Chapter II

REVIEW OF RELATED LITERATURE

The known facts build up the edifice of new theories and principles. Review of research studies serve as a buckle between the old and the new, between the known and the unknown. It is a milestone leading the research on the high road of future. Review of literature develops the researcher's insight and establishes his intellectual superiority over others. A study of relevant literature is an essential step to get a good comprehension of what has been done with regard to the problem under study. The literature in any field forms the foundation upon which all future work will be built. The literature relevant to the present study which has been collected from different sources of reference is described in this chapter.

All studies relevant to the topic on the development of Physical Education Activity Manual for School children in Kerala State qualified for inclusion in the literature review, this includes qualitative and quantitative research that were conducted both overseas and in India. The focus was on the topic especially targeted on the children of the elementary school level aged from 4 to 8. The relevant studies on the same and the similar dated between 1965 and 2012 were included for the fulfillment of the research. In order to access information a literature search was conducted by performing keyword searches for articles in English on the online data basis, CD-ROM data basis, internet and dissertation abstracts international, using library catalogues, books and conference presentations.

Generalization of the results obtained by Corder (1966) and Brown (1967) are restricted due to the relatively small sample size employed in both studies, differences in the level of intellectual function of participants, and the type of exercise intervention employed. A historically important large-scale study by Ismail (1967), addressed these aforementioned methodological shortcomings. One hundred forty-two fifth- and sixth-grade (age range=10–12 years) boys ($n=66$) and girls ($n=76$) matched on IQ, sex, and
health status were assigned randomly to an exercise program that involved a special daily physical activity program or a control condition in which they participated in the standard school physical activity classes. The study was conducted throughout an entire academic year. Experiences gained from the enhanced exercise program did not influence children's performance on the Otis IQ test. The strengths of the study include a large sample size, stratification procedures, and the length of the exercise program. However, the conclusion that routine exercise has little effect on children's mental function is qualified by the lack of sufficient information concerning the exercise programs. It is not possible to determine the intensity of physical activity performed in either the special exercise or standard exercise programs, nor is it clear what instructional methods were employed by physical education teachers.

Brown (1967) assigned 40 12-year old boys (Mean IQ=35) randomly to either a 6-week exercise isometric program or an attention-control condition. The exercise program consisted of a series of 12 yoga-like activities that required the child to exert muscle tension to maintain body position. The Stanford–Binet Intelligence Test and the Vineland Social Maturity Scale were administered by evaluators unaware of children's treatment assignment. Children who participated in an exercise program, compared to those who did not exercise, improved on both the IQ test (exercise ES=0.54; control ES=0.13) and the social scale (exercise ES=0.86; non-exercise ES=0.08). Because the exercise tasks required the children to attend, use memory and reasoning processes, and control motor movements, Brown hypothesizes. Two randomized experiments have assessed the impact of physical activity on children's academic achievement.

The experiment conducted by Ismail (1967), which was described previously, reported that physical activity did not influence children's performance on a standardized test of intelligence. The exercise program did, however, have a positive effect on children's performance on the Stanford Achievement Test (ES=0.43). An important procedural element of this study was selection and assignment of children to one of three levels of achievement. The children's subgroup classification was based on a combination of pre-intervention IQ and academic achievement scores and teachers' opinion of each child's intellectual ability. Improved performance was observed
following exercise regardless of children's pre-treatment level of academic achievement. These results suggest that the benefits of exercise training are similar regardless of children's initial level of academic achievement. Recently, Coe et al. (2006) randomly assigned 214 sixth-grade students to physical education classes or to arts or computer classes for a school semester. Participation in physical education classes did not differentially affect children's academic grades or performance on the Terra Nova Standardized Test of Academic Achievement. However, children who reported habitual levels of physical activity that exceeded Healthy People 2010 guidelines achieved higher academic grades than did less active children. These findings led the authors to propose that a threshold level of vigorous physical activity is required to produce improved academic achievement. In summary, while there is evidence for a relation between chronic exercise and children's academic achievement, the results from these studies must be interpreted cautiously. Only two studies involved random assignment of children to experimental and control conditions. Ismail (1967) found exercise to have robust positive effects on children's academic achievement as measured by a standardized test instrument.

