CHAPTER II

REVIEW OF RELATED LITERATURE

The research for reference material is a time consuming but fruitful phase of the graduate programme. A familiarity with the literature in any problem area helps the students to discover what is already known, what others have attempted to find out, what methods have been promising disappointing, and what problems remain to be solved.

The literature in any field forms the foundation upon which all future work will be built.” The review of literature are generally used as a basis for inductive reasoning for locating and synthesizing all the relevant literature on a particular topic.

The present chapter covers the available literature pertaining to the studies made on various aspects of assessment of fitness profiles. The review of literature has been collected from a number of pertinent studies undertaken by the physical educationists, sports scientists and sports administrators. Considering the purpose of the present study the reviews have been mainly classified into the following aspects:

2. Studies on assessment of fitness components.
3. Studies on fitness profiles pertaining to Indian students.
4. Studies comparing fitness profiles among different groups and its relationship with cognitive domain.
2.1 STUDIES ON EVALUATION OF PHYSICAL ACTIVITY PROGRAMMES

Zhu W, et al. (2010) studied key physical education program factors and policies that may affect Texas students' physical fitness, a 39-question survey, administered as part of the Texas Youth Fitness Study (TYFS), was sent to 5651 Texas schools via e-mail. The survey consisted of five sections: (a) demographics, (b) physical education/recess frequency and duration, (c) resources/environment, (d) school physical education policies, and (e) experience/perception of fitness testing. A total of 2576 responses were received, of which 1505 responses (elementary = 58.1%, middle school = 21.2%, high school = 19.4%, and "mixed" school = 1.3%) were used for the report. Most of the findings are consistent with those reported in recent national studies. In addition, there were four distinct aspects: (a) broad support among teachers for the Senate Bill 530 mandate, (b) strong evidence of adherence to the mandated testing protocols, (c) teachers' negative experiences related to the testing, and (d) lack of recess in some Texas elementary schools. The survey provided rich updated information on physical education programs and policies in Texas schools.

Escartí A, et al. (2010) evaluated improvement in self-efficacy and personal and social responsibility among at-risk of dropping-out of school adolescents participating in a program in which Hellison's Teaching Personal and Social Responsibility Model was applied in physical education classes during the course of an academic year. Thirty at-risk adolescents aged 13-14 years old (23 boys, 7 girls)
were assigned to an intervention group (12 boys and 3 girls) or a comparison group (11 boys, 4 girls), the latter of which did not participate in the program. Quantitative results showed a significant improvement in the students' self-efficacy for enlisting social resources and in self-efficacy for self-regulated learning. Qualitative results showed an improvement in responsibility behaviors of participants in the intervention group. This suggests that the model could be effective for improving psychological and social development in at-risk adolescents, and that physical education classes may be an appropriate arena for working with these young people.

Martin MW, et al. (2010) reported that PE2GO is a self-contained physical education (PE) program that provides classroom teachers with the tools they need to lead developmentally appropriate PE lessons. The purpose of this study was to evaluate the PE2GO pilot programs in 6 school districts across the United States. We used paper and pencil surveys at pre intervention (n = 114) and mid intervention (n = 94) and an electronic survey at post intervention (n = 65). In addition an electronic survey was sent to administrators at preintervention (n = 18); focus groups were conducted with teachers at mid intervention for a broader perspective. The study took place September 2004 through May 2005. Results indicate that teachers were satisfied with the PE2GO program and the perceived effects it had on their students. Teachers reported that students increased their time engaged in physical activity (128.7-181.1 minutes per week pre-to-post intervention). Administrator support was important (ie, associated with improvement), but not always present. In
conclusion, the PE2GO program holds promise for the concept of providing in-class physical activity opportunities for students.

Hatzis CM et al. (2010) assessed the long-term effectiveness of a school-based health education intervention program 10 years after its initiation. In 1992 the total population of first grade students from three counties of Crete participated in the study. Over 1000 students were randomly selected for initial and periodic evaluation. Biochemical and behavioural parameters (anthropometric, lipoproteins, blood pressure, physical activity, dietary record and health habits) were measured. Re-evaluation of the program was performed at 3, 6 and 10 years after its initiation. Ten years after the initiation of the program, the results showed that BMI had increased significantly less (p<0.001) and performance in the shuttle run test was significantly better (p<0.001) in the intervention group as compared to the control group. The reduction in total cholesterol noted in both groups was significantly greater in the intervention group than in the control group (p<0.001). The incidence of smoking was also significantly lower in the intervention group (intervention group 7%, control group 13%, p<0.005). This program appears to improve children's health and decrease risk factors for chronic diseases. If these positive effects are maintained in the forthcoming decades, the risk of chronic diseases may well be reduced.

Huang HM et al. (2010) assessed the effectiveness of an in-school weight control program. Data was collected prior to and after the school's summer vacation
The study utilized a one-group pretest-posttest design. Overweight and obese children from the fifth grade in an elementary school in Taipei City were selected as purposive samples. The study, which was conducted between March and June 2007, introduced general obesity concepts, taught basic nutrition education, and organized a physical activity program that comprised two 45-min exercise sessions during the week and one 30-min session activity each weekend. The obesity index assessed the body mass index (BMI) and waist-to-height ratio (WHtR), with physical fitness tests conducted before and after student summer vacations to assess achieved weight control results. The nonparametric test and repeat measure were used to assess weight control program effectiveness. After the weight control program, significant declines in BMI and WHtR ($p < .001$), significant improvements in 800-m run/walk ($p < .01$) and 1-minute sit-up tests ($p < .05$) were recorded. However, no significant comparative improvement was achieved on either obesity index or physical fitness test. Weight control programs represent an effective approach to reduce BMI and WHtR and improve physical fitness. An appropriate diet and exercise are important for school-aged children to maintain effective weight control and physical fitness health.

