end of the distribution for all age groups but did not discriminate above the 20th percentile.

The AAHPER 1962 youth fitness test project represented the first attempt by the physical education profession establish national norms. The test battery was originally developed in 1957 by a special committee of the AAHPER recreation council. The youth fitness test now consists of six items, for both boys and girls of age group of 10 to 17 years. The norms were revised and made up to-date to make more scientific after comparing the achievement of the youth of Great Britain, Japan, etc., with the American norms.

Hawkings 1982, physical fitness status of AR Junior state-ranked Tennis players was evaluated. The study was limited to 50 (27 boys and 23 girls) AR Junior tennis players who were ranked by the AR Junior Tennis Association. Fitness traits evaluated were: balance (Bass stepping stone test); strength (sit-ups, standing long jump, push-ups), agility (shuttle run-, endurance 600 yard run/walk) and flexibility (shoulder flexibility). Those ranked high as tennis players were compared on each of the measures with those ranked lower. Analyses were computed separately for boys and girls and also for 3 age levels within each group. No significant differences were found. When compared with national norms the children were above average on' the national norms except for the shuttle run. When boys were compared with girls, 11-12 year old had no significant difference; 13-14 year old boys were significantly better than girls on endurance, and 15-16 year old boys were better than girls on endurance, speed, strength and agility.
Knuttgen 1961 conducted a partial determination of fitness, the youth fitness test of the American Association for Health, Physical Education and Recreation. The test was given to 319 male and 135 female Danish school children. The results of the testing were compared with the American standards which were compiled in terms of both age and the Neil so-Cozens classification index. It was found that approximately 70 per cent of the boys and 86 per cent of the girls exceeded the various American mean scores.

Berger and Paradir 1969 studied the comparison of Physical fitness scores of white and black seventh grade boys of similar socio-economic level. Boys (N=115) in the seventh grade of Junior High School were tested for physical fitness by the AABPER youth fitness test. In addition, data were collected for age, height, weight and socio-economic level of each boy. Two racial groups were formed consisting of 30 white and 30 black children who were matched in age and socio-economic level. The purpose of this study was to determine whether the physical fitness of white and black children of equal socio-economic level was significantly different. There were no significant differences between the groups in age, height, weight, and socio-economic level. The black children exceeded the white children significantly on the shuttle run, 50 yard dash, 600 yard run and composite fitness score. It was concluded that black male children of similar socio-economic level to white children in the seventh grade have a higher level of physical fitness.

An international research program for the standardization of physical fitness test was undertaken by the International council on Health, Physical Education and
Recreation (ICHPER, 1962). A committee for the standardization of Physical Fitness Test was appointed at Tokyo in 1964 to set up standards and to construct instruments for the measurement of physical fitness. A survey was conducted and a list of tentative standards was distributed to all members of the committee for review. The comments and recommendations received were discussed at the meeting held in Switzerland in August 1967.

The performance tests were developed into two parts, the basic combination of test items including the endurance run (800 metres run and walk), the 50 metres sprint pull-ups, or the flexed arm hanging (for girls), standing broad jump and grip strength. The following additional test items applied under special circumstances were short sprint, two minutes sit-ups, bench press (15 kg press and 25-30 repetition), one minute trunk curl, vertical Jump, 10 metres shuttle run and arm flexion strength.

Singh1988 prepared Physical fitness norms for high and higher secondary school boys of Jammu and Kashmir State. Data were collected on 4200 male children belonging to six to eleventh classes of age 13 to 19 years subjects randomly selected and they were administered the AAHPER Youth Fitness Test. Age wise norms were prepared in terms of Percentile scale, Hull scale and T-scale.

Norms for the ninth and tenth standard boys of higher secondary schools and intermediate college of Varanasi town have been prepared on eight motor fitness tests. The test items included were standing Long jump, Burpee, Sit and reach, Bent knee sit ups, Push up, 50 yard dash, Nine minutes run / walk. For this purpose the researcher collected
data from 4021 subjects and on eight motor fitness test and constructed Percentile scale, 6 sigma scale and Hull scale, on each test separately. Besides preparing the correlation it was also studied age, height, weight and all the items of motor fitness test.

**Pillai1991** conducted a study on computation of norms for 12 minute run and walk among school boys. Data was collected on 1000 school boys belongs to sixth to tenth classes of age 13 to 15 years subjects were randomly selected and they were administered the Cooper's 12 Minutes Run / Walk test. Age wise norms wore prepared in terms of Hull scale.