Josep (1980) conducted a study to examine attitude towards six sub domains of physical activity assessed students from Grades 4 to 6 for a multiple longitudinal sample consisting of 58 boys and 56 girls. The children's attitudes toward physical activity (CATPA) were generally positive for both sexes; and consistent with previous research, the girls showed more favourable attitudes toward the aesthetic sub domain than the boys. However, the boys evidenced significantly more positive attitudes toward physical activity as the pursuit of vertigo and as catharsis. Neither the among-grade comparisons nor sex-by-grade comparisons attained statistical significance, indicating stability in group attitude scores. However, co relational analysis revealed the lack of stability of CATPA within individuals across the grades studied. Factor analysis provided further evidence negating the assumption of CATPA as an enduring behavioural disposition. The findings are discussed in relation to previous cross-sectional studies, and implications are derived for future research.
Tuckman and his colleagues conducted a series of experiments that employed a battery of cognitive tests to assess children’s mental function prior to and following aerobic exercise training. Tuckman and Hinkle (1986) assigned 154 fourth-, fifth-, and sixth-grade children randomly to either a 12-week aerobic running program or a standard school physical education class that met 30 min at a time, three times per week. The exercise program consisted of sprinting, relays, and distance runs that were gradually made more physiologically demands over the course of training. The regular exercise program consisted of ball games and occasional jogging. An analysis of covariance was performed on post-test scores to assess differences between experimental and control groups, boys and girls, and the three grade levels. Tests of physical function revealed that children in the aerobic training program were faster in an 800-m run, but not a 50-m dash, than children in the control condition. Tests of cognitive function revealed that aerobic training did not influence children’s performance on tests that measured perceptual-motor skill (Bender–Gestalt test) or visual-motor coordination (Maze Tracing Speed Test). Children in the aerobic exercise program did, however, perform better on a test of creativity (Alternate Uses Test) than did children in the standard exercise program. The Alternate Uses Test is measure of divergent thinking, that involves naming an object (e.g., hammer) and asking the respondent to describe as many appropriate uses of the object as possible.

Sherrill, Holguin, and Caywood (1989) conducted a study on Fitness, attitude toward physical education and self-concept of elementary school children. Elementary school children scoring in the highest and lowest 26% or 27% of their classes on the Texas Physical Fitness test were compared for attitude toward physical education and self-concept. Data were collected on the Children’s Attitude Inventory toward Physical Education, a Game of Pairs for Preference Among School Subjects, and the Children’s Self-Concept Scale. Analysis of variance indicated significant differences on all tests between boys high on fitness, girls high on fitness, boys low on fitness, and girls low on fitness. Subsequent Scheffe tests indicated that highly fit girls had significantly higher attitude and self-concept scores than boys low on fitness. No other group comparisons were significant. Pearson correlations indicated non-significant association between fitness and attitude and self-concept for the four groups.
Birtwistle and Brodie (1991) conducted a study on attitudes towards activity (CATPA) and perceptions of physical education of a sample of 291 secondary and 316 primary boys and girls were investigated with respect to health promotion. Using analysis of variance techniques significant differences between boys' and girls' attitudes were found in both the secondary and primary samples. Girls had significantly more positive attitudes towards physical activity than boys, but the data yielded no differences in attitudes between the socio-economic levels. The influence of CATPA scores of the literacy sets variable was significant, but the numeracy sets variable yielded non-significant results. This result highlighted the implications of internal school organization for health promotion and children's affective development. MANOVA was used to analyse gender differences in CAPTA sub domain scores. Girls from both samples were found to have significantly more positive attitude than boys in the aesthetic domain. Differences were also found in social growth and vertigo scores. All groups ranked health and fitness objectives highly, with a similar pattern of pupil perceptions of physical education emerging from both samples.