Naylor PJ, et al. (2010) reported that Action Schools is a whole-school framework designed as a positive approach to addressing childhood inactivity and unhealthy eating patterns during the school day that was effective for children in a large urban center. The purpose of this study was to explore the feasibility and
implementation of AS! BC in 3 remote Aboriginal communities in northern British Columbia. The AS! BC model provided tools for schools and teachers to create individualized 'action plans' to increase the opportunities for physical activity (PA) and healthy eating (HE) across 6 'action zones'. These zones included: (1) school environment; (2) scheduled physical education; (3) classroom action; (4) family and community; (5) extra-curricular; and (6) school spirit. Teachers (primarily generalists) were provided with the training and resources necessary to implement their action plan for their class. Schools had three visits from the AS! BC support team. Teachers received specialized training and support, a 'planning guide' and classroom-based resources. Gender- and skill-level-inclusive activities were prioritized. Although the model emphasized choice using a whole-school framework, 'classroom action' was a flagship component. Teachers were asked to provide students with a minimum of 15 additional minutes of PA each school day and at least one HE activity per month in the 'classroom action zone'. Information about implementation was gathered from weekly 'classroom logs' completed by teachers and focus groups with school staff. The logs showed that all 3 schools implemented physical activities (mean = 140 min/week, range = 7-360 min/week) and HE activities (mean = 2.3 times/week, range = 0-10 times/week) but this varied by school and teacher. Adherence to logging was low (34% of eligible weeks). Focus group data showed that the program was well received and that support from the AS! BC master trainer and support team was crucial to delivery of the program. Staff highlighted challenges (eg time, high staff turnover at the schools and lack of
financial resources), but felt that with continued support and cultural adaptations they would continue to implement AS! BC in their schools. The evaluation demonstrated that AS! BC was appropriate and feasible for use in the First Nations schools in these rural and remote communities with some cultural adaptations and ongoing support. Rural and remote locations have very specific challenges that need to be considered in broader dissemination strategies.

Abu-Moghli FA et al. (2010) aimed at exploring the lifestyles of university students, the relationship between specific demographical variables and health practices and the role of training in improving these practices. An experimental and a comparison group were selected using the convenient sampling method. Two 5-day training programmes on healthy lifestyles were conducted. Self-reported behaviours of both groups were assessed before and after the programme. The results reflected slightly positive health practices related to the three behavioural categories with the type of diet being the highest and physical activity being the lowest. No significant differences were reflected in relation to the selected variables. A positive influence of training on improving health behaviours of university students related to the three behavioural categories was observed. Results suggest a similar course to be included as a university elective and students' involvement in available extra curricular activities be encouraged.

Lai HR et al. (2009) explored the effects on junior high school students' self-esteem of a self-esteem program incorporated into the general health and physical
education curriculum. A quasi-experimental research design was used, and 184 seventh-grade students at two junior high schools in Taipei City were randomly selected and separated into two groups. The experimental group received one 32-week self-esteem program incorporated into their regular health and physical education curriculum, which was administered in three 45-minute-session classes each week. The control group received the regular health and physical education with no specially designed elements. During the week before the intervention began and the week after its conclusion, each participant's global and academic, physical, social, and family self-esteem was assessed. Data were analyzed using analysis of covariance. For all participants, the experimental group was significantly superior to the control group in respect to physical self-esteem (p = .02). For girls, the experimental group was significantly superior to the control group in family self-esteem (p = .02). However, there was no significant difference between the two groups in terms of global self-esteem. This study provides preliminary evidence that incorporating self-esteem activities into the regular school health and physical education curriculum can result in minor effects in students' physical self-esteem and family self-esteem. Findings may provide teachers and school administrators with information to help them design programs to improve students' self-esteem. This study also reminds health professionals to focus on providing self-esteem-building programs when working with adolescent clients.
Vinciullo FM, and Bradley BJ. (2009) determined whether there is a relationship between the Coordinated School Health Program (CSHP) and student academic performance. Data were collected from schools and the community for three reports for 50 states and the District of Columbia (DC). The School Health Policies and Programs Survey (SHPPS), the National Assessment of Educational Progress (NAEP), and the U.S. Census 2000 Profile were used to study the relationships among three parameters: (a) The intervention called a CSHP; (b) Student achievement; and (c) Rate of poverty in each state. A stepwise regression analysis was conducted, controlling for poverty using state-level data. Components of a CSHP had statistically significant relationships with academic achievement. Students in states with policies promoting students' health demonstrated higher academic scores and higher rates of high school completion.

Madsen KA, et al. (2009) identified physical activity opportunities linked to fitness and weight status among adolescents in low-income communities. Cross-sectional, ecological analysis of 9268 seventh- and ninth-grade students in 19 public schools participating in The California Endowment's Healthy Eating Active Communities program. Cardiorespiratory fitness (mile time) and body mass index. Independent variables included students' perceptions and behaviors related to daily physical activity opportunities, assessed via anonymous survey. Ecological analysis was used to link survey data with fitness and body mass index data within each school. Linear regression identified associations between youths'
perceptions/behaviors and fitness/body mass index. As the proportion of students reporting enjoying physical education, walking to school, and spending 20 minutes or longer in exercise during physical education increased from 0% to 100%, mile time decreased overall (-2.7 minutes; \(P = .03\)), mile time decreased among seventh graders (-3.3 minutes; \(P = .02\)), and body mass index z scores decreased among ninth graders (-0.7; \(P = .045\)), respectively. Each additional day students reported being active on school grounds outside school hours was associated with decreased mile time (-0.5 minute; \(P = .02\)). Active transport to school was associated with poorer weight status and greater odds of purchasing food while in transit (odds ratio = 1.5; \(P < .001\)). Physical education is a valuable policy opportunity to improve student health. Promoting active transport may improve fitness but must be done in conjunction with community partnerships to improve the food environment in the vicinity of schools. Promoting the use of school grounds outside school hours (such as after-school programs) should also be prioritized in response to youth obesity.