**Callaway1983** constructed Percentile norms for Alabama children in grade 1-9 based on both AAHPER Youth Fitness Test and AAHPER Health Related Fitness Test. The subjects were 2545Alabama boys and girls. Norms were constructed for each test item based on age and sex. The obtained mean performance on each test items were compared with national norms. Ikeda conducted a study on comparison of physical fitness of children in Iowa, U.S.A., and Tokyo, Japan. He reported that Tokyo children scored better than Iowan (U.S.A.) children in pull-ups (boys) bent-arm hang (girls) and the grass-hopper (a test of endurance) while the Iowan children scored better in sit-ups.

**Yadev, (1986)** A study on standardization of physical fitness norms for school children of Haryana (13 to 16 years of age) was conducted with the purpose of estimating the fitness and comparing the standard of physical fitness between urban and rural boys of Haryana. For the purpose of this study, 3600 school boys of the twelve districts of Haryana were randomly selected and the performance of the boys were
recorded on 50m dash, shot-put, standing broad jump, zigzag run, sit-ups and step up test. The norms in terms of percentile rank of said group were developed.

In 1980, AAHPERD published its new health related physical fitness test manual. The test was designed for boys and girls of age from 6 to 17 years. The data were collected for over 12,000 boys and girls from throughout the nation and used to develop gender specific percentile rank norms for each test. *(Nelson, 1982)*

Construction of norms was done for the AAHPERD youth fitness test variables for the Physical Education professional College men and women children in Tamilnadu. A total of 1064 men children and 460 women children studying in seven Physical Education Colleges in Tamilnadu were selected as subjects for this study. AAHPERD youth fitness test variables namely, shoulder strength, abdominal strength, agility, power, speed and endurance were selected for norm construction separately for men and women. Mean, Standard Deviation and Hull Scale were used as the statistical techniques to construct the norm. *(Helina, 1997)*

For the construction of test and computation of norms for the measurement of agility, 4848 boys were selected from all the KendriyaVidyalaya School of Tamilnadu State. The test scores were correlated using Pearson’s Product moment correlation and intra class correlation method. The result of the study revealed a reliability coefficient of different groups and tested population varying from 0.75 to 0.99 which was highly significant. The validity coefficient ranged from 0.85 to 0.93 which showed a high
validity. Further, a norm scale using Hull Scale was also computed for agility. 

(Vairamani, 1996)

To compute norms for physical fitness of Primary School children of Punjab and Haryana, the data relating to male, female, rural and urban Elementary School children of age group 6–11 years of Punjab and Haryana were collected by using Glover (1962) physical test battery on (N=2500) each from Punjab and Haryana. To assess physical fitness of Elementary School children of age groups (6-11 years), mean and standard deviation were computed and to determine the differences in selected variables among five levels, one way analysis of variance was computed. ‘t’ ratio was computed to analyse the significant difference if any, existing in inter groups as well as on physical fitness test battery. Further Scheffe’s post hoc test was applied to analyse the significant difference in pairs and finally Percentile Scale, T-Scale and Hull Scale were computed for norms for various age groups and in different variables of physical fitness of Punjab, Haryana, male, female, rural and urban Elementary School children. Based on the findings and within the limitations of the study, the following conclusions were drawn:

1. The subjects belonging to the age group 6-11 years of Punjab and Haryana showed varied performance in standing broad jump, shuttle race, sit-ups and seat crawl.

2. There were variations in the performance of Punjab’s male, female, rural, urban elementary children in ages 6-11 years in standing broad jump, shuttle race, sit-ups and seat crawl.
3. There were variations in performance in Haryana’s, male, female, rural and urban Elementary School children in ages 6-11 years in standing broad jump, shuttle race, sit-ups and seat crawl. (Singh, 1996)

To compute norms and validation of McDonald Soccer test, 250 male Soccer players who played in the first division tournaments registered in Tripura state Football Association were selected as the subjects. The Mean and Standard Deviation was computed. Based on this, ‘t’ scale was computed and norms were constructed. (Gupta, 1986)

For a study on construction of norms for the predicted skills, physical and anthropometrical variables for College men Soccer players in Kerala, initially, one hundred men soccer players were selected for the prediction. The data were collected for one hundred soccer players on the chosen nine variables, via, dribbling, ball control, kicking, speed, power, endurance, height, and leg strength and thigh girth. After prediction of the variables for the purpose of the norm construction, two thousand Soccer players from different Colleges between the age of 18 and 25 years were selected as subjects. For the prediction, Wherry Do Little method of variable selection was employed. From the nine chosen variables, ball control power, dribbling and endurance were predicted in the order of importance. After the prediction data were collected for 2000 subjects on the predicted variables, to construct norms, Hull Scale was employed. As per the qualitative grading, it was found that 317 subjects fell in failing group, 873 subjects fell in below average, 748 above average and 137 were good in ball control. In power, 18 subjects were failing group, 260 were below average, 829 were average, 609
were above average and 93 were outstanding. In dribbling, 158 were in failing category, 126 were below average, 744 were in average, 773 were above average, 238 were good and 36 were outstanding. In endurance, 101 subjects were in the failing category, 90 were below average, 767 were average, 813 were above average, 276 were good and 28 were outstanding. *(Varghese, 2000)*