A study conducted by Zervas et al. (1991) explored the possibility that exercise training would prepare children to perform a matching-to-sample task given immediately following an acute bout of physical activity. Nine pairs of twin boys, 11–14 years of age, participated in the study. One twin from each pair was randomly assigned to a 6-month aerobic exercise program that was conducted 3 days/week. The exercise program consisted of a 15-min warm-up period of stretching followed by 60 min of sprinting runs and continuous running. Exercise intensity was adjusted based on measures of the child's anaerobic threshold. The other twin was assigned to a standard school physical education program. An additional group of eight age-matched boys was assigned to a standard physical education program. Following treatments, boys assigned to the aerobic training program and boys assigned to the physical education program performed a computerized design-matching task that recorded accuracy and speed of responding before and 15 min after a physically demanding 25-min treadmill run. Treadmill speed was determined for each child on the basis of a test of VO2max. The average treadmill speed was 13.01 km/h for children in the aerobic training program and 12.96 km/h for children in the standard exercise program. Non-twin children assigned to a standard exercise condition performed
the cognitive task before and following a non-exercise period. Analysis of response times following the treadmill run revealed that children's speed of processing increased, regardless of their treatment condition. Analyses of children's response accuracy before and following exercise revealed that boys in the aerobic exercise training program and in the physical education program improved significantly (aerobic exercise group ES=2.01; standard exercise group ES=1.33); additionally, the response accuracy for children in the two exercise conditions was significantly higher that of boys in the control condition.

Improvements in children's response times and accuracy following an acute bout of exercise in the Zervas et al. (1991) study are consistent with findings obtained with adults (McMorris and Graydon 2000) and children (Tomporowski 2003). The increased level of arousal induced by physical activity is believed to mediate increased response speed and accuracy (Davranche and Audiffren 2004). Interpreting the impact of exercise training on children's mental performance is less straightforward, however. Prior to the acute bout of exercise, children's performance on the matching-to-sample task did not differ as a function of exercise conditions, suggesting that exercise training had little effect on the processes involved in performing the task. Further, there was no evidence to suggest that an intense aerobic exercise training regimen better prepared children to perform mentally demanding tasks following intense physical activity than did a standard education class.

Cognitive science is characterized by the study of mental processes, Ellis and Hunt (1993) Researchers in this field Improvements in children's response times and accuracy following an acute bout of exercise in the Zervas et al. (1991) study are consistent with findings obtained with adults (McMorris and Graydon 2000) and children (Tomporowski 2003a). The increased level of arousal induced by physical activity is believed to mediate increased response speed and accuracy (Davranche and Audiffren 2004). Interpreting the impact of exercise training on children's mental performance is less straightforward, however. Prior to the acute bout of exercise, children's performance on the matching-to-sample task did not differ as a function of exercise conditions, suggesting that exercise training had little effect on the processes involved in performing the task. Further, there was no evidence to suggest that an intense aerobic exercise
training regimen better prepared children to perform mentally demanding tasks following intense physical activity than did a standard education class typically employ a componential-analysis approach to assess the operations of the mind (e.g., perception, attention, memory, information processing). Cognitive scientists usually employ theory-based tests and attempt to isolate and evaluate how various factors influence brain structures and mental processes. Several exercise scientists have assessed the impact of exercise training on specific components of children’s mental function.

A subsequent experiment conducted by Hinkle et al. (1993) provided similar results. Eighty-five eighth-grade children were assigned randomly either to an 8-week aerobic running program that met five times weekly or to a standard physical education class. The aerobic exercise program and standard exercise program were identical to those used in their prior research. A multiple analysis of variance was performed on children’s pre-post treatment gain scores of physical and mental function. As in the earlier study, the students in the aerobic program completed an 800-m run significantly faster than did children in the standard exercise program. Also, those who exercised aerobically performed better on the Torrance Test of Creative Thinking, which measures verbal and figural divergent thinking. Tuckman (1999) summarized the results of several studies and concluded that chronic exercise training has little impact on children’s intelligence or cognitive skills, but it does facilitate creativity. Most cognitive researchers consider that the tests of creativity reflect executive function Lezak et al. (2004); Naglieri and Kaufman (2001). The Torrance Test of Creative Thinking, for example, provides an index of creative figural fluency, flexibility, and originality. As such, the results of the experiments conducted by Tuckman and his colleagues reported here are taken as support for the executive function hypothesis.

The effect of 2 years of regular physical activity training on the academic achievement of 759 children enrolled in kindergarten through the fifth grade was assessed by Sallis and his colleagues (Sallis et al. 1999). Children in different schools were provided a physical activity program designed specifically to enhance fitness and skill (Sports, Play, and Active Recreation of Kids—SPARK). Each session of the exercise program was 30 min long and the program was carried out 3 days/week throughout the
school year. Classes were instructed either by exercise specialists or by classroom teachers trained to implement the SPARK program. Children in a control group followed their school’s standard physical education program. An analysis of changes in percentile scores obtained on a standardized test of academic achievement revealed decreases in performance for the three treatment groups. The scores of children who participated in physical activity training declined less than those of children in the control condition, however. Children in the study were drawn from relatively high socio-economic backgrounds and the observed decline in academic performance was explained by Sallis in terms of a regression-to-the-mean effect. The results were interpreted as evidence that children’s time spent in physical activity classes did not have a negative influence on their academic achievement.