Schneider M et al. (2009) reported that the HEALTHY study was a multi-site randomized trial designed to determine whether a 3-year school-based intervention targeting nutrition and physical activity behaviors could effectively reduce risk factors associated with type 2 diabetes in middle school children. Pilot and formative studies were conducted to inform the development of the intervention components and the process evaluation methods for the main trial. During the main trial, both qualitative and quantitative assessments monitored the fidelity of the intervention
and motivated modifications to improve intervention delivery. Structured observations of physical education classes, total school food environments, classroom-based educational modules, and communications and promotional campaigns provided verification that the intervention was delivered as intended. Interviews and focus groups yielded a multidimensional assessment of how the intervention was delivered and received, as well as identifying the barriers to and facilitators of the intervention across and within participating schools. Interim summaries of process evaluation data were presented to the study group as a means of ensuring standardization and quality of the intervention across the seven participating centers. Process evaluation methods and procedures documented the fidelity with which the HEALTHY study was implemented across 21 intervention schools and identified ways in which the intervention delivery might be enhanced throughout the study.

Jago R et al. (2009) examined whether 6th grade students can achieve moderate to vigorous physical activity (MVPA) from 1) activity-based physical education (AB-PE) with 585 participants and 2) a curricular-based (CB-PE) program with 1,544 participants and randomly sampled heart rates during lessons. AB-PE participants spent between 54-66% with a heart rate >140 bpm. CB-PE participants spent between 49-58% with a heart rate >140 bpm. Girls' mean heart rate was 3.7 bpm lower than the boys. PE can be readily modified so that students spend more than 50% of time in MVPA.
Ceschini FL et al. (2009) described the prevalence of physical inactivity and associated factors among high school students from state's public schools in the city of São Paulo, state of São Paulo, Brazil. Sixteen state's public schools were randomly selected according to the geographic areas of the city (North, South, East, and West). The sample consisted of 3,845 high school students in 2006. Physical inactivity was measured using the International Physical Activity Questionnaire (short IPAQ) and was defined as practicing moderate and/or vigorous physical activity for a period of less than 300 minutes per week. The independent variables analyzed were: gender, age, socioeconomic level, geographic area of the city, awareness of the Agita São Paulo program, participation in physical education classes, smoking, alcohol intake and time spent per day watching television. Three-level Poisson regression was used for assessing the variables, with a significance level of p < 0.05. The general prevalence of physical inactivity among adolescents in São Paulo was 62.5% (95%CI 60.5-64.1). The factors associated with physical inactivity were gender, age, socioeconomic level, geographic area of the city, awareness of the Agita São Paulo program, non-participation in physical education classes, smoking, alcohol intake and time spent per day watching television. It was concluded that the prevalence of physical inactivity among adolescents in São Paulo was high in all the geographic areas evaluated, and that sociodemographic and behavioral factors contributed significantly to physical inactivity.
Gutiérrez M, and Ruiz LM. (2009) examined the relations among students' perceptions of motivational climate, sportspersonship attitudes, and attitudes toward content and teachers in physical education. 910 secondary school students ages 13 to 16 years (M=14.3, SD=1.1) completed Spanish translations of L'Echelle de Perception du Climat Motivational by Biddle, et al., the Multidimensional Sportspersonship Orientations Scale by Vallerand, et al., and the Student Attitudes toward Teacher and Program in Physical Education by Luke and Cope. Structural equation modeling showed that perceived mastery climate is a predictor of students' attitudes toward teacher and content and positive sportspersonship attitudes. In contrast, perceived performance climate was not a predictor or mainly predicted negatively the students' attitudes toward the physical education teacher, content, and sportspersonship attitudes. These findings are discussed with regard to the implications for physical educators.

de Barros MV et al. (2009) evaluated the effectiveness of a school-based intervention on the promotion of physical activity among high school students in Brazil: the Saude na Boa project. A school-based, randomized trial was carried out in 2 Brazilian cities: Recife (northeast) and Florianopolis (south). Ten schools in each city were matched by size and location, and randomized into intervention or control groups. The intervention included environmental/organizational changes, physical activity education, and personnel training and engagement. Students age 15 to 24 years were evaluated at baseline and 9 months later (end of school year).
Although similar at baseline, after the intervention, the control group reported significantly fewer d/wk accumulating 60 minutes+ moderate-to-vigorous physical activity (MVPA) in comparison with the intervention group (2.6 versus 3.3, P<.001). The prevalence of inactivity (0 days per week) rose in the control and decreased in the intervention group. The odds ratio for engaging at least once per week in physical activity associated with the intervention was 1.83 (95% CI=1.24-2.71) in the unadjusted analysis and 1.88 (95% CI=1.27-2.79) after controlling for gender. The Saude na Boa intervention was effective at reducing the prevalence of physical inactivity. The possibility of expanding the intervention to other locations should be considered.

Heyman E, and Dekel H. (2009) reported that studies indicate that musculoskeletal discomfort and back pain problems are evident not only in adults, but also in children. We believe that educating towards a balanced-posture, body-function and movement patterns, as well as their ergonomic implications, can minimize and even prevent these problems. Such an ergonomics awareness educational program has to start at childhood and should be an integral part of the curriculum in the schools. This article presents the educational program "Ergonomics, Movement & Posture" (EMP), which is taught in elementary schools by Physical Education (PE) students of the Kibbutzim College of Education in Israel, as part of their practicum. Although there has been no formal evaluation of the
effectiveness of the program, so far, participating children, their parents, the teachers and the principles have offered positive feedback.