For construction of norms in selected athletic events for the undergraduate Physical Education men children in Karnataka state, 645 men children were selected as subjects. The data collected from the selected athletic events were 100 metres, 800 metres, 1500 metres, long jump, shot put. The data were statistically analysed with the help of Mean and Standard deviation. The raw scores were converted into Hull Scale norm scores. In 100 metres, as per the norm scores 102 were poor, 120 were fair, 160 were average, 186 were good, 73 were very good and 4 were excellent. *(Gowda, 1995)*

Physical fitness norms for High School boys of Punjab state from five thousand subjects were constructed. The test administered consists of eight items that is, standing broad jump, sit and reach test, agility run, knee bent sit ups, 50 metres dash, push ups (chairs), Cricket ball throw and 600 metres run/walk test. The percentile norms for physical test were found to be valid and suitable to assess the physical fitness level of the High School boys of 12 to 15 years. *(Singh, 1986)*
2.3. Studies on Comparison of Physical Fitness on Selected Groups

Traddonio 1982 conducted a study to compare the physical fitness of public school children from economically deprived areas with national norms. He also compared the physical fitness to public school children from high poverty area with those from low poverty area. The national norms were developed from the 1975 national survey of youth fitness. The AAHPER youth fitness test was used as the measure of physical fitness. The subjects, 90 titles 1 eligible school, 180 class rooms and 1080 children from 12 largest standard areas in the United State were taken for this study.

In the statistical analysis involved, it was found that there was no difference in the physical fitness of boys and girls represented by 1975 national norms. It was found that also there was no difference in physical fitness of boys or girls, of high poverty areas and girls from low poverty areas.

Johnson 1971 carried out a study to gain an understanding of the inter-relationship between a student's levels of physical fitness and self-concept. A further purpose was to determine if Negro children differ significantly in terms of physical fitness and self-concept from white children. He found out that Negro high school boys were superior to white boys in strength, cardio-vascular endurance, state in health, physical appearance, skills and sexuality. A greater relationship between physical fitness and self-concept was found among whites than among Black high school children.
Alston 1965 made a comparison between the performance of girls on the Virginia physical fitness test, AAHPERD youth physical fitness test and North Carolina physical fitness test. He found the correlations between the Virginia and the AAHPERD test was 0.89 between AAHPERD test and the North Carolina test 0.80. The mean difference gave essentially equivalent result for assessing physical fitness of high school.

Craig 1976 compared the physical fitness levels of Canadian and South African School boys. He used CAHPER Physical Fitness Test battery. The results showed that physical fitness levels of South African high school boys were higher than those of Canadian high school boys. Kirchner and Gliner, made a comparative analysis of Eugene, Oregon elementary school children using the Kraus-Weber test of minimum muscular fitness. The Kraus-Weber test was administered in 1956 to a random sample population of 1195 elementary school children of Eugene, Oregon of the children in the Eugene sample 38.1% failed in one or more of the test items. This was lower than the original Kraus's findings of 58.7%. The girls were superior to the boys at all age levels. The reason for this difference was largely due to failures in flexibility test of the 455 children who failed the test, 78.7% failed only in one item, 17.4% in two Items, 2.9% in three Items and 1.1% in four Items. For both sexes, there was a decrease in strength failures at each increased age level, at the same time, there was an increase in flexibility failures at each increased age level.

MCQui 1966 used the Quartile limits of the American and Japanese norms as bases for comparing separately with chi-square, the performance of Philippines children
whose ages were 15, 16, 17 and 18 and over years. Most of the shuttle run items were in the top quartile of both the American and Japanese norms for all the age groups. 15 years old Philippines boys performed better than their American counterparts on the other items. However the performance of Philippines boys in the pull-ups, soft ball throw for distance and sit-ups showed considerable deficiency in arm and abdominal fitness.