Executive functions are involved in planning and selecting strategies that organize goal-directed actions (Das et al. 1994) and stand apart from processes involved in basic information processing; e.g., encoding, stimulus evaluation, response selection, and response execution Kramer et al. (1999). There is a general consensus among researchers that executive functioning is not a unitary process; rather it is a number of more elemental underlying processes. Evaluation of adults’ performance on tests of executive function reveals three variables which, while moderately correlated, are clearly separable: set-shifting, which requires individuals to disengage processing operations of an irrelevant task and to engage operations involved in a relevant task; updating, which is closely linked to working memory and the need to monitor mental representations; and inhibition, which involves the deliberate suppression of a prepotent response.

Hagger (1997) investigated the relationship between attitude towards physical activity and physical activity behaviour and the influence of gender and season on physical activity level in 45 primary school children, aged 9 to 11 years. Attitudes towards physical activity were assessed using two different theoretical approaches: the children's attitudes towards physical activity (CATPA) inventory and the theory of reasoned action (TRA) questionnaire. Physical activity behaviour was measured using Cale's (1994) self-report measure of physical activity. Approximately 50% of the children were categorised as 'inactive' based on cut-off points developed by Blair (1984). A 2 x 2
(gender x season) factorial analysis of variance showed that children participated in more moderate physical activity in the summer than in the winter ($F(1,44) = 6.29$, $p<.05$) but there were no gender differences in physical activity levels. Descriptive statistics for the CATPA inventory showed that children generally exhibited positive attitude towards physical activity. Mann-Whitney U tests for two independent samples revealed significant differences between the high-active and low-active children for the catharsis, health and fitness, vertigo and aesthetic sub domains from the CATPA inventory ($p<.05$). None of the TRA variables showed any significant differences for activity level. Present results suggest that some attitude variables from the CATPA inventory differ according to children's physical activity levels and thereby emphasise the need for physical educators to foster positive attitudes towards physical activity in order to encourage children to adopt and maintain healthy and active lifestyles.

Kramer et al. (1999) assessed the impact of aerobic exercise training on both executive and non-executive cognitive processes in older adults. Participants in this study were assigned to either a 6-month aerobic training program or a non-aerobic toning program. A battery of cognitive tests was administered to participants prior to and following interventions. Clear post-training differences were observed. Individuals who participated in aerobic exercise training performed tests that required executive function (i.e., a category switching task, a flanker task, and a countermanding task) more rapidly and more efficiently than non-exercisers. Importantly, treatments had negligible influence on older adults' performance of tasks that did not emphasize executive-type mental processes (e.g., pursuit rotor task, spatial attention task, digit–digit matching task).

Sallis et. al (2000) conducted a study on Understanding the factors that influence physical activity can aid the design of more effective interventions. Previous reviews of correlates of youth physical activity have produced conflicting results. A comprehensive review of correlates of physical activity was conducted, and semi quantitative results were summarized separately for children (ages 3–12) and adolescents (ages 13–18). The 108 studies evaluated 40 variables for children and 48 variables for adolescents. About 60% of all reported associations with physical activity were statistically significant.
Variables that were consistently associated with children's physical activity were sex (male), parental overweight status, physical activity preferences, intention to be active, perceived barriers (inverse), previous physical activity, healthy diet, program/facility access, and time spent outdoors. Variables that were consistently associated with adolescents' physical activity were sex (male), ethnicity (white), age (inverse), perceived activity competence, intentions, depression (inverse), previous physical activity, community sports, sensation, seeking, sedentary after school and on weekends (inverse), parent support, support from others, sibling physical activity, direct help from parents, and opportunities to exercise. These consistently related variables should be confirmed in prospective studies, and interventions to improve the modifiable variables should be developed and evaluated.