2.2 STUDIES ON ASSESSMENT OF FITNESS COMPONENTS

Chen et al. (2006) reported that the 3 min step test is a widely used method to evaluate physical fitness, but whether this method is valid when performed at altitude is unknown. The purpose of this study was to examine the effect of altitude on the fitness score of the 3 min step test, and the role of ambient temperature in this effect. In study I, 11 healthy volunteers (aged 18.1 +/- 1.1 years) performed a 3 min step test at sea level and at altitude (1950 m). Plasma lactate and stress hormones, as indicators of metabolic stress, were measured before and after the test. To determine the role of ambient temperature, we performed study II at sea level with the same step test simulating the altitude temperature condition (24 degrees C at high altitude versus 32 degrees C at sea level) with 23 subjects (aged 20.4 +/- 0.4 y). In study I, plasma lactate of the subjects was elevated during the step test at sea level and to a greater extent at high altitude. Plasma cortisol and testosterone levels were elevated only at high altitude. However, the heart rate (HR) recovery after the step test was faster at high altitude than at sea level, producing a better physical fitness index. Furthermore, in study II, we demonstrated that the subjects who performed the 3 min step test at 24 degrees C exhibited faster HR recovery than at 32 degrees C. The current study therefore suggests that environmental conditions leading to temperature variation have strong confounding effects on the fitness score of the 3 min step test.
van de Vliet et al. (2006) investigated the physical fitness profile of high-performance athletes with intellectual disability (ID) in comparison with able-bodied individuals. Participants were 231 male and 82 female athletes. All evaluations were done using the EUROFIT physical fitness test. In comparison with population data, both male and female athletes with ID score better for flexibility and upper body muscle endurance, but have similar or lower values for running speed, speed of limb movement, and strength measures. Compared with age-matched physical education students, male athletes with ID score better for running speed and flexibility, and worse for strength. Female athletes with ID score not different from able-bodied individuals for flexibility, running speed, and upper body muscle endurance, but worse for strength measures. Athletes with ID also have poorer cardio respiratory endurance capacity compared with sportive peers without ID. Furthermore, male athletes have a more differentiated profile depending upon their sports discipline, compared with female athletes. It can be concluded that high-performance athletes with ID reach physical fitness levels that are equal to or lower than those of able-bodied sportive counterparts. Further research should investigate the importance of reduced muscle strength to be the limiting factor.

Murphy et al. (2006) investigate the effect of a six-month teacher-led osteogenic physical activity program, vs. a self-led activity program, on ultrasound measurements of bone in inactive teenage girls. Ninety sedentary girls [mean (SD) age 16.3 (.6) years] were identified from 300 assessed for physical activity across five schools in southeast Ireland. Schools were matched and randomly assigned to a
teacher-led physical activity (TLPA) program, a self-led physical activity (SLPA) program, or a control group. Broadband ultrasound attenuation (BUA), speed of sound (SOS), and os calcis stiffness index (OCSI) were measured using a portable ultrasound machine. Anthropometry, aerobic fitness, calcium intake, and physical activity were assessed, and focus groups held one month after program completion. Descriptive statistics, paired t-tests, and analysis of variance were used to analyze the data. Both intervention groups demonstrated significant improvements (p < .05) in BUA, SOS, OCSI and aerobic fitness, i.e., TLPA: +14.9%, +21.9%, + 15.9%, and +8.5%, respectively, and SLPA: +10.6%, +30.3%, + 15.6%, and +5.1%, respectively, with no change in controls. Differences between intervention groups and controls were significant for BUA and OCSI (p < .05). TLPA and SLPA groups engaged in an average of 4.5 and 3.4 hours/week of physical activity, respectively, over the intervention period. The SLPA group continued to exercise after the intervention had ceased, whereas the TLPA group did not. Previously inactive teenage girls can adhere to an osteogenic activity program whether supervised or directing their own activity. Longer-term, sustainable initiatives with this age group are needed and might focus on developing personal skills for physical activity.

Leyk et al. (2005) reported that in westernized countries the sedentary lifestyle in conjunction with a hypercaloric diet has caused an increase in the number of obese adults. Moreover, recent studies suggest that the prevalence of overweight in children increased during the last decade. However, the literature has to be interpreted with some caution since the majority of epidemiological studies
examining health, fitness, and obesity rely on self-reported data rather than measurements. A further limitation is that most studies examine either physical activity or nutrition, only few deal with both aspects simultaneously. In the present study we analyzed both aspects in more than 58,000 persons aged between 17 and 26 years. All of them were applicants for the German Bundeswehr, which accepts only volunteers with school leaving certificates and a body mass index (BMI) below 30 kg \text{ m}^{-2}. The admitted subjects performed a Physical-Fitness-Test (PFT) consisting of 5 simple sport tests (shuttle run, sit-ups, push-ups, standing jump, Cooper test). For 23,000 subjects additional measurements of body height and body weight as well as information about their education level were available. These data were combined with the PFT results. We found large deficits in the physical fitness of young adults: More than 37% of the participants failed to pass the PFT, with failure rates of the male volunteers increasing significantly since 2001. While the female volunteers showed virtually constant body weight and BMI, the corresponding values of men increased monotonously between the age of 17 and 26 years. Physical fitness was positively, BMI negatively correlated with education level. The present findings suggest that body weight increases and fitness decreases in non-obese young adults in Germany. Despite the correlations between BMI and physical fitness the terms "overweight" and "physically unfit" should not be regarded as synonyms.
Milde et.al (2006) assessed the physical fitness of short-statured boys aged 7 - 20 years by applying fitness norms established for the Polish population in relation to calendar or growth age. The results of EUROFIT fitness tests recorded in 3517 short-statured (below percentile 10 for body height) boys, aged 7-20 years, selected from a large (n=37 000) representative male cohort, were analysed. Individual results were confronted with the respective percentile norms related to calendar age (CA) or growth age (GA), since body height deficiency at given CA could have affected the results of fitness tests expected for that CA. The percentages of subjects below, the percentile 3 or above percentile 97 for given fitness test and CA or GA for the Polish population, were determined. No differences between the percentages computed for CA and GA were noted in case of the following tests: sit-and-reach (SAR) and bent-arm hang (BAH). Significant differences in percentages for both percentiles were found for the following tests: standing broad jump (SBJ), endurance shuttle run (ESR), handgrip (HGR) and plate tapping (PLT). In case of sit-ups (SUP) significant differences in percentages between CA and GA norms were found below the percentile 3, and in case of shuttle run (SHR) and flamingo balance (FLB) -- above percentile 97.: Fitness tests were classified into two categories according to the differences between the results related to norms for calendar or growth age: those independent of whether CA or GA norms were applied (SAR and BAH), and those susceptible to the kind of norm (SBJ, HGR, PLT, SHR, FLB and SUP). The results of tests from the latter category should thus be evaluated by confronting them with the norms established for the growth age, and not calendar age.
Ng C. et al. (2006) made a study to describe the levels of obesity, adiposity measures, physical activity and fitness in Cree children aged 9-12 years. Cross-sectional survey study took place in northern Quebec, Canada. Height, body mass, waist circumference and five skinfold thicknesses were measured. Physical activity was assessed by having children wear a pedometer for two days. Children performed the 20-metre shuttle run test (SRT) to determine their physical fitness level. Of 82 participating children, 33% were overweight (but not obese) and 38% were obese according to an international reference. The mean sum of five skinfold measures exceeded the 95th percentile of Canadian children. Compared with the Third National Health and Nutrition Examination Survey, the majority of children exceeded the 85th percentile for waist circumference (62%) and at the suprailiac (80%), subscapular (72%), and triceps (54%) skinfold sites. 90% of children scored below the 20th percentile in the SRT compared with normative data from Quebec children. Based on pedometer scores, only 49% of children were sufficiently active. There is a high prevalence of overweight and central adiposity in this population, with low physical activity and fitness levels. This profile may result in adverse health outcomes.

