Chapter 2

Review of Related Literature
Chapter-II
REVIEW OF RELATED LITERATURE

Johnson (1942) proved that AAHPER Youth Fitness Test is partial indicator of both motor and cardio-respiratory fitness. He administrated these two tests to 47 women physical education major significant relationship were found between “t” score total of the AAHPER test and both the distance covered and fitness categories of Cooper is 12 minute test other significant relationship were found between of AAHPER battery. Five of these items i.e., 600 Yard run-walk, softball throw a, standing board jump, shuttle run and bent arm hang were found to be significantly relates to 12 minute run-walk test.

Hunsicker and Reiff (1966) conducted a comparative study of the physical fitness level of the American boys and girls. Physical fitness level of the students in the year 1965 was compared with the level of fitness of students who attended schools in the year 1957-58. AAHPER Youth Fitness Test was administered to 9627 boys and girls from 110 schools in the United States and 1602 students from 18 schools in Alaska. Through statistical analysis of the data percentile score based on age were developed for each item separately for boys and girls. The score revealed that the physical fitness level of the public school children of grade 5 through 12 in the year 1965 was higher than those in the year 1958.

Boon (1967) examined the fitness level of urban and rural boys. (N-100) each urban and rural boys were administered AAHPER youth fitness test. The result of the study showed the urban boys were superior to rural boys and difference between two was significant at .05 level of confidence. It was further concluded, that two samples were weaker in the same components of the physical fitness.
Dahi (1971) developed the AAHPER Youth Fitness Test on 400 Negro and white boys from the Taxas school district, all test data was collected during the spring semester of the 1969-70 schools year. It was found the Negro boys obtained higher mean scores than white boys on gross body coordination. The difference was significantly higher than white boys as on muscular explosiveness (.01 level of confidence).

Veerawami (1973) conducted a study to evolve physical fitness norms for higher secondary school of greater Gwalior. It was concluded that in all items except pull ups of the AAHPER youth fitness test, the mean score in Indian boys in all age group were lower than the percentile at American norms. There was a positive but low order of relationship between physical fitness and participation in physical activities. There was a positive low correlation (r=.13) between physical fitness and academic achievement.

Tuteja (1978) did a comparison between rural and urban high school students with regard to physical fitness. The AAHPER Youth Fitness Test and the N.P.E.D. Test were conducted to get a single score for both physical fitness tests of rural and urban high school students. The ‘t’ test was employed for testing the differences between rural and urban students. It was concluded that there was no significant difference between them in physical fitness and motor ability performance.

Robins (1985) made an attempt to develop percentile norms for Albana students in grade 1-9 based on their performance on both the AAPHER. Health related fitness test (HRFT). The two tests were administered to Albana school students. Percentile tables were constructed for each test items based on age and sex. Albanas means use compared with national means. The result indicated that Albana students performed better on events agility, speed and cardiovascular endurance. The national group performed better or events measuring abdominal muscular endurance and flexibility.
Singh (1986) conducted a study on the physical fitness of 4000 college students of Panjab University, Chandigarh. Fleishman’s test battery was used on 17 to 22 years old student. In conclusion he found that physical fitness improve linearly according to age and that students belonging to the rural area were significantly superior in their performance of test items like the standing broad jump, pushups, 600m run and walk test.

Singh (1986) prepared physical fitness norms for high school boys of Punjab state. Data were collected on 5000 subjects selected randomly from various schools in the state. The test battery administered consisted of eight items, i.e. the standing broad jump, sit and reach test, agility run, sit ups with bent knee, 50 meter dash, pushups, cricket ball throw and the 600 meter run and walk. He found a significant relationship between the age and performance of the subjects (12 to 15 years boys) socio economic status yielded a significant association with the performance of the subjects only in the agility run, sit ups and bent knee tests, urban subjects perform significantly better than their rural counterpart’s in the standing broad jump, agility run, 50m dash and cricket ball throw tests, whereas the rural subjects were found significantly better in the sit-and-reach test and 600m run-walk test.

Lamb et al. (1988) focused the concept of positive health and in particular, recognizes the importance of physical fitness. It is argued that measures of physical fitness are indicators of positive health and such measures are identified under their discrete headings of agility, flexibility, power, speed and reaction time, strength, cardiovascular capacity, body composition and posture. The theme of health-related fitness is explored, with recognition of its increasing importance for health promotion in schools, the community and commerce. Evidence is presented that highlights the general acceptance of the importance of certain fitness components in the assessment of the positive health of populations. In addition, an alternative method of assessing fitness is discussed, arising from the authors’ recognition of its potential as an
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inexpensive, easily administered indicator of one aspect of positive health. The case for using subjective indicators of positive health is also presented—the argument being that subjective health could be a possible mediator in the attainment of positive health.

Pellett and Heidi (1990) investigated the relationship between health-related fitness levels and academic achievement in elementary school children. A sample of 105 elementary students in grades four and five were tested. The study consisted of 64 males and 41 females in both grades. California Achievement Test scores of reading, language, and math were selected to reflect the academic achievement variables. The AAHPERD Physical Best Test was used to measure physical fitness. Test items included body composition (sum of the triceps and calf skinfold), one-mile walk/run, sit-ups, and sit and reach. A SAS Canonical Correlation Analysis was used to examine the relationship between health-related physical fitness and academic achievement. Means and standard deviations were calculated for both genders, and females and males alone. Results indicated that there was no significant relationship ($R > .05$) between health-related physical fitness levels and academic achievement in fourth-grade and fifth-grade students.

Tyagi (1993) evaluated the physical fitness norms for boys and girls in grade nine through twelve of Delhi state. 3000 boys and 3000 girls in grade nine through twelve were randomly selected from fifty school of Delhi state AAHPERD youth fitness test was administered. Analysis of the data revealed that this study exhibited no significant differences in physical fitness across age in both boys and girls. It was also observed that physical fitness was significantly correlated to height and weight in the case of boys and not in case of girls.

Lamb (1994) investigated the health-related fitness of Hong youth (male and female), grades 6-11 in the Crosse School District using the presently implemented physical fitness test battery. Subjects were 2,674 students,
including 202 Hong. The subjects were split into 2 groups, Hong (H) and all others (AO), then subsequently divided into 3 age categories: 13 years and under, 14-16 years, and 17 years and over. All subjects performed the following test: sit-ups (SU), mile run (MR), sit and reach (SR), flex arm hang (FAH) or bench press (BP), and skin fold measures (SF). The results were analyzed by t-test to determine signifying difference between H and AO (p< .05). Current fitness levels were compared to health-related criteria for each component of fitness. Sit up scores for h females, across all age groups, fell into the sub optional category and were significantly different from AO females in each group. Mile run score for both H and AO fell into a good or marginal fitness category. No significant differences were found between groups for any age classification. Sit and reach scores in all cases (except H females, 14-16 years), H were significantly different from AO and fell into the above optimal category. Flexed arm hang scores H (males and females) 13 years and under were below optimal. Skin-fold score for all subjects (except H males 13 years and under) were within the optimal category for health-related fitness. This research identities the current health-related fitness. Levels of students in a Midwestern school district and suggests cultural differences that may influence that fitness status. Recommendations are made for practical application and future research.

Obara (1997) compared health related physical fitness on high school students of Argyle academy and River Side Academy, they have different physical education programmes and found that the student from Argyle Academy demonstrated significantly better scores for the 20m shuttle run and trunk lift, while those from River side park academy demonstrated significantly better scores for the curl-ups and 90 degree push-ups there was no significant difference in the sum of five skin fold, waist to hip ratio, and back saver sit and reach.
Riddoch and Boreham (1995) examined the fitness and physical activity levels of children and youth are commonly questioned, but the evidence cited is both equivocal and methodologically diverse. The amount and type of physical activity undertaken during childhood that is appropriate for optimal health is unknown, although it has been suggested that, in the absence of such criteria, activity levels known to confer health benefits in adults are also appropriate for children. The measurement of activity in children is problematical, and there is currently no valid method of assessing activity levels that is feasible for use in large studies. Therefore, studies may lack either internal validity or wider applicability. Studies using self-report methods indicate relatively high levels of activity with 60 to 70% of children taking sufficient 'appropriate' physical activity. However, a variety of activity thresholds have been used. Studies that use more objective methods report much lower levels of activity, especially when cardiovascular fitness criteria are applied. The use of less stringent health-related thresholds results in higher levels of 'appropriate' activity. Nearly all studies of teenagers report a decline in activity with age during this period. Data from the large population studies indicate that activity levels peak in children at around 13 to 14 years of age, and then markedly decline. Boys are normally reported to be more active than girls, but this difference is greatly reduced when moderate activity alone is compared, indicating that boys participate in more vigorous exercise than girls. The health effects of low levels of vigorous activity in children are unclear.