Several large scale co relational studies have been conducted that examine the strength of the relation between physical activity and academic achievement. Dwyer and his colleagues evaluated a sample of almost 8,000 Australian children ranging between 7 and 15 years of age selected from 109 schools Dwyer et al. (2001). Measures of children's physical fitness (situps, pushups, long jump, hand grip, etc), cardiorespiratory efficiency (50-m sprint, 1.6 km run, and sub-maximal measure of VO2), and general activity (self report questionnaire) were correlated with ratings of scholastic achievement provided by school personnel. Small but significant positive associations were found between scholastic achievement and physical fitness measures and general activity measures.

A plausible explanation for researchers' failure to detect the effects of exercise on children's intelligence is that IQ tests provide only global measures of functioning, which may not be sensitive enough to detect subtle changes in specific aspects of cognitive functioning brought about by exercise training. As discussed previously, there is a growing consensus among contemporary researchers that exercise may differentially benefit specific components of cognitive processing Brisswalter et al. (2002) Indeed, the processes that are central to executive function are difficult to isolate via traditional IQ
tests. In the next section, we describe studies that measure specific components of cognition.

Elizabeth and Nancy (2003) conducted a study to assess the possible relationship of sports participation during high school to body self-objectification, instrumentality, and locus of control, and to explore the possibility that different sports might be differentially related to psychological variables according to the perceived stereotypical masculinity or femininity of the sport. Two studies were reported herein. In the first, using 195 male and female students were examined perceptions of sports according to emphasis on physical appearance and perceived masculinity/femininity. These findings were used in Study 2, which included 437 college women, to describe sports participation along dimensions of both extent of participation and the nature of the sports in which the individual participated. Extent of participation in physical fitness activity was also assessed. Participation in sports and/or physical activity was associated with higher scores on the body shame subscale of McKinley and Hyde's (1996) Objectified Body Consciousness Scale, which indicates greater internalization of cultural standards of female beauty. Body shame was also related to participation in more "feminine" sports (those focusing more on female appearance). Physical activity was also consistently related to both instrumentality and locus of control. Further research is needed to understand the relationship of sports and physical exercise activities to body self-objectification and other indicators of psychological functioning among women.

Data gathered by the California Department of Education in (2004) provided the basis for an evaluation of over one million children's scores on a standardized test of physical fitness that measured aerobic capacity, body composition, strength, and flexibility and the California Standards Test, which provides indices of language arts and mathematics proficiency (California Department of Education 2005). Physical activity scores of children in grades 5, 7, and 9 were strongly positively correlated with both measures of academic achievement, with girls evidencing a stronger relation than boys.

Coe et al. (2006) observed that vigorous physical activity did not lead to improved performance on a standardized test of academic achievement even though associated with achieving higher class grades. Results obtained from studies that lack
subject randomization are difficult to interpret. Dwyer et al. (1983) assigned schools to experimental and control conditions, but failed to find any effect of physical activity on standardized tests of academic performance. The SPARK project Sallis et al. (1999) employed standardized tests of academic achievement, but suffered from subject selection bias (high socio-economic status) and high drop-out rates. Researchers who conducted the Three Rivers Project Shephard et al. (1984) employed a cohort subject assignment methodology but interpretation of the findings are limited as teacher-assigned academic grades were used as the primary outcome measure. Exercise-related improvements in academic performance are reported most frequently when children’s grades served as outcome measures. It is possible that changes in children’s grades in the studies reviewed are due to teachers’ expectancies that increased physical activity would enhance class performance rather than physical activity per se Taras (2005). It is critical to use unbiased tests rather than teacher-assigned grades to assess academic achievement Sallis et al. (1999.) At best, the studies reviewed demonstrate that time spent in physical education classes does not have a deleterious impact on children’s academic progress.

Vilhjalmssson and Kristjandottir (2003) conducted a study on gender differences in physical activity in older children and adolescents the central role of organised sport. Previous studies have generally had limited success in accounting for gender differences in leisure time physical activity. Based on a representative national survey of 3270 Icelandic 6\textsuperscript{th}, 8\textsuperscript{th} and 10\textsuperscript{th} grade students, the study found that girls lower enrolment in organised sport clubs fully accounts for gender differences in frequency of overall physical activity, and largely accounts for gender differences in frequency of strenuous activity and weekly hours of overall and strenuous activity (enrolment hypothesis). Further more, girl’s high sport club withdrawal rate accounted for a small but significant part of the gender differences in weekly hours of overall activity and frequency of strenuous activity (withdrawal hypothesis). No evidence was found to suggest that different activity levels of boys and girls enrolled in the clubs affected gender differences in levels of overall or strenuous physical activities (activity differential hypothesis). Other independent variables, i.e., perceived importance of sport achievement, sport and exercise related instructions, physical education experiences, and social modelling did not
significantly affect observed gender differences beyond the sport club variables. The measuring of the results and their implications for gender disparities, health promotion, and future research are discussed.