2.4. Studies on Rural and Urban school Children.

Albarwani et al. 2009, conducted a study the effects of overweight and leisure-time activities on maximal aerobic capacity (VO2max) in urban and rural Omani adolescents. For the purpose of the study A total of 529 (245 males, 284 females) adolescents, aged 15-16 years were randomly selected from segregated urban and rural schools. Maximal aerobic capacity was estimated using the multistage 20-meter shuttle-run test. The body mass index (BMI) of urban boys and girls was significantly higher than that of rural boys and girls. Urban boys and girls spent significantly less weekly hours on sports activities and significantly more weekly hours on TV/computer games than their rural counterpart. Urban boys and girls achieved significantly less VO2max than rural boys and girls (44.2 and 33.0 vs. 48.3 and 38.6 mL/kg/min, respectively). Maximal aerobic capacity was negatively correlated with BMI in urban boys.

JoensMatre2008, conducted study on Increasing prevalence of overweight in youth has been well chronicled, but less is known about the unique patterns and risks that may exist in rural and urban environments. A better understanding of possible rural–urban differences in physical activity profiles may facilitate the development of more
targeted physical activity interventions. Participants (1,687 boys; 1,729 girls) were recruited from fourth, fifth, and sixth grade classes in schools from urban areas, small cities, and rural areas. Multilevel modelling analysis was used to examine rural–urban differences in physical activity and prevalence of overweight. Physical activity was assessed by self-report and body mass index was calculated from measured height and weight. Prevalence of overweight was higher among rural children (25%; \( P < .001 \)) than children from urban areas (19%) and small cities (17%). Urban children were the least active overall (Cohens' \( d = -0.4 \)), particularly around lunchtime while at school (\( d = -0.9 \) to \(-1.1 \)). Children from small cities reported the highest levels of physical activity. They concluded that the results of this study suggest there are rural–urban differences in children's prevalence of overweight and physical activity even within a fairly homogenous Midwestern state.

**Reyes** (2003) examined a study on physical fitness of school children residents of in an urban Colonia and a rural indigenous community in Oaxaca, southern Mexico, was compared. Two measures of performance-related fitness (standing long jump, 35-yard dash [32 m]) and four measures of health-related fitness (grip strength, sit and reach, timed sit-ups, distance run) were taken on 355 rural (175 boys, 184 girls) and 324 urban (163 boys, 161 girls) school children, 6-13 years of age. Urban children were significantly taller and heavier than rural children. Absolute grip strength did not consistently differ between rural and urban children, but when adjusted for age and body size, strength was greater in rural children. Explosive power (standing long jump) and abdominal strength and endurance (timed sit-ups) were better in urban than in rural
children without and with adjustment for age and body size. Urban-rural differences in running speed (dash) and flexibility (sit and reach) varied by age group and sex. Younger rural children and older urban girls performed better in the distance run, whereas older rural and urban boys did not differ in endurance. The size advantage of urban children does not necessarily translate into better levels of performance- and health-related physical fitness. The observed differences may be related to activity habits associated with school physical education and lifestyle in the respective communities.

**Eiben et al. 2005,** presented a comparison between urban and rural boys and girls based on their Hungarian National Growth and Physical Fitness Study, carried out in the whole territory of Hungary. The sample investigated (N=39,035) comprised 15% of the 3-18 year-old healthy boys and girls in Hungary. The anthropometric programme included 18 body measurements and the physical fitness investigation used a battery of seven tests.

Data were collected also about the family background, urban boys and girls are taller, more robust and stronger than their rural counterparts. Pubertal growth spun in urban boys and girls appears about one-and-a-half year earlier, than in rural ones in width measurements. Urban boys and girls usually have higher means than the rural ones. Based on their skin folds, however, urban boys and rural girls usually have more subcutaneous fat. These differences are the most pronounced during or at the end of puberty. The authors surveyed the different urban and rural socio-economic
environmental factors, influencing children's growth and physical fitness, and they discussed the possible reasons of those differences.

**Shamli2010**, conducted a study to measure the physical activity and physiological fitness (cardiovascular fitness, body composition, flexibility, muscle strength and endurance) of 10" grade male children in the Al-Dhahirah region, Sultanate of Oman. The study sample consisted of 330 male children from rural and urban areas. The study used a physical activity survey to measure the physical activity and a test battery to measure the physiological fitness components (1 mile walk/run test; a skin fold of chest, abdominal, and thigh; sit and reach test; hand grip test; and one minute sit-ups). The results showed that body fat percentage (6.82:1:4.91) and muscle strength (38.15:1:7.60) of urban children were higher than rural children (body fat percentage 5.79:1:4.29, muscle strength 37.81:1:6.93). Rural respondents scored higher in flexibility (39.36:1:6.95), muscle endurance (40.03:1:7.64) and cardiovascular endurance (7.63:1:1.30) compared to urban children (flexibility 37.96:1:6.97, muscle endurance 39.78:1:7.67, cardiovascular endurance 8.03:1:1.77). The results showed significant difference in body fat percentage (p = 0.04), muscle endurance (p = 0.00), and cardiovascular endurance (p = 0.01) between participation in sports activities and physiological fitness components for the overall sample. The study recommended that a concerted effort be made by all parents, teachers, school administrators and the community to improve the general physical fitness of children on the whole.
2.5 Studies on Physical Activities Program