Dawson et al. (2001) studied health and physical fitness parameters in 10-14 year old New Zealand children from one Christchurch Intermediate School were collected in field tests and analyzed for secular trends over a 9 year period. Boys' weight increased by 2.9 kg (95% confidence interval 1.1-4.7) and girls' by 2.1 kg (CI 0.8-4.2) over the nine year period. Boys' and girls' height over the period did not change but body mass index (BMI) increased for boys (12 kg.m^-2, CI 0.6-1.9) and girls (1.1 kg.m^-2, CI 0.4-1.9). The
proportion of children overweight or obese (BMI - 25 kg.m⁻²) has almost doubled in boys (4.2% to 7.8%) and quadrupled in girls (2.0% to 11.3%).

Tran et al. (2001) evaluated the effects of hatha yoga practice on the health-related aspects of physical fitness, including muscular strength and endurance, flexibility, cardio-respiratory fitness, body composition and pulmonary function. Subjects were required to attend a minimum of two yoga classes per week for a total of 8 weeks. Each yoga session consisted of 10 minutes of pranayamas (breath-control exercises), 15 minutes of dynamic warm-up exercises, 50 minutes of asanas (yoga postures), and 10 minutes of supine relaxation in savasana (corpse pose). The subjects were evaluated before and after the 8-week training program. Isokinetic muscular strength for elbow extension, elbow flexion, and knee extension increased by 31%, 19%, and 28% (p<0.05), respectively, whereas isometric muscular endurance for knee flexion increased 57% (p<0.01). Ankle flexibility, shoulder elevation, trunk extension and trunk flexion increased by 13% (p<0.01), 155% (p<0.001), 188% (p<0.001), and 14% (p<0.05), respectively. Absolute and relative maximal oxygen uptake increased by 7% and 6%, respectively (p<0.01). These findings indicate that regular hatha yoga practice can elicit improvements in the health-related aspects of physical fitness.

McMillan and Erdmann (2001) described gender specific health related physical fitness measurements in kindergarten there and determine relationship between body fatness and health related physical fitness test performance significant positive relationship were found between SSK and 1-mile walk/run times for both boys and girls. Significant inverse relationships were found between SSK and 1-minute bent knee-sit ups for both boys and girls. Neither boys and nor girls showed a significant relationship between SSK and sit & reach. Researchers found higher body fatness to be significantly associated with poorer health related physical fitness test perform in both kindergarten boys and girls.
Vinod (2001) studied the assessment of health related physical fitness of school students belonging to Jammu provenance. A sample of 4000 subjects was selected between age group of 13, 14, 15, 16. AAHPER health related physical fitness test battery used for this purpose. He concluded that the significant difference between one age group to other age group of the rural boys in all the fitness components.

Jermo et al. (2002) conducted a study on a health related fitness and functional performance test battery for middle aged and older adults: feasibility and health related content validity strong and graded associates were found for cardio respiratory and musculoskeletal fitness and the FP test level with perceived health and functional ability status both men and women.

Yi-Ching and Robert (2002) studied the relationship between physical activity and health-related physical fitness was evaluated in 282 Taiwanese adolescents 12-14 years of age. The subjects were randomly selected from the 7th, 8th and 9th grades in two junior high schools in Taiwan. Health-related fitness was assessed as the one-mile run (cardio respiratory endurance), timed sit-ups (abdominal strength and endurance), sit-and-reach (lower back flexibility), and subcutaneous fatness (sum of the triceps, sub scapular, suprailiac, and medial calf skin-folds). Physical activity is significantly and positively correlated with one-mile run performance and the sit-and-reach, but not with sit-ups and subcutaneous fatness. Overall, the strength of the relationships between estimated energy expenditure and specific fitness items in the total sample vary from low to moderate, with only 1% to 12% of the variance in fitness variables being explained by estimated energy expenditure. Comparisons of active versus inactive and fit versus unfit adolescents provide additional insights. The more active (highest quartile) are also more fit in cardio-respiratory endurance and in the sit-and-reach than the less active (lowest quartile), and the more fit in the one-mile run (better time, lowest quartile) and the sit-and-reach (highest quartile) are more active than the less fit in each item, respectively.
Carnethon et al. (2003) studied cardio-respiratory fitness in young adulthood and the development of cardio-vascular disease risk factors and found that participants with low fitness were 3 to 6 fold more likely to develop diabetes, hypertension and the metabolic syndrome than participants with high fitness. The association between low fitness and hypercholesterolemia was modest 95% confidence interval and attenuated to marginal significant after body mass index adjustment improved fitness over 7 years was associated with a reduced risk of developing and the significance of these associations was reduced after accounting for changes in weight.

Constantinos et al. (2003) examined the differences in physical activity levels between urban and rural primary school children. The sample consisted of 256 Greek-Cypriot children and their parents from two schools representing urban areas and three schools representing rural areas. Children’s activity levels were assessed for 4 weekdays in the winter and for 4 weekdays in the summer using a pedometer (DW-200; Yamax, Tokyo, Japan). Daily step counts were used to describe children’s activity levels. Parents completed a questionnaire assessing environmental variables in both seasons. Two-way ANOVAs indicated that urban school children were significantly more active in winter than rural school children (means = 13,583 ± 4313 versus 12,436 ± 3610, \( P < 0.001 \)) and that rural school children were significantly more active in the summer (means = 16,450 ± 5134 versus 14,531 ± 4901, \( P < 0.001 \)). Parents of children in rural schools reported more space available in the garden and in the neighborhoods and safer neighborhoods than parents of children in urban schools, whereas children in urban schools had more exercise equipment available at home and were transported more frequently to places where they could be physically active. Results of this study suggest that intervention programmes to promote physical activity need to consider seasonal and geographical location differences in physical activity levels.
Koutedakis et al. (2003) conducted a study on national physical education curriculum motor and cardio-vascular health related fitness in Greece adolescent it has been found that children in the physical education (PE) group had inferior motor and cardio-vascular health related fitness profiles compared with those in the PE+ group. Body fat, aerobic fitness, and time spent in intensive physical activity showed the greatest difference between the two groups in the pupils in the PE group, these were longer then the levels proposed to be necessary to combat future health risks. Adjustments for confounding variables showed a decrease in the significance of motor fitness, but not in cardio-vascular health related parameters.

Santa-clara et al. (2003) conducted a study on effect of a one year combined exercise training programme on body composition in men with coronary artery disease. The result suggests that a long term combined training (C.T) programme is more effective than an aerobic training (AT) programme done in producing changes in body composition. The percentage changes in total all trunk fat mass were higher in CT then in AT.

Takken et al. (2003) obtained insight into the interaction between daily physical activity and components of Health related physical fitness in children with juvenile idiopathic arthritis. Forty five patients (10 male/35 female; mean (SD) age 8.9 (2.2) years) participated in the study. Body mass, height, skinfold thickness, number of swollen joints, and joint range of motion were determined. The maximal oxygen consumption (VO2peak) was assessed during a graded maximal bicycle exercise test. Daily physical activity levels were measured with a caltrac activity monitor and a parental Physical activity rating (PAL) on a five point Likert scale. Partial correlation coefficients (to control for age) between physical activity and indices of health related physical fitness showed significant relationships between Caltrac motion counts and absolute VO2peak (r=0.31) and relative VO2peak (r=0.34), but not with the indices of body composition. There was also a significant correlation between PAL and
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relative VO2peak (r=0.33). Physical activity was significantly related to cardiorespiratory fitness but not to body composition in children with juvenile idiopathic arthritis. A longitudinal follow up should show whether an active lifestyle protects for loss of aerobic fitness in this patient group.