Armstrong and Welsman (2006) reviewed the reviews the habitual physical activity of children and adolescents from member countries of the European Union in relation to methods of assessing and interpreting physical activity. Data are available from all European Union countries except Luxembourg and the trends are
very similar. European boys of all ages participate in more physical activity than European girls and the gender difference is more marked when vigorous activity is considered. The physical activity levels of both genders are higher during childhood and decline as young people move through their teen years. Physical activity patterns are sporadic and sustained periods of moderate or vigorous physical activity are seldom achieved by many European children and adolescents. Expert committees have produced guidelines for health-related physical activity for youth but they are evidence-informed rather than evidence-based and where there is evidence of a relationship between physical activity during youth and health status there is little evidence of a particular shape of that relationship. The number of children who experience physical activity of the duration, frequency and intensity recommended by expert committees decreases with age but accurate estimates of how many girls and boys are inactive are clouded by methodological problems. If additional insights into the promotion of health through habitual physical activity during youth are to be made, methods of assessment need to be further refined and recommended guidelines re-visited in relation to the existing evidence base.

Liou and Chiang (2004) investigated levels of physical activity among children and examine their rates of compliance with various international recommendations. The sample was comprised 463 children (249 boys and 214 girls), aged between nine and twelve from four cities in Taiwan. Three-day Physical Activity Logs (3-d PAL) were used as the instrument to measure physical activity in
the previous seven days. The mean and percentile of average estimated energy expenditure (EE, kcal/kg/day), moderate-vigorous physical activity (MVPA, min/day) and vigorous physical activity (VPA, min/day) among boys and girls according to age group were reported. Four international physical activity recommendations were used, as the criteria with which were examined compliance rates. Results indicated no significant main effects of age or gender, and no interaction was found between EE and MVPA. VPA significantly increased between the aged nine and eleven. Girls aged 12 engaged less significantly VPA than boys. Over 90% of children met the Physical Activity Guidelines for Adolescents (PAGA) and the United States' Healthy People Objective No. 22.6; 80% met the United Kingdom Expert Consensus Group guideline; and 70% met the Healthy People Objective No. 22.7. These results indicated that physical activity among the majority of children complied with the international recommendations. The only significant difference came in participation rates for vigorous physical activity among children of different ages and gender. Our results provide important information for health policy in the field of children's physical activity. We would recommend the setting up of national objectives for the physical activity of children and the conducting of a national surveillance study with a more precise and consistent measurement of physical activity for children to offer a comparable data in the future is suggested.

Yi-Ching Huang and Malina (2002) studied on 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. Physical activity was estimated as total daily energy expenditure and energy expenditure in moderate-to-vigorous physical activity from 24-hour activity records for three days, two week days and one weekend day. Health-related fitness was assessed as the one-mile run (cardiorespiratory endurance), timed sit-ups (abdominal strength and endurance), sit-and-reach (lower back flexibility), and subcutaneous fatness (sum of the triceps, subscapular, suprailiac, and medial calf skinfolds). 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 cardiorespiratory 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.

Savvas et. al.(2006) conducted a cross sectional study to provide estimates for overweight and obesity in a sample of Greek schoolchildren and to determine their possible relation with selected motor and health-related fitness parameters. The
study sample consisted of 709 healthy children (328 girls, 381 boys, mean age = 8.9±1.6 years), living in the towns of Agios Stefanos (12000 citizens) and Alexandroupolis (60000 citizens), Greece. All pupils underwent anthropometric, motor and cardiovascular fitness assessments (Eurofit test battery). The body mass index (BMI) cut-off points adopted by the International Obesity Task Force were utilized for the assessment of overweight and obesity. Results showed 59.4% of the participants had a normal BMI, 25.8% were overweight and 14.8% were obese, without significant differences between genders. In general, the higher BMI categories were strongly associated with inferior performances in all fitness tests, except flexibility. This graded relationship was consistent for both boys and girls, although the statistical relationship between BMI categories and fitness performance varied by gender. It was concluded In conclusion, the findings of the current study offer some support to the reported high prevalence of childhood obesity in Greece and suggest that overweight and obesity are limiting factors for fitness performance in primary schoolchildren. The present data suggest that interventions promoting children’s health should, ideally, begin early in life and involve measures that simultaneously improve fitness and lower fatness.