Aires et al. 2010, conducted a study to analyze the relation between body mass index (BMI), Cardio respiratory Fitness (CRF), and levels of physical activity (PA) from sedentary to very vigorous intensities, measured by accelerometer, in children from a middle and high school. This cross-sectional study included 111 children and adolescents, age 11 to 18 years. PA was assessed with an accelerometer for 7 consecutive days (1 minute epoch) using specific cut-points. PA components were derived using special written software (MAHUffe). CRF was assessed by maximal multistage 20m shuttle run. T-test was used to test differences between BMI groups, Pearson's correlation, to analyze correlations between all variables and multinomial logistic regression, and to predict the value of BMI categories. This paper provides evidence that BMI was inversely and significantly correlated with CRF. Only CRF was correlated with Vigorous and Very Vigorous PA levels and total amount of PA. Children with Overweight/Obesity were less likely to perform more laps than normal weight counterparts. The total amount or intensity level of PA did not show any influence on BMI level.

Barkley et al. 2009, studied during the play time, children engaged in short bouts of intense activity, much like interval training. This natural preference for interval-type activity may have important implications for prescribing the most motivating type of physical activity, but the motivation of children to be physically active in interval or continuous fashion has not yet been examined. In the present study, ventilator threshold (VT) and VO2 peak were determined in boys (n = 16) and girls (n = 16) age 10 ± 1.3
years. Children sampled interval and continuous constant-load physical activity protocols on a cycle ergometer at 20% < VT on one day and 5% > VT on another day. The physical activity protocols were matched for energy expenditure. Children then completed an operant button pressing task using a progressive fixed ratio schedule to assess the relative reinforcing value (RRV) of interval versus continuous physical activity. The number of button presses performed to gain access in interval or continuous physical activity and output maximum (Omax) were the primary outcome variables. Children performed more button presses (P < 0.005) and had a greater Omax (P < 0.005) when working to gain access to interval compared to continuous physical activity at intensities > VT and < VT. This suggests that interval-type physical activity was more reinforcing than continuous constant-load physical activity for children when exercising both > VT and < VT. Children likely participate in short-duration bouts of activity at a high-rate during natural play because it is more reinforcing than longer, continuous activity.

Bayer et al. 2008, investigated on how physical activity is an important determinant of energy balance. However, its impact on overweight/obesity has proved difficult to measure in pre-school children and few studies have found significant associations. A set of simple questions was used to distinguish pre-school children with high and low physical activity, and the association of this classification with childhood overweight/obesity and performance in an established motor test was investigated. Survey, cross-sectional setting and subjects’ weight and height were measured in 12,556 children taking part in the obligatory school entrance health examination 2004-2005 and 2005-2006 in three urban and three rural Bavarian regions. Their parents were asked to
answer a questionnaire with a set of questions on physical activity. The mean age of the children evaluated was 5.78 (sd 0.43) years, 6535 (52.1 %) were boys. Physically active children were less likely to be overweight (OR = 0.786, 95 % CI 0.687, 0.898) or obese (OR = 0.655, 95 % CI 0.506, 0.849) and achieved 6.7 (95 % CI 5.8, 7.7) % more jumps per 30 s than less active children in a motor test, adjusted for a number of potentially confounding variables. Classification of pre-school children as physically active or not, based on a small set of questions, revealed significant associations with overweight/obesity and a motor test. Once further validated, this classification might provide a valuable tool to assess the impact of physical activity on the risk of childhood overweight and obesity.

Beets et al. 2009 conducted a study on why majority of children do not participate in sufficient amounts of daily, health-enhancing physical activity. One strategy to increase activity is to promote it within the after-school setting. Although promising, the effectiveness of this strategy is unclear. A systematic review was performed summarizing the research conducted to date regarding the effectiveness of after-school programmes in increasing physical activity. Databases, journals, and review articles were searched for articles published between 1980 and February 2008. Meta-analysis was conducted during July 2008. Included articles had the following characteristics: findings specific to an after-school intervention in the school setting; subjects aged ≤18 years; an intervention component designed to promote physical activity; outcome measures of physical activity, related constructs, and/or physical fitness. Study outcomes were distilled into six domains: physical activity, physical fitness, body composition, blood lipids, psychosocial
constructs, and sedentary activities. Effect sizes (Hedge's g) were calculated within and across studies for each domain, separately. Evidence synthesis: Of the 797 articles found, 13 unique articles describing findings from 11 after-school interventions were reviewed. Although physical activity was a primary component of all the tested interventions, only eight studies measured physical activity. From the six domains, positive effect sizes were demonstrated for physical activity (0.44 [95% CI=0.28-0.60]); physical fitness (0.16 [95% CI=0.01-0.30]); body composition (0.07 [95% CI=0.03-0.12]); and blood lipids (0.20 [95% CI=0.06-0.33]).