Fenczyński and Szmigiel (2006) conducted a study to establish whether sex constituted a factor that differentiated physical activity amongst young people with obesity (simple obesity), and amongst non-obese young people during PE classes and during their free time outside school. A subject group of 300 individuals were examined. The experimental group (group E) comprised 75 girls and 75 boys, pupils of primary, lower-secondary and secondary schools from large towns in Poland (Cracow, Katowice, Rzeszów) who suffered from simple obesity. The control group (group C) equalled 150 pupils from the same schools selected at random from among individuals that fitted between 25 and 75 percentiles according to a percentile weight-height grid. The attitudes of the young people towards compulsory physical exercises and active movement outside the school were tested by means of an original questionnaire developed by the authors. The results of the research showed that overweight young people of both sexes attempted more often to avoid physical activity (movement) than their non-obese peers, both during physical education classes and outside school. Sex turned out to be a factor that differentiated attitudes towards physical activity. Almost total avoidance of physical activity by obese girls as compared with obese boys was observed. The boys to a greater extent than the girls, did engage in physical exercise. The results of the research showed the necessity for increased interaction to strengthen motivation to take up physical activities by obese pupils, particularly girls. What is also worth considering is one’s potential for physical fitness amongst young people when choosing activities, which becomes limited due to existing obesity.

Castelli et al. (2007) measured 259 third- and fifth-grade children’s physical fitness via a standardized field test (Fitnessgram) Welk et al. (2002) that provided measures of aerobic performance, flexibility, and muscular strength. Regression analyses were conducted to determine the relation between physical fitness scores and standardized tests of academic achievement that yielded scores for mathematics, reading, and total academic achievement. Aerobic physical fitness was significantly positively
associated with reading achievement ($\beta=0.40$), mathematics ($\beta=0.42$), and total academic achievement ($\beta=0.43$). Other measures of physical fitness were not associated with academic achievement.

Clear evidence for a selective facilitation effect of aerobic exercise on children's executive function was obtained in a recent randomized clinical trial experiment conducted by Davis et al. (2007). The study assessed the impact of 10–15 weeks of exercise training on the cognitive functioning of 94 overweight children who ranged in age from 7 to 11 years. The children were randomly assigned to one of three experimental conditions: no exercise control, 20-min exercise, or 40-min exercise condition. Children participated in physical training games 5 days/week after school. The program consisted of games (e.g., running games, jump rope, soccer) designed to maintain average heart rates of above 150 bpm and to exert a vigorous physical challenge on children. A standardized test of cognitive function, the Cognitive Assessment System (CAS) (Naglieri and Das 1997), was administered to each child before and after the intervention period. The CAS provides four scales of cognitive functioning: Planning (which assesses executive function; i.e., cognitive control, utilization of processes and knowledge, intentionality, and self regulation), Attention (which assesses focused, selective cognitive activity and resistance to distraction), Simultaneous (which assesses spatial and logical processing of nonverbal and verbal material), and Successive (which assesses processing of sequential information). Analysis of covariance performed on post-test scores revealed that exercise influenced the Planning scale. Children in the high dose exercise group improved their Planning scale scores significantly more than did children in the control group (ES=0.30). No effects of the exercise intervention were observed on remaining CAS scales. There were no differences in the CAS performance of children who performed 20 min of daily exercise and those children in the control condition, suggesting that positive effects may accrue only with a large amount of vigorous physical activity. The results of cross-sectional studies indicate that children who are physically fit perform cognitive tasks more rapidly and display patterns of neurophysiological activity indicative of greater mobilization of brain resources than do less fit children. Several large-scale experiments provide evidence to suggest that exercise training exerts specific, rather than
global, effects on children’s cognitive function. Following aerobic exercise training, children’s performance improves exclusively on tests that involve executive function.