Volbekiene and Kaunas (2003) established gender differences in health related fitness of Lithuanian students and changes in fitness in respect to age. Six sex and age groups of students with 90 on average in each group were tested in 2002 at high schools in the large towns of Lithuania. Students were selected by random. All the students performed Euro fit test of physical fitness: endurance shuttle run, sit and reach/ flexibility, sit-ups/trunk strength; anthropometrics measures: height, weight. Height dynamics in 16 - 18 age boys groups increases until 18 years (p<0.05), among girls these changes are insignificant (p>0.05). Boys weight increases until 18 (11 grade) years (p<0.05). Weight results in 16 - 18 age groups of girls do not differ (p>0.05). Differences in sit ups and sit/reach results in 16 - 18 age groups of boys and girls are insignificant (p>0.05) 20 m shuttle run results in males from 16 to 18 years improved (p<0.05), whereas in females, the results essentially do not change (p>0.05). Early stabilization of health related fitness results has been established: fitness results boys and girls essentially do not change from 16 year (up to 18 year). In all cases the results of health related fitness in boys are higher than in girls.

Ozcan et al. (2007) assessed health related physical fitness and physical activity parameters among children and to determine whether there were any significant gender and maturation differences. A total of 853 Turkish school children comprised of male pre-pubertal (n = 212), female pre-pubertal (n = 199), male pubertal (n = 222) and female pubertal (n = 218) children selected from the suburban schools of the Anatolian district of Istanbul were enrolled to compare group means for body composition, physical fitness and physical activity. Evaluation of body fat ratio of the children revealed a significantly
higher value for girls. The Max VO\textsubscript{2} and handgrip strength was greater in the male gender while maturation differences showed a similar pattern favoring the pubertal period. The flexibility of the pubertal girls was significantly better than their male counterparts. The duration of physical activity was significantly longer in the males than female children. The duration of light activity among girls was longer than that of boys whereas the duration of MVPA in boys was significantly longer than that of girls. On the other hand the duration of MVPA among the pre-pubertal children was significantly higher than that of children in the pubertal period.

Buffart et al. (2008) investigated the components of health related physical fitness in adolescents and young adult with myelomeningocele (MMC), and to study relation between aerobic capacity and other health related physical fitness components. This cross sectional study included 30 adolescents and young adults with MMC, aged 16-30 years (25 males). Aerobic capacity was quantified by measuring peak oxygen uptake (peak \textit{vo2}) during a maximal exercise test on a cycle or arm ergometer depending on the main mode of ambulation. Muscle strength of upper of and lower extremity muscles was assessed using a hand-held dynamometer. Regarding flexibility we assessed mobility of hip, knee and ankle joint. Body composition was assessed by measuring thickness of four skin folds. Relations were studied using linear regression analyses. Average peak VO\textsubscript{2} was 1.481/min, 61% of the participants had subnormal muscles strength, 61% had modified restrictions in at least one joint and average sum of four skin folds was 74.8mm. sPeak VO\textsubscript{2} was significantly related to gender, ambulatory status and muscles strength, explaining 55% of its variance. Adolescents and young adults with MMC have poor health related physical fitness gender and ambulatory status are important determinants of peak VO\textsubscript{2} in addition, we found a small, but significant relationship between peak VO\textsubscript{2} and muscle strength.
**Dumith et al. (2008)** analyzed the health-related physical fitness (HRPF) components according to characteristics such as sex, age, type of school (public or private) and geographic area of the school (urban or rural), in individuals aged 7-15 years. The data collected belong to the Projeto Esporte Brasil (Brazil Sport Project) (PROESP-BR), and the HRPF components assessed were: body mass index (BMI), flexibility ("sit-and-reach" test), localized muscular resistance (LMR) (one-minute sit-up test) and aerobic capacity (nine-minute running test). The sample comprised 665 students, randomly selected from elementary schools of the Rio Grande County, Brazil. To compare the means of the measures and the tests according to the independent variables, simple and multivariate linear regression was used. Amongst the main results, it can be emphasized that the HRPF components were more associated with biological characteristics (sex and age), with no expressive differences by type of school, nor by geography area of school (indicators of socioeconomic level). Further studies are needed for the establishment of national reference parameters of HRPF of children and adolescents.

**Harvey et al. (2008)** examined the following: (a) the relationships among the latent constructs of fundamental motor skills (FMS), health-related physical fitness (HRF), and observed body fatness in South Korean adolescents with mental retardation (MR); (b) the indirect effect of fundamental motor skills on body fatness when mediated by health-related fitness; and (c) whether the degree of MR and gender affects these relationships. Student’s ages 13 to 18 years (287 boys and 134 girls) were recruited for the study. Separate structural equation models were estimated based on gender and the level of disability: mild or moderate MR. Group differences in the model structure were not found, so the data were combined and a single model estimated. The results showed that FMS significantly contributed to HRF (standardized effects \[\beta\] = .53), \(p < .01\) and indirectly contributed to decreased body fatness mediated by HRF (\(-.27\), \(p < .01\). HRF directly contributed to decreased fatness (\(-.50\), \(p < .01\).
results from this study support the importance of both increased FMS and increased HRF in relation to decreased body fatness.

Holt and Erin (2008) examined the five health-related physical fitness components as predictors for preseason overuse knee injuries in collegiate basketball players and secondarily, to determine what, if any, differences exist between the number of overuse knee injuries in collegiate basketball players and secondarily, to determine what, if any, difference exist between the number of overuse knee injuries in males and females. Three research questions were identified for the study. Laboratory and field test were used to determine physical fitness ratings. The data was analyzed using independent t-test and a MANOVA. Finding showed that leg press (f=4.846; p=0.038) was the only significant difference (t=1.774) was found between genders. Future studies showed focus on the relationship between overuse injuries, body composition, muscle strength, and aerobic capacity.

Anil et al (2009) investigated the present study on body mass index and health related physical fitness of school children was undertaken with the view of portraying the health related fitness profile of school children in Kannur district of Kerala. Data on body mass index and health related fitness according to ICHPER.SD Asia Youth Health Related Fitness test was collected from 1000 school children from different schools of Kannur district, Kerala. The study had sub samples of 250 boys and 250 girls from schools belonging to urban areas; and 250 boys and 250 girls belonging to rural areas. The data on BMI and health related fitness variables of the study were comparable to the data of Indian counterparts shown in previous studies. The analysis of data revealed that girls had significantly greater BMI as compared to boys. However, boys scored significantly better than girls on one mile run, sit ups and modified pull ups. Girls were significantly better than boys in case of flexibility performance in the sit and reach test. In case of sum of skinfolds, girls had significantly greater skinfold measurements as compared to boys. Rural sample of school
children scored significantly better than urban school children in modified pull ups. In case of sum of skinfolds, urban school children had greater skinfold measurements as compared to their rural counterparts. The study warrants the need for further investigations covering a wider segment of population and taking other vital parameters such as nutritional status, physical activity patterns, and socio-economic conditions so as to obtain meaningful relationships

Jonatan (2009) investigated whether physical fitness in childhood and adolescence is a predictor for cardiovascular disease risk factors, events and syndromes, quality of life and low back pain later in life. Physical fitness-related components were: cardio respiratory fitness, musculoskeletal fitness, motor fitness and body composition. Adiposity was considered as both exposure and outcome. The results of 42 studies reporting the predictive validity of health-related physical fitness for cardiovascular disease risk factors, events and syndromes as well as the results of 5 studies reporting the predictive validity of physical fitness for low back pain in children and adolescents were summarized. We found strong evidence indicating that: higher levels of cardio respiratory fitness at childhood and adolescence are associated with healthier cardiovascular profile later in life. Muscular strength improvements from childhood to adolescence are negatively associated with changes in overall adiposity. A healthier body composition at childhood and adolescence is associated with a healthier cardiovascular profile later in life, and with a lower risk of death. The evidence was moderate for the association between changes in cardio respiratory fitness and cardiovascular disease risk factors, and between cardio respiratory fitness and the risk of developing metabolic syndrome and arterial stiffness. We also found moderate evidence on the lack of relationship between body composition and low back pain. Due to a limited number of studies, we found inconclusive evidence for a relationship between
muscular strength or motor fitness and cardiovascular disease risk factors, and between flexibility and low back pain.