Bélanger et al. 2009, examined why majority of youth do not attain the recommended levels of physical activity. To develop interventions that will be more efficient at enabling healthy levels of physical activity during adolescence, a better understanding is needed about which specific types of physical activity adolescents are more likely to sustain and when they tend to stop participating in each specific type of activity. From 1999 to 2005, 1276 adolescents, initially aged 12-13 years, completed a 7-day physical activity recall every 3 months during each of 5 years of secondary school. The prevalence of participation in each of 29 specific physical activities in each of Grades 7-11 was computed. Survival analyses were used to estimate when adolescents who reported each activity at baseline tended to discontinue the activity. All analyses were conducted in 2008. Results: The prevalence of participation in most activities declined over the 5 years; it did not increase for any activity. Within 2 years of baseline, the majority of adolescents discontinued participation in most activities in which they had reported participation at baseline. Sustained participation in a specific activity related
both to its intensity (90%, 73%, and 40% of girls and 77%, 86%, and 60% of boys sustained participation in light-, moderate-, and vigorous-intensity activities, respectively) and its format (41% and 89% of girls and 69% and 90% of boys sustained participation in team and individual physical activities respectively).

**Berntsen et al. 2010**, conducted a study to assess whether five months of guided active play in overweight or obese children and adolescents under multidisciplinary management for weight reduction leads to increased physical activity levels in leisure time, as well as changes in aerobic fitness and body composition. Sixty overweight or obese children and adolescents were randomly assigned to an intervention or control group. All participants received dietary advice and were encouraged to increase physical activity level. The intervention group additionally participated in 60-minute guided active play/physical activity twice a week for 5 months. Physical activity was recorded; aerobic fitness and body composition were measured at inclusion and after cessation of intervention. Physical activity level during weekend days was significantly higher for the intervention group compared with the controls after 5 months intervention (p=0.04). The mean reduction in percentage of body fat was 1.8% (95%CI: 0.6, 3.1) in the intervention group (p=0.04) and not significant among the controls (0.9 [-0.9, 2.7]). There was no change in aerobic fitness.

**Collard et al. 2010**, investigated the effects of a school-based physical activity-related injury prevention programme, called 'iPlay', on risk behaviour and Neuromotor fitness. Methods: In this cluster randomized controlled trial 40 primary schools throughout the Netherlands were randomly assigned in an intervention (n = 20) or control
group (n = 20). The study includes 2,210 children aged 10-12 years. The iPlay-intervention takes one school year and consists of a teacher manual, informative newsletter and posters, a website, and simple exercises to be carried out during physical education classes. Outcomes measures were self-reported injury preventing behavior, self-reported behavioral determinants (knowledge, attitude, social-influence, self-efficacy, and intention), and Neuromotor fitness. The I Play-programme was not able to significantly improve injury-preventing behavior. The programme did significantly improve knowledge and attitude, two determinants of behavior. The effect of the intervention-programme on behavior appeared to be significantly mediated by knowledge and attitude. Improved scores on attitude, social norm, self-efficacy and intention were significantly related to changes in injury preventing behavior. Furthermore, I Play resulted in small non-significant improvements in Neuromotor fitness in favour of the intervention group.

Debate et al. 2009 conducted a study to find that the numerous physiological, psychological, and academic benefits of physical activity (PA), declines in PA levels among girls have been observed over the last decade. The purpose of this preliminary study was to assess the short-term changes pertaining to Girls on the Run and Girls on Track developmentally focused youth sport programmes (DYS) on global self-esteem, body image, commitment to PA, and PA frequency. This preliminary study employed a Non 56 experimental, one-group, pre- and post-intervention study design using a 29-item paper-and-pencil assessment tool (n = 1034). Paired sample t-tests from pre- to post intervention revealed statistically significant differences in self-esteem (p < .001),
body size satisfaction (p < .001), and vigorous PA frequency (p < .001). Stratification by the number of times participating in the intervention revealed the greatest changes at first participation followed with continued improvements in self-esteem (p = .013) and body size satisfaction (p < .001) for those participating in a second time. Age differences were also observed between participants ≤10 years old and 11-15 years; in that significant improvements in commitment to PA (p = .003) were observed for the older girls.