Hillman and Burkhalter (2007) Activity, Nutrition, and Obesity to Cognition and Scholastic Performance across the Human Lifespan. Published in a supplement to Advances in Nutrition. Presented at the conference “Forum on Child Obesity Interventions” held in Mexico City. We reviewed studies that examine the relationship of energy consumption, storage, and expenditure to cognition and scholastic performance. Specifically, the literature base on nutrient intake, body mass, and physical activity is described relative to cognitive development and academic achievement. The review of literature regarding the overconsumption of energy and excess body mass suggests poorer academic achievement during development and greater decay of brain structure and function accompanied by increased cognitive aging during older adulthood. The review of literature regarding energy expenditure through the adoption of increased physical activity participation suggests increased cognitive health and function. Although this area of study is in its infancy, the preliminary data are promising and matched with the declining physical health of industrialized nations; this area of science could provide insight aimed at improving brain health and cognitive function across the human lifespan.

Gidlow et. al (2008) conducted a study to compare in-school and out-of-school physical activity within a representative sample. Socio-demographic, physical activity, and anthropometric data were collected from a random sample of children (250 boys, 253 girls) aged 3–16 years attending nine primary and two secondary schools. Actigraph GT1M accelerometers, worn for seven days, were used to estimate physical activity levels for in-school (typically 09.00–15.00 h), out-of-school (weekday), and weekend periods. Physical activity as accelerometer counts per minute were lower in school versus out of school overall (in school: 437.2 ± 172.9; out of school: 575.5 ± 202.8; $P < 0.001$), especially in secondary school pupils (secondary: 321.6 ± 127.5; primary: 579.2 ± 216.3; $P < 0.001$). Minutes of moderate-to-vigorous physical activity accumulated in school accounted for 29.4 ± 9.8% of total weekly moderate-to-vigorous physical activity overall but varied by sector (preschool: 37.4 ± 6.2%; primary: 33.6 ± 8.1%; secondary: 23.0 ± 9.3%; $F = 114.3, P < 0.001$).
Approximately half of the children with the lowest in-school activity compensated out of school during the week (47.4%) and about one-third at the weekend (30.0%). Overall, physical activity during the school day appears to be lower than that out of school, especially in secondary school children, who accumulate a lower proportion of their total weekly moderate-to-vigorous physical activity at school than younger children. As low in-school activity was compensated for beyond the school setting by less than half of children, promoting physical activity within the school day is important, especially in secondary schools.

Starc. and Strel (2012) constructed a comparison group pre-test/post-test quasi-experiment to assess the effect of the implementation of the PE curriculum by specialist PE teachers on children's physical development and physical fitness. 146 classes from 66 Slovenian primary schools were assigned to quasi-test (71) and quasi-control (75) groups. Data from the SLOFIT database was used to compare the differences in physical fitness and development between groups of children whose PE lessons were delivered by specialist PE teachers from the second grade onwards (quasi-test, n = 950) or by generalist teachers in all first three grades (quasi-control, n = 994). The Linear Mixed Model was used to test the influence of specialist PE teachers' teaching. The quasi-control group showed significantly lower improvement of physical fitness by -0.07 z-score units (95% CI -0.12 to 0.02) compared to the quasi-test group. A significant difference of -0.20 (-0.27 to -0.13) was observed in explosive strength, and of -0.15 (-0.23 to -0.08) in running speed, and in flexibility by -0.22 (-0.29 to -0.14). No significant differences in physical development were observed. Specialist PE teachers were more successful than generalist teachers in achieving greater improvement of children's physical fitness, but no differences were observed in physical development of quasi-test and quasi-control group.

Sacchetti. et. al, (2012) conducted a cross-sectional study was carried out to analyze, through a limited number of fitness tests, the main conditioning and coordinative abilities in children aged 8–9 years, and their relationship with gender, anthropometric variables and physical activity habits. The height and weight of 256 boys and 241 girls were measured and information about physical activity habits was collected using a self-
administered questionnaire. Physical performance was assessed by means of a few standardized tests: ‘sit & reach’, medicine-ball forward throw, standing long jump, 20 m running speed, and forward roll test. In both boys and girls, body weight and Body Mass Index (BMI) were positively correlated with the medicine-ball throw performances and negatively correlated for the standing long jump and speed tests, while no association was found with tests measuring back flexibility and total body coordination. Daily physical activity and participation in sport were not significantly correlated with body weight and BMI, but were positively associated with children's motor performance. The standardised fitness tests selected in the current study have been found to be suitable to identify fitness levels of primary school children. Thanks to their limited number and ease of measurement, they can be used in any school context to classify children and for monitoring the effects of targeted interventions promoting physical activity.