Kenneth et al. (2009) conducted a study on health-related fitness (Georgia Youth Fitness Assessment) in Georgia's fifth-grade and seventh-grade students; provide a baseline against which future progress could be measured, and guide public and private leaders and decision makers. A state wide probability sample of fifth- and seventh-grade students designed to enable grade-specific comparisons by gender, race/ethnicity, and urban/rural status was drawn. Measurements included aerobic capacity; body composition; and muscular strength, endurance, and flexibility. Physical activity during the most recent 3 days was assessed. The survey was conducted in 2006; the data were analyzed in 2007–2008. Ninety-three schools (86% response rate) and 5248 students (77% response rate) participated. Fifty-two percent of students did not meet the standard for healthy aerobic fitness; 23% did not meet the standard for muscular strength, endurance, and flexibility; 30% were outside the recommended range for BMI. Twenty-two percent did not achieve the recommended 60 minutes of daily moderate-to-vigorous physical activity. All subgroups (e.g., boys/girls, urban/rural) scored poorly. Substantial numbers of Georgia's fifth- and seventh-grade students exhibit unhealthy levels of physical fitness. These data are consistent with the suggestion that physical inactivity has led to deficient levels of health-related fitness in more areas than just body composition.

Aguero et al. (2010) expressed that physical fitness is related to health at all ages. Information about physical fitness in the Down syndrome (DS) population however is scarce, especially when we consider children and adolescent. A review of the current data available on this topic would be both timely and important as it would serve as a starting point to stimulate new research perspective the data reviewed from the literature showed a general trend toward lower values of physical fitness parameters and worse body
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composition variables in children and adolescents with DS compared with the population without intellectual disability (ID) or even with the population with ID without DS. Notably, children and adolescents with DS have been described as poor physical fitness many of the training programmes carried out in children and adolescents with DS did not yield the desired response, and the reason are still unknown. The purpose of this review is to summarize the current available literature on health related physical fitness in children and adolescents with DS, and the effect of training on these variables.

Alyson et al. (2010) articulated that exercise is considered an acceptable method for improving and maintaining physical and emotional health. A growing body of evidence supports the belief that yoga benefits physical and mental health via down-regulation of the hypothalamic–pituitary–adrenal (HPA) axis and the sympathetic nervous system (SNS). The purpose of this article is to provide a scholarly review of the literature regarding research studies comparing the effects of yoga and exercise on a variety of health outcomes and health conditions. These studies subsequently were classified as uncontrolled (n<430), wait list controlled (n<416), or comparison (n<435). The most common comparison intervention (n<410) involved exercise. These studies were included in this review. In the studies reviewed, yoga interventions appeared to be equal or superior to exercise in nearly every outcome measured except those involving physical fitness. The studies comparing the effects of yoga and exercise seem to indicate that, in both healthy and diseased populations; yoga may be as effective as or better than exercise at improving a variety of health-related outcome measures. Future clinical trials are needed to examine the distinctions between exercise and yoga, particularly how the two modalities may differ in their effects on the SNS=HPA axis. Additional studies using rigorous methodologies are needed to examine the health benefits of the various types of yoga.
Moliner et al. (2010) analyzed the secular trends in health-related physical fitness in Spanish adolescents between 2001–2002 and 2006–2007. Two representative population studies were conducted 5 years apart in adolescents (12.5–17.5 years) from Zaragoza (Spain) that participated in the AVENA study in 2001–2002 and in the HELENA-CSS study in 2006–2007. Both studies used the same tests to assess physical fitness: the handgrip strength, bent arm hang, standing broad jump, 4×10m shuttle run and 20m shuttle run tests. Performance in 4×10m shuttle run and 20m shuttle run tests was higher in 2006–2007 (Cohen’s $d$ ranging from 0.2 to 0.4, $p < 0.05$), whereas performance in handgrip strength and standing broad jump tests was lower in 2006–2007 (Cohen’s $d$ ranging from 0.3 to 1.1, $p < 0.001$). Adjustment for age, pubertal status, and fat mass, fat free mass and parental education did not alter the results. The odds ratio (OR) of meeting the FITNESSGRAM Standards for healthy-cardio respiratory fitness was higher in 2006–2007 in both boys (OR, 95% CI: 2.123, 1.157–3.908) and girls (OR, 95% CI: 2.420, 1.377–4.255). The results indicate that levels of both speed/agility and cardio-respiratory fitness were higher in 2006–2007 than in 2001–2002, whereas muscular strength components were lower in 2006–2007.

Arja et al. (2010) investigated the impact of measured cardiovascular and musculoskeletal physical fitness level on HRQoL in Finnish young men. In a cross-sectional study, we collected data regarding the physical fitness index, including aerobic endurance and muscle fitness, leisure-time physical activity (LTPA), body composition, health, and HRQoL (RAND 36) for 727 men [mean (SD) age 25 (5) years]. Associations between HRQoL and the explanatory parameters were analyzed using the logistic regression analysis model. Of the 727 participants who took part in the study, 45% were in the poor category of the physical fitness, while 37% and 18% were in the satisfactory and good fitness categories, respectively. A higher frequency of LTPA was associated with higher fitness ($p < 0.001$). Better HRQoL in terms of general
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health, physical functioning, mental health, and vitality were associated with better physical fitness. When the HRQoL of the study participants were compared with that of the age- and gender-weighted Finnish general population, both the good and satisfactory fitness groups had higher HRQoL in all areas other than bodily pain. In a regression analysis, higher LTPA was associated with three dimensions of HRQoL, higher physical fitness with two, and lower number of morbidities with all dimensions, while the effect of age was contradictory. Our study of Finnish young men indicates that higher physical fitness and leisure-time physical activity level promotes certain dimensions of HRQoL, while morbidities impair them all.

Kwok et al. (2010) investigated the relation between health-related physical fitness and weight status in Hong Kong adolescents. 3,204 students aged 12-18 years participated in the Hong Kong Student Obesity Surveillance (HKSOS) project in 2006-2007. Anthropometric measures (height, weight) and health-related fitness (push-up, sit-up, sit-and-reach, 9-minute run) were assessed. Body mass index (BMI) was computed to classify participants into normal weight, underweight (Grade I, II/III), overweight, and obese groups. The associations of health-related physical fitness with BMI and weight status were examined by partial correlation coefficients and analysis of covariance, respectively. More boys than girls were overweight or obese (18.0% vs 8.7%), but more girls than boys were underweight (22.3% vs 16.7%). Boys performed significantly (P < 0.001) better in sit-up (38.8 vs 31.6 times/min) and 9-minute run (1632.1 vs 1353.2 m), but poorer in sit-and-reach (27.4 vs 32.2 cm) than girls. All four physical fitness tests were significantly positively correlated with each other in both sexes, and BMI was only weakly correlated with sit-up and sit-and-reach tests in boys. Decreasing performance (P for trend < 0.05) was observed from normal weight to overweight and obese for push-up, sit-up, and 9-minute run in both sexes. From normal weight to Grade I and Grade II/III underweight, decreasing performance (P for trend < 0.05) for sit-up and sit-and-
reach in both sexes and for push-up in boys was observed. The relations between BMI and health-related physical fitness in adolescents were non-linear. Overweight/obese and underweight adolescents had poorer performance in push-up and sit-up tests than normal weight adolescents. Different aspects of health-related physical fitness may serve as immediate indicators of potential health risks for underweight and overweight adolescents.