Hong Yan et.al (1996). reported that there are 200 million Chinese adolescents and they represent a significant proportion of the world adolescent population. Their health, growth and nutritional status is of vital importance to China but also to the health of adolescents globally. Previous assessments of nutritional status of adolescents in China have been undertaken without using World Health
Organization (WHO) recommended anthropometric methods or reference data. Using data from the National Survey on the Constitution and Health of Chinese Students in 1995 (NSCHCS-95), this study aimed to assess the current nutritional status of Shaanxi school students using WHO recommended methods of nutritional assessment. Data for 6284 (3142 females and 3142 males) Shaanxi school students aged 10–17 years was abstracted from the Shaanxi portion of the NSCHCS-95. This national cross-sectional survey gathered anthropometric measurements using standard methods, maturity indicators, and basic social and demographic data. The calculation of anthropometric indicators was based on the National Centre for Health Statistics/WHO reference data and the prevalence of nutritional status indicators was estimated using standard WHO recommended cut-offs and methods of maturity adjustment. The median age of menarche and spermarche was delayed for Shaanxi rural female and male students in comparison with the reference data by 0.81 and 0.39 years, respectively. The prevalence of stunting and thinness in students in almost all ages was higher than in the reference population. For all age groups combined, the adjusted prevalence of stunting was 8.0% for urban students, and 11.0% for rural students. For students under 14 years of age, the adjusted prevalence of thinness was 18.3% for urban students, and 15.1% for rural students. The prevalence of 'at risk of overweight' and obesity among urban male students aged 10–11.99 (for overweight) and 10–12.99 years (for obesity) were similar to the reference population. Undernutrition (stunting and thinness) continues to be a public health problem in the Shaanxi school population and may be related to the less
developed rural economy in the province. Young Shaanxi urban male students showed a tendency towards an excess prevalence of 'at risk of overweight' and obesity, which may be related to improved economic conditions in urban areas. It is necessary to develop national anthropometric reference data, cut-off points and median ages of attainment of WHO recommended maturational indicators for Chinese adolescents.

Ciaran MacDonncha and Rhoda Sohun (2006) compared the physical fitness levels of Irish adolescents and reported that physical fitness data for males (n = 610) and females (n = 646) from Northern Ireland aged between 15 - 17 years for the following variables: height (males = 1728 cm, females = 1616 cm); weight (males = 63 kg, females = 56 kg); sit-ups in 30s (males = 26 reps, females = 20 reps); sit and reach (males = 22 cm, females = 25 cm); grip strength (males = 42 kg, females = 28 kg); standing long jump (males = 192 cm, females = 148 cm) and body fat percentage (males = 13.5%, females = 23.8%). When a comparison was made between adolescents from Ireland results demonstrated that large percentage differences exist between mean values for Irish adolescents and Northern Ireland adolescents for the following variables: sit-ups (30s); sit and reach flexibility and grip strength. The percentage body fat of Irish female adolescents was also greater than their Northern Ireland counterparts. Healthy body fat values for males and females are 15% and 25% respectively.
Rode and Shephard (2005) made a study on physical characteristics, muscle strength, and predicted aerobic power were compared in two circumpolar populations aged 20-49 years at different stages in acculturation to a “modern” sedentary life-style: the Inuit of Igloolik (110 males, 80 females tested in 1989-90) and the nGanasan of Volochanka (29 males, 25 females tested in 1992-3). Both populations show short stature but normal body mass. Skinfold thicknesses (average of triceps, subscapular, and suprailiac) of the male Inuit (mean 10-11 mm, rising with age to 15 mm) are now much greater than in previous surveys, reflecting adoption of a mechanized, sedentary life-style. Recent estimates from Siberia suggest continuing substantial daily energy expenditures by the men but not the women of this region, and averaged values for the three skinfolds in the nGanasan males (mean 7-8 mm) are still low. In women, both Inuit (mean skinfolds 15 mm, rising to 29 mm with age) and nGanasan (mean 19 mm, rising to 25 mm) are now relatively obese. Compared to the nGanasan, male Inuit have greater handgrip force (probably due to snowmobile operation), but poorer knee extension strength (probably because they now do little walking through snow). In contrast, older nGanasan women have less knee extension strength than the Inuit (probably because the latter still carry babies on their backs). The aerobic power of both Inuit and nGanasan (mean of 48, declining with age to 38-40ml/[kg.min] in males, mean of 38-45 declining with age to 33-37 ml/[kg.min] in females) still corresponds to that of a moderately active urban population.
Özdirenç et al. (2003) made a cross-sectional observational study of 98 rural and 74 urban healthy children (aged 9–11 years) was conducted in Turkey. A questionnaire was used in collecting information about the children's physical activity habits and their school's facilities. The physical fitness of children was evaluated with EUROFIT test battery. The rural children preferred to play football and volleyball while the urban children had a tendency to prefer indoor sports. The percent of urban children not involved in any sports activity was 35%, while this rate was 30.6% for rural children. It was also found that the urban children watched TV more than the rural children (13.4 ± 2.7 h/week, 10.9 ± 2.7 h/week, respectively). The results showed that body mass index and skinfolds thickness were higher in the urban children (P < 0.05). There were no significant differences in the hip–waist ratio or the hip and waist circumference between the two groups. In cardiopulmonary and motor fitness, no difference was found between the two groups. In contrast, flexibility and muscle endurance were significantly higher in the rural children. The children living in the urban areas were more inactive and obese, which resulted in a decrease in their flexibility and muscle endurance fitness.

Carlton et al. (2006) examined resiliency indicators in Hawaiian adolescents. AIMS: Multiple resiliency indicators were examined across different domains including individual, family and community in relation to increased psychological well-being. Existing data from the Native Hawaiian Mental Health Research Development Program (NHMHRDP) were used. These data included information
from a community sample of five high schools on three islands from the state of Hawai‘i. The sample included 1,832 students, where 64% were Native Hawaiian and 36% were non-Hawaiian. This study found that Native Hawaiian youth experienced more family adversity compared with non-Hawaiians, but Native Hawaiians were also more likely to have higher levels of family support. For internalizing symptomatology, the most robust resiliency factors were family support and physical fitness/health for Native Hawaiian and non-Hawaiian adolescents. For externalizing symptomatology, achievement and family support were consistently strong resiliency factors. The indicator for physical fitness and health was more influential among Native Hawaiians than non-Hawaiians for externalizing symptoms, while academic achievement was more influential among non-Hawaiians than for Native Hawaiians for the protection against internalizing symptoms. Our findings support the need for intervention programs designed to promote resilience in adolescents, including highlighting the importance of the family. Further research is needed to design and evaluate programs that promote well-being, enhance resilience and improve mental health in culturally appropriate ways.