Dobbins et al. 2009 evaluated the World Health Organization estimates of 1.9 million deaths worldwide attributed to physical inactivity. Chronic diseases associated with physical inactivity include cancer, diabetes and coronary heart disease. The purpose of this systematic review is to summarize the evidence of the effectiveness of school-based interventions in promoting physical activity and fitness in children and adolescents.

Search strategy: The search strategy included searching several databases. In addition, reference lists of included articles and background papers were reviewed for potentially relevant studies, as well as references from relevant Cochrane reviews. Primary authors of included studies were contacted as needed for additional information. Selection criteria: To be included, the intervention had to be relevant to public health practice, implemented, facilitated, or promoted by staff in local public health units, implemented in a school setting and aimed at increasing physical activity, report on outcomes for children and adolescents (aged 6 to 18 years), and use a prospective design with a control group. Data collection and analysis: Standardized tools were used by two independent reviewers to rate each study's methodological quality and for data extraction.
Where discrepancies existed discussion occurred until consensus was reached. The results were summarized narratively due to wide variations in the populations, interventions evaluated and outcomes measured. Main results: 13,841 titles were identified and screened and 482 articles were retrieved. Multiple publications on the same project were combined and counted as one project, resulting in 395 distinct project accounts (studies). Of the 395 studies 104 were deemed relevant and of those, four were assessed as having strong methodological quality, 22 were of moderate quality and 78 were considered weak. In total 26 studies were included in the review.

There is good evidence that school-based physical activity interventions have a positive impact on four of the nine outcome measures. Specifically positive effects were observed for duration of physical activity, television viewing, VO2 max, and blood cholesterol. Generally school-based interventions had no effect on leisure time physical activity rates, systolic and diastolic blood pressure, body mass index, and pulse rate. At a minimum, a combination of printed educational materials and changes to the school curriculum that promote physical activity result in positive effects. Authors' conclusions: Given that there are no harmful effects and that there is some evidence of positive effects on lifestyle behaviors and physical health status measures, ongoing physical activity promotion in schools is recommended at this time.

Deforche et al. 2003 studied the different aspects of physical fitness and physical activity in obese and non-obese Flemish youth. A random sample of 3214 Flemish school children was selected and divided into an “obese” and “non-obese” group based on body mass index and sum of skin folds. Physical fitness was assessed by the European physical
fitness test battery. Physical activity was estimated by a modified version of the Backed Questionnaire. Obese subjects had inferior performance on all tests requiring propulsion or lifting of the body mass (standing broad jump, sit-ups, bent-arm hand, speed shuttle run, and endurance shuttle run) compared with their non-obese counterparts (p<0.0001) both groups had similar levels of leisure-time physical activity; however, non-obese boys had a higher sport index than their obese counterparts (p<0.05). Results of this study show that obese subjects had poorer performances on weight-bearing tasks, but did not have lower scores on all fitness components. To encourage adherence to physical activity in obese youth, it is important that activities are tailored to their capabilities. Results suggest that weight-bearing activities should be limited at the start of an intervention with obese participants and alternative activities that really more on static strength to be used.

Gallotta et al. 2009 conducted a study to assess whether an enrichment of the coordinative demands of physical education (PE) during the curricular time may more efficiently improve coordinative abilities than the traditional PE programme. One hundred and fifty-two middle school children aged 11-12 years were randomly assigned either to an experimental (n=77) or to a traditional (n=75) PE programme lasting 5 months. The experimental intervention was structured in different modules focused on Coordination abilities. Pre- and post-intervention tests assessed children fitness (1 mile run-walk, curl-up, flexed arm hang, trunk lift, sit and reach, 30 m run, standing long jump, basketball forward throw) and motor Coordination abilities (four field tests of kinesthetic discrimination and response orientation ability).
After the intervention period, both groups showed a significant increment in most fitness tests. However, only the experimental group showed a significant improvement or a significantly more pronounced improvement than the control group in coordinative performances. The results show that both experimental and traditional PE interventions lead to increase physical fitness levels, but only the experimental one also improves coordinative abilities. Thus, focusing on a multivariate PE approach linking Coordination and fitness training seems to add quality to children’s experiences without reducing their effectiveness in terms of physical fitness. © 2009 John Wiley & Sons.