**Manmeet et al. (2010)** compared physical fitness components namely speed, strength, endurance, agility and flexibility between female students belonging to rural and urban set-ups. The study was carried out on 100 female students, 50 rural and 50 urban of Punjabi University, Patiala. The data was collected by use of measurements of height and weight as well as by application of tests like jumping, stepping, running, flexibility test, etc. The data was analyzed and compared with the help of statistical procedures in which arithmetic mean, standard deviation (S.D.), standard error of mean (SEM), t-test were employed. Rural female students were found to be superior in strength, endurance, speed and agility. Urban female students on the other hand, were found to be heavier and superior in tasks like flexibility.

**Kordi (2010)** determined the age-related loss of health-related physical fitness and normative data in healthy population women aged 20–60 years old of Tehran, Iran. In this cross-sectional study, 1000 healthy women aged 20–60 years old were randomly selected from northern, southern, eastern, western and center regions of Tehran. Cardiovascular fitness was determined by Ros and Jackson protocol. Body composition were measured using Jackson and Poolak procedure, flexibility was determined by sit and reach test, muscular strength with a standard dynamometer and muscular endurance were measured with Sit-ups test in one minutes. Cardiovascular fitness (vo2max), body composition, flexibility, muscular strength and endurance remained unchanged in the 20 and 30 year old age groups. Around of 40 years old, cardiovascular fitness, muscular strength and endurance began to gradually decline but body
composition increased and flexibility unchanged. Data for Vo2max and the other variables in 4-yr groups provide “normative” results. Result indicated age-related declined in Vo2max (0.43 ml/ kg/min× yr (−1)), muscular strength (0.004 kg/weight ×yr (−1)) and endurance (0.63 repetition ×yr (−1)), and increased in body fat (0.43 % ×yr (−1)) in 30–60 year. One-way ANOVA test showed that all variables significantly differed (P<0.001) among decades except sit and rich test (P< 0.059) between the second and third decades. Vo2max had a significant relationship (P< 0.01) with Age, BMI, body fat percent and muscular strength and endurance. Iranian women have a greater decline in cardiovascular fitness; muscular strength and endurance. The results of this study can be used as reference material for clinical studies in different age groups.

Sahana (2010) investigated an effect of aerobic exercise programme on health related physical fitness components of middle aged women. a fitness for living in the house or on the farm or at office or factory or in work places or in any service implies freedom from disease, enough strength, endurance and other abilities to meet the demands of daily living. Doing physical activity everyday contributes to optimum health and quality of life. Life styles can be changed to improve health and fitness through daily exercises. Aerobic exercise stimulates heart, lungs and all working group of muscles and produces beneficial changes in body and mind. Many physiological changes are determined by daily aerobic exercises. The purpose of the study was to determine the effect of a 12-week aerobic exercise programme on health-related physical fitness components, which are cardio-respiratory endurance, flexibility, abdominal strength endurance and body fat in middle-aged women. A total of 60 middle-aged women from Karyavattom panchayath of Trivandrum district in Kerala state between the age group of 35 and 45 years were selected as subjects for the study. They were tested to collect the data on selected variables. The cardio-respiratory endurance, flexibility, abdominal strength endurance and body fat
percentage were selected variables. Further, 30 subjects were randomly assigned as experimental group and 30 as control group. The experimental group underwent aerobic exercise training thrice a week for 12 weeks. The control group did not attend any training programme. The post-tests were conducted on both groups to collect the data on the variables of the study. The data pertaining to health-related physical fitness components were analyzed by paired test to determine the difference between initial and final mean for experimental and control groups. Significant difference seen at the 0.05 level with 29 degree of freedom is 2.045 and at 0.01 level with 29 degree of freedom is 2.756 in experimental group following 12 weeks of aerobic training programme for cardio-respiratory endurance, flexibility, muscular strength endurance and skin fold thickness (body fat %). In the case of control group no significant changes were seen in any of the selected variables. The conclusions of this study are improved cardio-respiratory endurance, flexibility, muscular strength endurance and decreased skin fold thickness (body fat %) among the experimental group of middle-aged women after 12 weeks of aerobic training.

Ujevi (2010) investigated the differences between Croatian children’s health-related physical fitness profiles in urban and rural areas. The sample for this study consisted of 2431 fifth-grade students (1248 boys and 1183 girls) from urban and rural areas of Croatia. The mean age of participants was 11.3±6.1 years. The differences between the health-related physical fitness of school children from urban and rural areas was computed using series of univariant analysis of variance and canonical discriminant analysis. The reliability of the tests was determined by Cronbach’s alpha coefficients. Urban boys and girls significantly differ in body height from rural boys and girls. Body mass index and body fat percentage are slightly higher in the urban boys and girls but they do not differ significantly. Urban children perform significantly better in the 20 m dash, standing long jump and timed sit-ups. Urban and rural boys and girls do not differ significantly in the flexibility. This study determined if selected...
levels of urbanization affected the physical fitness status of children in Croatia. The results suggest that the differences in children’s health-related physical fitness profiles are due to the level of urbanization.

**Wi and Dai (2010)** investigated the associations between cardiovascular function and both body mass index and physical fitness in Korean men. The subjects were 2,013 men, aged 20 to 83 years, who visited a health promotion center for a comprehensive medical and fitness test during 2006-2009. The WHO's Asia-Pacific Standard Report definition of BMI was used in this study. Fitness assessment of cardio-respiratory endurance, muscular strength, muscular endurance, flexibility, power, agility, and balance were evaluated by VO$_2$max (ml/kg/min), grip strength (kg), sit-ups (reps/min), sit and reach (cm), vertical jump (cm), side steps (reps/30s), and standing on one leg with eyes closed (sec), respectively. For cardiovascular function, we evaluated systolic blood pressure (SBP), diastolic blood pressure (DBP), resting heart rate (RHR), double product (DP), and vital capacity. There were significant decreases in cardio-respiratory endurance (p < 0.001), power (p < 0.001), and balance (p < 0.001), and increases in muscular strength (p < 0.001). Further, cardiovascular function, including SBP (p < 0.001), DBP (p < 0.001), double product (p < 0.001), and vital capacity (p=0.006) appeared to be lower for the obesity group. We conclude that an obese person exhibits lower fitness level and weaker cardiovascular function than a normal person.

**Chuen et al. (2011)** investigated the health-related physical fitness is an important risk factor of cardiovascular disease. While previous studies have identified children with developmental coordination disorder (DCD) to be less physically fit than typically developing (TD) peers, there is limited longitudinal research in this area. This study was undertaken to evaluate concomitant changes in motor coordination and health-related physical fitness of Taiwanese children with and without DCD over a three years period. The movement assessment battery for children (movement ABC) test was used to evaluate
motor coordination, while health related physical fitness included several core components: 1. Body Mass Index (BMI) 2. Sit and reach forward 3. Long jump 4. Sit ups and 5. 800 meter run. Both the movement ABC and fitness test were implemented once each a year for three year. Twenty-five children with BCD and 25 TD children, matched by age and gender participated in this study, the TD group showed significant long term changes in BMI and long jump while the DCD group showed significant increases in BMI values and decreases in, flexibility, measured by the sit and reach test. In general with DCD performed were on the items of flexibility muscle strength and muscle endurance after the first year. Compared to as age and gender matched norms, children with DCD not only were less physical fit, but showed a significant long term decline in flexibility and abdominal or core strength (sit-ups). In year two and there was a significant negative correlation between poor fitness and motor co-ordination.

_Jen et al. (2011)_ explored whether or not differences in health-related physical fitness exist among people with different leisure lifestyles. The Physical Fitness Scales for Taiwan Citizens (Cheng & Liu, 2001) was utilized to measure the health-related physical fitness of 241 college students. Factor analysis resulted in 4 dimensions; namely, dawn activity loving, sports loving, healthy diet, and vacation loving. Next, using cluster analysis, we identified 4 groups of college students, and they were dawn activity lovers, sports lovers, inactive healthy dieters, and vacation lovers. Finally, we explored the relationships among the 4 groups and their health-related physical fitness using one-way analysis of variance. The results indicate that college students who routinely engage in exercise tend to have physical fitness superior to those who do not exercise on a regular basis.