Guerin, Elmi, and Corrigan (2007) compared the body composition and cardiorespiratory fitness levels of a sample of refugee Somali women living in New Zealand with normative data. Refugee Somali women were invited to participate in sessions to assess physical fitness and body measurements. Height, bodyweight and waist and hip circumference were measured. The Rockport Fitness Walk Test was
used to estimate the women's cardiorespiratory fitness levels. Thirty-one women between 12 and 66 years old participated in this study. There was a significantly greater proportion (71.4%) of participants with a BMI in the overweight or obese range (≥25 kg/m²) compared to normative New Zealand women's data (49.3%; p = 0.015). The proportion of Somali women (42%) with a waist-to-hip ratio in excess of 0.8 was higher than that of New Zealand women (35.6%), but not statistically so. All women over 30 years of age (n = 12) had an estimated VO₂max below the 50th percentile with eight participants below the 10th percentile. The extent of overweight and obesity and low fitness levels, particularly among the older Somali women in this study, suggests that Somali women are at increased risk of developing lifestyle related diseases.

Zizzi et al. (2006) reported that although much has been learned about the global determinants of physical activity in adults, there has been a lack of specific focus on gender, age, and urban/rural differences. In this church-based community sample of Appalachian adults (N = 1,239), the primary correlates of physical activity included age, gender, obesity, and self-efficacy. Overall, 42% of all participants and 31% of adults age 65 years or older met recommended guidelines for physical activity, which suggests that most participants do not engage in adequate levels of physical activity. Of participants who met physical activity guidelines, the most common modes of moderate and vigorous activity were walking briskly or uphill, heavy housework or gardening, light strength training, and biking. These particular
activities that focus on building self-efficacy might be viable targets for intervention among older adults in rural communities.

Michaud (1996) study of physical fitness represented one of the several facts of sports and physical activity, which could have, in short and long terms, definite influences on the health and well being of children and adolescents, as well as adults and at the same time the measurement of physical fitness raised several conceptual methodological and technical problems which explained why surveys including such measures had been scarce until recently. Hence a literature review had been made by Michaud and Narring in search of the methodological problems linked with fitness measurements. Describing the components of physical fitness as endurance, muscular strength, agility, co-ordination and body composition the researcher reviewing the main test batteries available recommended the utilization of the test batteries in the future, either in the area of research or of individual and group assessment of physical fitness”.

2.3 STUDIES ON FITNESS PROFILES PERTAINING TO INDIAN STUDENTS

The Central Board of secondary Education took the lead in introducing physical Education as an academic subject at school level. The board appointed a committee with Shri S.D.Chopade as the chairman to form a curriculum on physical education. Later it was introduced as a required common subject for junior secondary (nineth and tenth classes) and senior secondary education (eleventh and twelfth
The syllabi and courses (1980) for secondary school examination physical fitness play an important role in the curriculum of physical education in addition to the various objectives of physical education.

There are no special periods allotted for physical fitness in the syllabus of the central Board of secondary Education. It is expected that the students would develop a certain amount of physical fitness through participation in other physical education activities. However, there is provision for assessing physical fitness.

In the scheme of examination a student is permitted to sit for examination at the end of class ten only if he has obtained grade 4 (fair) in health and physical education. Maximum of seventy five marks were allotted for theory out of which ten marks for fitness.

Sibi and Saha (1995) conducted a study of sets concept, movement concept and physical fitness among the school boys of West Bengal. The purpose of the study was to utilize the physical education programme to help an individual to develop physically, mentally and socially through psychomotor, cognitive and effective learning process. These processes are inter related and influenced by one another to bring desirable changes in behavior. The sample for the study was drawn from rural (R) urban (U) and semi urban (SU) areas of India Murshida bad and 24 districts in west Bengal. Each group composed of 33 subjects. The ages of the subjects were 14 through 16 years. The test batteries include test items, namely (1) Leg flexed sit-ups for 30 seconds: (2) Side stepping for 30 seconds: (3) squat thrust
for 30 seconds: (4) modified pull-ups for 30 seconds and (5) standing broad jump. The coefficient of correlation of 0.346 between physical fitness and movement concepts was significant at 0.01 levels. It was concluded that there was a significant positive correlation between physical performance and movement concepts.

Yadav (1986) conducted a study on standardization of physical fitness of the school children of Haryana (13 to 16 years of age) with the purpose of estimating the fitness and comparing the standard of physical fitness of urban and rural boys of Haryana. For the purpose of this study 3600 boys of the twelve districts of Haryana were randomly selected and the performance of the boys were recorded on 50mts dash, shot put, standing broad jump, zig zag run, sit-ups and step-up tests.

Chatterjee, (1993) “conducted a study of the physical and motor fitness level of Indian School going boys of age nine to nineteen years. The study revealed that there were major increments in most of the parameters during the maximum spurt in height and weight. The finding also indicated highly significant correlation for all the fitness measures with age, height, weight except PFI 50yd dash and shuttle run where correlations values were negative. The study conducted in India was compared with that of American significantly superior in explosive strength of legs. National players were better in abdominal and shoulder strength.”

Raj Aneja (1996) conducted a study on the physical fitness of the children of coastal and non-coastal area. The purpose of this study was to compare the general physical fitness of boys of the similar age group (12-14 years) in coastal and non-
coastal area. The study was restricted to 600 untrained day scholar boys 300 from coastal area and 300 From non coastal area school in Thirivananthapuram District during the academic year 1995-96. The AAHPER youth fitness test was administered. It was found that there was no significant difference in the ‘t’ value at .05 level of significance in pull-ups, sit-ups shuttle run and 50 yard dash and the significance was found only in broad jump and 600yd Run/walk.

Chittibabu (2000) conducted a comparative study of anthropometric measurements and physical fitness components of physical education students of Kerala and Tamilnadu. The Study find significant difference in the components of physical fitness among male students of Kerala and Tamilnadu. Significant difference (P<0.05) existing between Kerala and Tamilnadu samples on speed (50 yard dash) strength (pull ups) and sit-ups) and power (standing broad jump). Tamilnadu boys dominated on speed, strength and power.