The independent school children outperformed children from the Catholic and government sectors on the selected tests for both boys and girls (p<0.0001). In the 20 metres STR, the difference amounted to 0.28 – 0.43 SDs. In the print and jump test, independent school children were superior by 0.05 – 0.17 SDs. A proxy for socio-economic status (SES) schools consistently about 90% of the differences between sectors with high SES schools consistently outperforming low SEs schools. Nonetheless, even when SES was factored in, sectorial differences remained significant. In so far as fitness is related to school activities, these findings raise equity concerns in Australian school physical education.

Haga 2009 found that Physical therapists often treat children with low motor competence. Earlier studies have demonstrated poor physical fitness outcomes and a reduced level of physical activity for these children compared with their peers with normal motor skills. The aim of this study was to examine how physical fitness
developed over time in 2 groups of children those with a low level of competence in motor skills (low motor competence [LMC]), and those with a high level of competence in motor skills (high motor competence [HMC]). From an initial sample of 67 children, a group of 18 was identified as having HMC or LMC on the Movement Assessment Battery for Children and was selected for the present study. Eight children (3 girls and 5 boys) comprised the LMC group, and 10 children (4 girls and 6 boys) made up the HMC group. A longitudinal design was implemented, and physical fitness in the 2 groups was evaluated by measuring different fitness components over a period of 32 months. A mixed-effects analysis of variance revealed significant main effects for group and for time but no group X time interaction effect. The LMC group performed less well on all physical fitness measures than the MC group, and both groups scored significantly higher on the physical fitness test after a period of 32 months. The lack of a significant interaction effect indicated that the relative differences in physical fitness outcomes between the groups were relatively constant over time. This study was limited by the small sample size and lack of assessment of anthropometric variables and children's perceived self-efficacy.

**Hastie et al. 2010,** conducted a study to evaluate compares the aerobic fitness status of a sample of rural American and Russian children, and examined these findings in light of their out of school physical activity participation. In this study ten and eleven year old (N = 415) children from both countries completed a 15 m Progressive Aerobic Cardiovascular Endurance Run (PACER) fitness test, and following the test, the children scoring beyond the upper limit of the healthy fitness zone were interviewed with regard
to their out-of-school participation in physical activity. From the results the Russian children achieved significantly higher scores than American children (P < .001), and males scored higher than females for both countries (P < .001). After examining the profiles of the children 3 apparent themes began to emerge: Russian children walked to and from school; the children in both settings who achieved a superior fitness level participated in after school physical activity; after school activities for the American children appeared to be more recreational orientated than the Russian children, who participated in structured training in sports clubs.

Juan et al. 2010, examined the importance of individual and school factors as correlates of overall youth physical activity has been demonstrated by previous research, less is known about the relationship of these factors with specific patterns of physical activity during adolescence. Thus, the purpose of this study was to examine the association of selected individual and school factors with patterns of physical activity based on a sum index of physical activity in a population-based sample of Spanish adolescents. For the purpose of this study One thousand and eighty-four children aged 12 to 17 years completed a self-report survey once during school hours. In addition to participation in physical activity outside of school hours, the following variables were included in the analysis: gender, age, weight status, physical self-perceptions, evaluation of the school physical education experience, and type of school (public vs. private). Multinomial logistic regression was used to model the associations among the variables and to calculate odd ratios (ORs) and 95% confidence intervals (CIs) for each pattern of physical activity. From the results the physical self-perceptions variable was the most
consistent individual correlate of physical activity across participation patterns (ORs ranging from 4.29 to 1.88, CIs ranging from 2.16-8.54 to 1.10-3.21). Regarding the school variables included in this study, both were linked with participation in physical activity, but evaluation of the physical education experience showed the most consistent associations across activity patterns.

2.6 Summary of the Literature

The review of the literature helped the investigator to spot out relevant topics and variables. The latest literature also helped the investigator to develop a strong background of his study and support his findings with regard to the problem. Further the literature collected in the study will also help the research scholar to have a broad understanding in the similar areas. The reviews have been presented under three sections such as survey, physical fitness norms and status of physical fitness, physical fitness between Rural and Urban. All the research studies presented in the section proves that norms based on age and sex, physical fitness variation between rural and urban school children, countries, and Races and physical activities programmes that contribute significantly for the better development of selected dependent variables.

The research studies reviewed are from many journals available in the websites. It is specifically noted that there is only a few studies that have been conducted in India. This inference has motivated the research scholar to find out the influence of intensive physical activity program on physical fitness variables along with the survey of physical fitness among the school children of the Virudhunagar District of Tamilnadu. The review of literature helped the researcher from the methodological point of view too. It
was learnt that most of the research studies cited in this chapter are content analysis and experimental designs and found appropriate methods for finding out the lapses and measures for remedy.