_Aamusal et al. (2011)_ studied the health-related physical fitness of the Tshannda rural school children in grades 1 to 7 and to evaluate age and gender differences in physical fitness among the Tshannda children. The stature, body mass and skin folds of the children was measured and the Euro fit test battery was used to
assess the children’s physical and performance fitness. Percentage body fats fat mass and fat-free mass were calculated. There was progressive increase and improvement in the performance values from grade level one to seven. In the physical performance tests requiring moving the body, power and strength, the boys generally performed higher than the girls. Girls were superior to boys in the tests of flexibility. Body fat was higher in girls than in boys at all grades and increases with advancement in grades. The physical performance measures of our samples increase in grade levels and with the boys having higher values than girls as well as performing better in activities requiring physical exertion and expenditure of energy. In contrasts, the girls showed superiority in flexibility measures and accumulate more body fat than the boys. Physical fitness of these rural school children seems to be low, thus confirming the worldwide decline in fitness levels of children.

Morteza (2011) evaluated the level of physical fitness among college students of Islamic Azad University (IAU), Shabestar branch based on gender. There were 450 students who has been involved in this physical fitness test study which were 250 male students (mean ± SD; Age: 22.5 ± 8.25 yrs, Height: 174.23 ± 5.2 cm, Weight: 68.45 ± 9.29 kg) and the other 200 are female students (mean ± SD; Age: 22.75 ± 6.2 yrs, Height: 159.75 ± 5.2 cm, Weight: 56.71 ± 8.84 kg). There were 6 activities in this test which were 12 minute run, sit-up, and vertical jump for explosive strength, 10 meter agility shuttle, flexibility and push up. All these tests were evaluated the level of fitness from aspect agility, speed, endurance of cardiovascular, power of leg and flexibility. Physical fitness performance was better in male students, except for sit and reach test, in which female students performed better.

Priti and Alok (2011) compared the health related physical fitness components among girls of government schools of Uttar Pradesh, age of students were between 12-17 years. One hundred fifty subjects were selected from each school. Total four hundred fifty subjects were randomly selected as subjects. To
compare the various components of Health Related Physical Fitness among the girls studying in different type of government school (Rural, Urban and Semi Urban), ANOVA was applied at .05 level of significance. Significant difference was found among the girls belonging to different area of government schools (Urban, Semi Urban and Rural) in relation to their Abdominal Muscular Strength. Significant difference was found between the paired means of Semi Urban and Rural (4.98), Urban and Rural (3.86) and Urban and Semi Urban (1.12) in relation to their Abdominal Muscular Strength. Significant difference was found among the girls belonging to different area of government schools (Urban, Semi Urban and Rural) in relation to their Shoulder Muscular Strength. Significant difference was found between the paired means of Urban and Rural (7.33), Semi Urban and Rural (5.13) and Urban and Semi Urban (2.2) in relation to their Shoulder Muscular Strength. Significant difference was found among the girls belonging to different area of government schools (Urban, Semi Urban and Rural) in relation to their Body Fat Percentage. Significant difference was found between the paired means of Urban and Rural (1.53), Semi Urban and Rural (1.11) and Urban and Semi Urban (.43) in relation to their Body Fat Percentage. Significant difference was found among the girls belonging to different area of government schools (Urban, Semi Urban and Rural) in relation to their Coordinative Ability (Agility). Significant difference was found between the paired means of Urban and Rural (2.25), Semi Urban and Rural (1.32) and Urban and Semi Urban (.93) in relation to their Coordinative Ability (Agility). Significant difference was found among the girls belonging to different area of government schools (Urban, Semi Urban and Rural) in relation to their Cardio Respiratory Endurance. Significant difference was found between the paired means of Urban and Rural (285.8), Urban and Semi urban (204.00) and Semi Urban and Rural (81.87) in relation to their Cardio Respiratory Endurance. Significant difference was found among the girls belonging to different area of government schools (Urban, Semi Urban and Rural) in relation to their Flexibility. Significant difference was found
between the paired means of Urban and Rural (4.12), Urban and Semi urban (2.69) and Semi Urban and Rural (1.43) in relation to their Cardio Respiratory Endurance.

**Ruiz et al. (2011)** examined the work developed by the ALPHA (Assessing Levels of Physical Activity) study and describe the tests included in the ALPHA health-related fitness test battery for children and adolescents. The evidence-based ALPHA-Fitness test battery include the following tests: 1) the 20 m shuttle run test to assess cardio-respiratory fitness; 2) the handgrip strength and 3) standing broad jump to assess musculoskeletal fitness, and 4) body mass index, 5) waist circumference; and 6) skin-fold thickness (triceps and sub scapular) to assess body composition. Furthermore, we include two versions: 1) the high priority ALPHA health-related fitness test battery, which comprises all the evidence-based fitness tests except the measurement of the skinfold thickness; and 2) the extended ALPHA health-related fitness tests battery for children and adolescents, which includes all the evidence-based fitness tests plus the 4 x 10 m shuttle run test to assess motor fitness.

**Spaniol (2011)** investigated the health related fitness of undergraduate kinesiology majors, 98 females (age 22.09), and males (age-22.58), participated in the study. All participants were enrolled in a mandatory measurement and evaluation course. Participants completed six health-related fitness (HRF) tests covering the four major areas of fitness: body composition, flexibility, muscular endurance, and cardio-respiratory endurance. Body composition was assessed using bioelectrical impedance (BIA) and 3-site skin-fold (SKF); flexibility was assessed using the modified sit and reach. Muscular endurance was assessed using the one-minute sit-up and one-minute push up test, cardio-respiratory endurance was assessed using the 1.5 mile run. Descriptive statistic were collected and data analysis was performed by utilizing one-sample t-test, for each fitness test, to compare the means of HRF for undergraduate kinesiology majors with a set criterion standard of the general population.
scores were then standardized and independent t-test were computed, for each fitness test, to compare the standardized means of HRF between genders. Statically analysis indicated that females kinesiology majors scored significantly higher on the modified sit and reach \( t(97) = 6.53, p = .00 \), one-minute push-up \( t(97) = 11.3, p = .00 \), one-minute sit-up \( t(97) = -8.21, p = .00 \) and the 1.5 mile run \( t(97) = -4.01, p = .00 \) but significantly lower in BIA \( t(97) = 2.05, p = .04 \) when compared to the general population. There was no significant difference in SKF \( t(97) = .018, p = .86 \) for female kinesiology majors. Male kinesiology majors scored significantly higher in the modified sit and reach \( t(128) = 4.01, p = .00 \), one minute push up \( t(128) = 8.53, p = .00 \), and the one minute sit up test \( t(128) = 9.71, p = .00 \), but significantly lower in BIA \( t(128) = 4.35, p = .00 \), SKF \( t(128) = 2.91, p = .00 \) and the 1.5 mile run \( t(128) = 1.98, p = .05 \) when compared to the general population no sign if cant difference were found regarding overall performance on fitness test between genders.

**Kumar (2011)** compared physical fitness components namely speed, strength, endurance, agility and flexibility between female students belonging to rural and urban set-ups. The study was carried out on 100 female students, 50 rural and 50 urban of Delhi University, Delhi. The data was collected by use of measurements of height and weight as well as by application of tests like jumping, stepping, running, flexibility test etc. The data was analyzed and compared with the help of statistical procedures in which arithmetic mean, standard deviation (S.D.), standard error of mean (SEM), t-test were employed. Rural female students were found to be superior in strength, endurance, speed and agility. Urban female students on the other hand, were found to be heavier and superior in tasks like flexibility.

**Dartagan (2012)** identified the proportion of children and adolescents of the school population from the sample was composed of 2,849 subjects (1,457 girls and 1,392 boys), with age range between 6 and 18 years. The physical fitness
components were assessed by a test battery of five items: back-saver sit-and-reach; curl-up; trunk-lift; push-up and endurance run (PACER), following cut-off-points for gender and age suggested by the Fitness gram. It was possible to observe with the obtained results that the proportion of schoolchildren that reached the minimum motor requirements established was not higher than 8%, and the global amount able to meet the health-related criteria was lower from 10 years of age in both genders. The data also show that great part of the studied youngsters demonstrate physical fitness components that could compromise a better health status, indicating the urgent need of implementing intervention programs addressed to the improvement of the practice of physical exercise in the school population.