Jinaraj Tarun (1998) analysed the physical fitness of boarders and day scholars of a public school. The purpose of the study was to analyse physical fitness status of male students of the age group 12-14 years of boarding and day scholar student’s from St. Thomas central school, Mukkola, Thiruvananthapuram were selected as subjects. The AAHPER youth fitness test was administered. The ‘t’ value at 0.05 level of confidence the boarders and the day scholars on broad jump, and 50 yds. significance difference was found on pull ups, situps, shuttle run, and 600 yds. run/walk.
Anderson (1995) “conducted a study to find out the changes over two years on different physical fitness measures, and the relationship between these changes and changes in physical activity measuring maximum aerobic work capacity functional strength, muscular endurance agility and flexibility. Most physical measures increased over time in boys and in girls and an increase was found in arm extension strength and trunk extensor endurance, but not per kg of body mass decreased. Changes in physical activity or sports activity did not relate to change in physical fitness level. The study concluded that the physical fitness level in adolescence was so high that only physical activity at high relative intensity was supported to have an effect on the fitness level.

Rajakumari (2001) conducted a study on a comparison of high and low fitness level of school students on their attitude towards physical education there is a significant difference between high and low fitness groups of public school students in the age group of 16-18 years in their attitude towards physical education. Positive attitude to the whole hearted involvement in physical activities and negative attitude and with low inclination of low fitness group”.
2.4 STUDIES COMPARING FITNESS PROFILES AMONG DIFFERENT GROUPS AND ITS RELATIONSHIP WITH COGNITIVE DOMAIN

Groslambert A, and Mahon AD. (2006) made a study to review the key findings from the published literature concerning rating of perceived exertion (RPE) in relation to the developmental level of a subject. The use of RPE in the exercise setting has included both an estimation paradigm, which is the quantification of the effort sense at a given level of exercise, and a production paradigm, which involves producing a given physiological effort based on an RPE value. The results of the review show that the cognitive developmental level of children aged 0-3 years does not allow them to rate their perceived exertion during a handgrip task. From 4 to 7 years of age, there is a critical period where children are able to progressively rate at first their peripheral sensory cues during handgrip tests, and then their cardiorespiratory cues during outdoor running in an accurate manner. Between 8 and 12 years of age, children are able to estimate and produce 2-4 cycling intensities guided by their effort sense and distinguish sensory cues from different parts of their body. However, most of the studies report that the exercise mode and the rating scale used could influence their perceptual responsiveness. During adolescence, it seems that the RPE-heart rate (HR) relationship is less pronounced than in adults. Similar to observations made in younger children, RPE values are influenced by the exercise mode, test protocol and rating scale. Limited research has examined the ability of adolescents to produce a given exercise intensity based on perceived exertion. Little else is known about RPE in this age group. In healthy middle-aged and elderly
individuals, age-related differences in perceptual responsiveness may not be present as long as variations in cardiorespiratory fitness are taken into account. For this reason, RPE could be associated with HR as a useful tool for monitoring and prescribing exercise. In physically deconditioned elderly persons, a rehabilitation training programme may increase the subject's ability to detect muscular sensations and the ability to utilise these sensory cues in the perception of effort. RPE appears to be a cognitive function that involves a long and progressive developmental process from 4 years of age to adulthood. In healthy middle-aged and elderly individuals, RPE is not impaired by aging and can be associated with HR as a useful tool to control exercise intensity. While much is known about RPE responses in 8- to 12-year-old children, more research is needed to fully understand the influence of cognitive development on perceived exertion in children, adolescents and elderly individuals.

Deary IJ, et al. (2006) made a study to test the hypothesis that physical fitness is associated with more successful cognitive aging. Surviving participants (N = 460) of the Scottish Mental Survey of 1932 were tested on the same general cognitive test at age 11 and 79 years. Measures of grip strength, 6-meter walk time, and lung function (forced expiratory volume from the lungs in 1 second [FEV1]) were assessed at age 79 years. A latent physical fitness trait, derived by principal components analysis of the three fitness measures, was significantly associated with successful cognitive aging. Cognitive score at age 11, sex, social class, and APOE-
epsilon4 genotype were included as covariables. Higher childhood IQ was associated with better lung function in old age. It was concluded that Physical fitness is associated with cognitive reserve. Intervention studies aimed at making older people fitter are good candidates to improve cognitive aging.

van Boxtel MP, et al. (1996) studied self-reported physical activity, subjective health, and cognitive performance in older adults. They reported that the literature to date suggests a positive relationship between physiological indicators of physical fitness (such as aerobic capacity) and indices of cognitive performance. However, the complexity and cost of methods to measure physical fitness prohibit their use in large-population studies in cognitive aging research. In this study, a questionnaire measuring habitual physical activity was used as an indirect estimate of physical fitness, to predict performance in several cognitive domains in an age- and sex-stratified sample of 80 healthy older adults (55 years and older). Age effects were found on several measures of cognitive speed and fluency, but not on memory performance. Women were slower in sensorimotor speed than men but scored higher on memory tasks. No main effects of activity on cognitive measures were found, but two measures that assessed cognitive speed were sensitive to the age-by-activity interaction term. Subjective health also appeared to contribute to the explained variance in the same two indices of cognitive speed. Limitations of the use of activity questionnaires in cognitive aging research are discussed.
Salokun (1992) conducted a study on enhancing adolescent students self concepts through physical education by a psychomotor approach to health full school living. The purpose of the study was (i) to live peacefully with oneself and other (ii) healthy attitude to and judicious use of facilities and equipment (iii) positive perception of and the development of favourable attitude toward school process and (iv) ability to give favourable interpretation to occurrences within the school, reaction and feeling of others. The subjects were boys and girls whose ages ranged between 12 to 14 years and 15 to 18 years. The participating subjects scored significantly higher than non participating peers. It can be said that positive self concept development through organized programme of physical education can lead to health full school living among adolescent students.

2.5 SUMMARY OF RELATED STUDIES

The review of related literature showed that there are several studies on evaluation of physical education and physical activity programmes on physical fitness and personality of students, assessment of fitness components, studies on fitness profiles pertaining to Indian students and studies comparing fitness profiles among different groups and its relationship with cognitive domain.
It was found that there was further scope for research to make a study on panaromic view of physical education and sports programmes for the wholesome development of school students, in Karnataka State. Hence, the investigator with the background knowledge gained through the above reviews undertook this study.