**Kumar and Singh (2012)** compared the physical fitness status of Government and Non-Government school boys of Chandigarh. The AAHPER (1976) Youth Physical Fitness Test (Test Item Six : Pull-up, Sit-up, Shuttle Run, Standing Broad Jump, 50 yard Dash and 600 Yard Run/Walk) was conducted on 4000 male students ranging between 13 to 16 years students in different schools from Government (N=2000) and Non-Government (N=2000) area of Chandigarh (UT). To compare the mean differences between the Government and Non-Government school boys 't' test was computed with the help of SPSS Software. The level of significance chosen was .05. There were significant differences obtained between government and Non-Government school boys. The finding reveals that Non-Government school boys are superior in their physical fitness than their counterparts.

**Singh and Singh (2012)** evaluated health related physical fitness differences among boys of Kandi area. In the present study, the subjects for data collection were drawn from the different government schools of Kandi areas of Punjab state. Random sampling technique was used to select the subjects. The sample consisted of one thousand and five hundred seventy five (N=1575) boys of Kandi areas of Punjab state. To measure maximal functional capacity and
endurance of the cardio-respiratory system of the subjects, the 9-Minute run test was applied. To evaluate the level of fatness in school age boys, the skinfold fat caliper was used. To assess the abdominal muscular strength and endurance of the subjects, modified sit-ups test was applied. Sit and reach test was used to evaluate the flexibility (extensibility) of the low back and posterior thighs of the subjects. The Analysis of Variance (ANOVA) was applied to find out the significant differences among various age groups/classes of Kandi area boys. Scheffe’s post-hoc of test was applied to see the direction and significance of differences where ‘F’ ratio was found significant. The significant differences were observed among various age groups of Kandi area. The class 9th demonstrated significantly better maximal functional capacity & endurance than class 8th whereas class 10th exhibited significantly better on maximal functional capacity & endurance than class 8th and class 9th. Class 8th demonstrated better body composition than class 9th and class 10th. Similarly class 9th demonstrated better on the said variable than class 10th though not significantly. Class 9th exhibited significantly better abdominal muscular strength & endurance than class 8th. Similarly class 10th demonstrated significantly better than class 8th and class 9th on the said variable. Class 9th showed significantly better flexibility (extensibility) of the low back and posterior thighs than class 8th. Similarly class 10th demonstrated significantly better flexibility than class 8th and class 9th.

**Saha & Haldar (2012)** examined the health related physical fitness variables and psychomotor ability between rural and urban school going children. One thousand students age ranging from 17 to 30 years were selected as subjects for the study of which five hundred were Tribal and the remaining five hundred were Non-tribal School going from different schools of North 24 Parganas District, West Bengal. The subjects were tested in their respective school ground for continuously five days. The criterion measures included under Health related physical fitness directly related to improvement of health are 1)
Sit and Reach test to measure lower back flexibility and was, 2) Body Fat Monitor, an electronic device manufactured by Omron model no. HBF 306 to measure Body fat percentage, 3) Aerobic/cardiovascular function was measured by the 1.5 mile run test, 4) Abdominal muscular strength and endurance was used measured by Partial Curl Ups and 5) Upper body muscular strength and endurance was measured by Right Angle Push-Ups. To measure the psychomotor ability, reaction ability was considered and was measured by Nelson Hand Reaction Test. For the purpose of Comparison of Health related physical fitness variables and psychomotor ability between Rural and Urban School going children, Student’s t⁡ ratio statistical technique was used to analyze the data. The level of significance was set at p<0.05 level. The results showed significant differences between Rural and Urban school going children in all the Health related Physical fitness components as well as in Reaction ability under psychomotor ability and rural school going children was found better than urban school going children.

Kiflu et al. (2012) examined the relationship between selected physical fitness performance capacities with the degree of body fat percentage between overweight and normal weight sedentary young male adults. Among five hundred forty five (545) voluntarily registered college students’ population one hundred twenty (120) subjects, who met the inclusion criteria, were purposely recruited and selected being as subjects to participate in the study from Ethiopia, the capital city of Addis Ababa, in one of the prominent governmental college of Kotebe college of teacher education. The age of the subjects was ranged between 19 to 24 years old. Out of 120 subjects, 90 subjects were sedentary and overweight (grade 1 obese), identified as group one while the remaining 30 subjects were sedentary but normal weight based on the standard classification and criteria of age, sex and body weight. The data for physical performance variables such as cardio respiratory fitness, sit ups, pull ups, standing broad jump and shuttle run were collected through the procedure of
American Alliance for health physical education, and recreation (AAHPER) fitness test revised (1976) manual and the body composition (body fat percentage) was gathered at the standard seven different anatomical landmarks identified and recommended by American college of sport medicine (ACSM, 2008). Body density was determined by using the equation of Jackson and Pollock; and percentage body fats (%BF) of the subjects’ were computed from body density according to the formula described by (Siri 1961). The results of the present study indicate that all the selected physical fitness components were significantly negatively correlated with body fat percentage (%BF) except shuttle run performance, which was positively correlated with %BF in the case of both groups. The degree of correlation between body fat percentage and fitness variables indicated moderate for both groups. The P-value for percentage body fat and physical performance parameters were significant at 0.05 and 0.01 level for normal weight and overweight groups respectively. It was found that body fat percentage value and physical fitness performances were inversely correlated. It was concluded that leaner subjects perform better than overweight subjects in physical performance activities / capacities which require specifically body movement through space such as running, jumping, and also in sit-ups and pull-ups performances.

Hombergen et al. (2012) investigated the impact of cerebral palsy (CP) on the level of health-related physical fitness (body composition, cardio-respiratory endurance, flexibility, muscular endurance, and strength) in adults with CP compared with able-bodied adults. Two reviewers independently applied the inclusion criteria (adults, comparative design, components of physical fitness) to select potential relevant studies. Pooling data was not possible, but a best-evidence synthesis was conducted. Also, a description of the level of health-related physical fitness in CP was given (expressed as a percentage of able-bodied controls). Nine case-control studies were included (average age ± SD of subjects with CP, 21±3y): 3 investigated body composition; 5, cardio-
Respiratory endurance; 3, muscular strength; and 1, muscular endurance. Two of the studies investigated multiple fitness components. No studies on flexibility were found. Muscular strength (34%-60%), muscular endurance (27%-52%), and cardio-respiratory endurance (14%) showed significantly lower values in adults with CP compared with able-bodied controls. Studies on body composition reported conflicting results on the impact of CP. The results of this review point to a reduction in 3 components of health-related physical fitness in young adults with CP compared with controls: muscular strength, muscular endurance, and cardio-respiratory endurance. However, the level of evidence varies from moderate (muscular strength) to limited (muscular endurance and cardio-respiratory endurance). Additional studies of high methodological quality are recommended before firm conclusions can be made.

Toriola & Monyeki (2012) conducted a study to determine the health-related physical fitness (HRPF), body composition and physical activity (PA) status among adolescent learners. A total of 283 adolescents learners (111 boys and 172 girls) with mean age of 14.90±0.72 years from the Physical Activity and Health Longitudinal Study (PAHLS) were participants in the study. Body composition according to the standard procedures of the International Society for the Advancement of Kinanthropometry (ISAK), HRPF using the Eurofit protocol test and PA levels using the International Physical Activity Questionnaire (IPAQ) were assessed and administered. Subsequently, total PA scores were calculated. The results show that on average, the boys (165.41±9.55cm) were significantly taller than the girls (157.88±6.94cm) (p<0.000). Girls had a slightly higher significant BMI (21.43±4.37 kg/m²) than the boys (20.01±3.71kg/m²) (p=0.002). When the learners were categorized based on their BMI scores, the girls were more overweight (32.4%) compared to the boys (17.1%). Additionally, the girls (%body fat 26.01±8.51) were substantially (p<0.000) fatter than the boys (13.19±8.56). Furthermore, the results also indicated that the boys had consistently better performances in all
the HRPF tests than the girls (p<0.000). More girls (19%) than boys (16%) watched TV for more than 3 hours daily. A total of 85 (30%), 78(27.5%) and 88(31.1%) of the adolescent students had low, moderate and high PA involvement. It was concluded that girls were more overweight and less active than boys. In view of the health implications of the findings, there is a need to create enabling environment and opportunities that will promote physically active lifestyle and develop life-long positive attitudes towards PA among the learners. Community-based strategies designed to facilitate effective and sustainable PA intervention programmes in schools are recommended.

Makama et al. (2012) investigated the relationship between body composition and physical fitness in 14-year-old high school adolescents of South Africa. Baseline data from a longitudinal study on physical activity and health (PAHLS) may provide valuable information for future studies, hence to inform public health policy makers. The objectives of this study are to determine the prevalence of underweight, normal weight and overweight among adolescents aged 14 years in the Tlokwe Local Municipality of the North West Province of South Africa, and to assess the association between physical fitness and body composition separately for boys and girls, adjusted for race and locality. Body weight, height and triceps, and sub scapular, skin folds of 256 adolescents (100 boys and 156 girls) aged 14 years were measured, and percentage body fat and body mass index (BMI) were calculated. BMI was used to determine underweight, normal weight and overweight based on the standard criterion. Physical fitness was assessed by standing broad jump, bent arm hang and sit-ups according to the EUROFIT fitness standard procedures. Multinomial logistic regression analyses stratified for gender and adjusted for race (black or white), and the locality (urban or township) of the schools were used to analyze the data. In the total group 35.9% were underweight and 13.7% overweight. Boys were more underweight (44%) than girls (30.7%). The prevalence of overweight was 8% in boys and 17.3% in girls. BMI was strongly (p=0.01)
related with percentage body fat. Strong and significant positive associations between physical fitness and BMI for the underweight girls with high physical fitness scores (OR, 10.69 [95%CI: 2.81-40.73], and overweight girls with high physical fitness scores (OR, 0.11 [95%CI: 0.03-0.50]) were found. Non-significant weaker positive relationship between physical fitness and BMI for the underweight boys with high physical fitness scores (OR, 1.80 [95%CI: 0.63-5.09]), and the overweight boys with high physical fitness scores (OR, 0.18 [95%CI: 0.02-1.78]) were found. Both underweight and overweight among boys and girls in Tlokwe Local Municipality exist, and their effects on physical fitness performances were also noticed. As such, strategic physical activity, interventions or follow-up studies recognizing this relationship particularly in the overweight adolescents are needed. In addition, authorities in health and education departments dealing with adolescents should make use of this evidence base information in policies development.

Petroski (2012) investigated the associations between health-related physical fitness and socio-demographic factors in students from a capital city of a Brazilian state. A cross-sectional study was conducted on 605 students aged 15 to 19 years. Socio-demographic data were collected, including gender, age, education level and family income, and correlated to physical fitness levels. The percentages of students with unhealthy body composition, unhealthy skeletal muscle fitness and aerobic fitness levels were 23.8%, 34.4% and 30.5%, respectively. There was a trend for fewer male adolescents (OR: 0.65; IC95%: 0.42-0.98) to have unhealthy body composition. Students from lower socioeconomic families were less likely to have musculoskeletal unfitness (OR = 0.60; IC95%: 0.41-0.89). In relation to aerobic fitness, male students (OR = 3.86; IC95%: 2.67-5.58) and those aged 17-19 years (RO = 1.49; IC95%: 1.02-2.177) were more likely to be unfit. It is important to encourage young people to take part in sports and physical activities at
moderate to vigorous intensities in order to improve their body composition, aerobic capacity and physical fitness.

Kamil et al. (2012) measured health-related fitness of children based on different implementation levels of the physical education program. Another was to determine the effect of anthropometric and social factors on students’ health-related fitness. A total of 918 students’ age 13, 14, and 16 years old were selected from three different implementation levels program. The total score of the checklist questions was used as criteria in classifying Implementation levels in Selangor schools. Heights and weights were measured, from which the BMI was calculated. Data concerning students’ family income were collected from school files. Data on student involvement in a variety of PA During and outside of school hours were gathered from information given by students (SKAF questionnaire). Tanner, Self-reported assessment was used to estimate students’ stage of maturation. Length was considered as indicator of Adolescent growth. Effectiveness of These factors on students’ health-related fitness was determined by comparing the pre-post-health-fitness tests scores of Students. Results indicated that children in the high-implementation-level have better-health fitness performance on both Pre-test and post-test measurements than children in the low-implementation level. However, health- fitness Performances that reflect significant differences was different among age groups. The older age groups generally performed better on overall fitness tests than did the younger age groups. Several covariates had strong relationships with pre and post-test fitness scores for different age groups such as; height, weight, BMI, maturity status, time spent in PA, race, and family income. Variations of health-related fitness performance between students involved in this study are most likely contributing to the different implementation levels. Thus, a well-programmed and supervised PE program can develop the health status of students at all levels of education.
Tarandeep et al. (2012) compared the health related physical fitness components between urban and rural primary school children. The sample was 20 subjects, 9 years of age 10 of urban primary school children (girls) and 10 subjects of rural primary school children (girls). Five Health related physical fitness components (40 yard dash, standing broad jump, handgrip, sit and reach and 600 yard run/walk) were taken. The result shows that the static strength of rural children’s was significantly higher than the urban school children. But there is no significant difference of speed, explosive strength, flexibility and cardiovascular endurance components between urban and rural primary school children.

Kangane & More (2013) studied the percentage body fat of 13 years school going boys in Nashik District. Three Thousand Eight students (n=3008) of Rural, Tribal, & Urban schools were selected randomly as sample by employing Fishers random Table. The subject’s age group was 13 years. The score in each criterion measure (% Body Fat) were taken. Descriptive statistics have been applied to process the data prior to employing inferential statistics One way ANOVA. Further, Scheffe’s post hoc test was employed for comparison among school students. The result summarized that there was significant difference among school students.

Ramajayam & Gopinath (2013) analyzed the health related physical fitness among adolescent’s school boys of Puducherry. The sampling procedure used in this study large distribution of random population. To achieve this purpose the health related physical fitness of different age group 13, 14, 15 and 16 yrs school going boys of Puducherry in a total (N=3000),various districts (Puducherry, Karikkal, Mahe, Yanam age group (n-750) subjects were selected by convenience sampling method. At the school level health related physical fitness is one of the major problems among the pupil. The selected criterion variables are Muscular Strength (pushups), Muscular Endurance (sit-ups), Cardio Respiratory Endurance (Tuttle Pulse Ratio test), Percent Body Fat (skin
fold technique) and Flexibility (sit and reach test), are measurable components of health related physical fitness. The data were analyzed by One Way Analysis of Variance (ANOVA), to find out whether there was any significant difference on health related physical fitness among the different age groups. The level of significance was fixed at 0.05, if they obtained 'F' ratio is significant, scheffe's post hoc test was applied to find out the means difference. The result clearly indicates that a significant difference lies among the four age group of school boys on all health related physical fitness variables. Health related physical fitness variables muscular strength, muscular endurance, cardio respiratory endurance and flexibility are significantly increasing they age advances performance also increased. Rest of percent body fat fluctuations, 14 yrs and 15 yrs decreased. 16 yrs schools boys increasing the fat due to less physical activities and concentrate the studies.

After reviewing the related literature, researcher attempts have been made by different researcher to evaluate and to compare health related physical fitness level of different age and gender groups. But the present area of research “health related physical fitness among rural and urban school students of Rajasthan state” has not been investigated by any scholar in the past because of which the, present investigator has chosen the above area for his investigation and opted to compare the health related physical fitness of different age group of students and to develop health related physical fitness norms for the same.