Vazou, S. et. al (2012) studied on integrating physical activity (PA) in the classroom is a promising avenue for youth to increase their PA levels and academic achievement. However, research on its role in children's academic motivation is limited. Intrinsic motivation is important because it predicts both academic achievement and physical activity participation. The purpose was to examine the effect of PA integrated with academic lessons compared to traditional lessons on children's academic motivation. A total of 147 4th to 6th grade students (64 male, 83 female) from 15 classes participated. The intervention included six consecutive lessons over a two-week period on an academic subject (Language Arts, Math, Social Studies), alternating between traditional (1st, 2nd, 4th, and 6th; control) and integrated with PA (10 min) lessons in the classroom (3rd and 5th). The Intrinsic Motivation Inventory was used to assess students' Interest/Enjoyment, Perceived Competence, Effort, Value, and Pressure. After checking for non-significant interactions with gender, age, and academic subject, repeated-measure ANOVAs were conducted. Interest/Enjoyment significantly decreased after the traditional lessons (4th and 6th, $F = 3.80, F = 4.18$, respectively, $p < 0.05$) and increased significantly after the second integrated lesson (5th, $F = 7.26, p < 0.01$). Perceived Competence and Effort significantly increased after the integrated lesson ($F = 4.87, F = 5.03$, respectively, $p < 0.05$), whereas neither the Perceived Value of the lesson declined nor did children report feelings of Pressure from this alternative teaching method. This
research showed that PA integrated with the academic subjects can positively impact children's academic motivation.

OVERVIEW OF THE REVIEW

The necessity of a new Physical Education Manual is very high, as our country falls far behind other European countries like America in the achievements of medals and awards in the world meets and Olympics. Keeping this in mind a quality oriented sports and games programme should be implemented from the grass root level, that is from elementary school period itself. The P.E. curriculum should cope with the age and caliber of the students. The review done above shows that permanently based on the above review, we can formulate a generation fully stores, mentally fit and emotionally strong.

The review of literature regarding the over consumption of energy and excess body mass suggests poorer academic achievement during development and greater decay of brain structure and function accompanied by increased cognitive aging during older adulthood. The review on energy expenditure through the adoption of increased physical activity participation suggests increased cognitive health and function.(Burkhalter and Hillman, 2007)

The Wechseler Intelligence Scale for children (WISE) in a study conducted to evaluate the effects of 20 days of physical fitness training for boys proved that physical exercises put enhance the IQ of the participants remarkable (Corder, 1966). Also physical exercise provide concentration to the mind and flexibility and strength in mind with the result in creating a perfect individual. Physical exercises have the potential for exercise as a therapy for clinical or subclinical depression or anxiety, and Physical activity is a means of upgrading life quality through enhance self esteem, improved mood state, reduced anxiety, silent to stress or improved sleep.

The study conducted by (Zervas, 1991) explore the possibility that exercise training would prepare children to perform a matching-to—sample task given immediately
following and acute bout of physical activity. Reaction time measures and Electro Encephalography (EEG) used by Hillmanet, 2005 provides evidence that children who are physically fit display greater cortical activation and corresponding cognitive performance than less fit children.

The overall view of the reviews show that, physical exercises play a vital role in the creation of mentally enlightened and physically fit citizens and thereby become a part of the nation building. For this we need a well planned and clear cut curriculum or manual to train the children for the grass root level itself. With a clear and fixed vision supported by a perfect manual can create wonders and there by contribute much in the international level meets and Olympics later on.

Results of Children’s attitude Towards physical Activity (CAPTA) inventory showed that children generally exhibited positive attitude towards physical activity. Moode Finger burg (1994) found gender differences on Social experience, Health and Fitness, Aesthetic experience with the men and scores of women significantly higher.

Gary and David (1991) also found significant difference between boys and girls attitudes in both the secondary and primary samples. Girls had significantly more positive attitudes towards physical activity than boys, but no differences in attitude between the socio-economic levels.

The children attitude toward physical activity were generally positive for both sexes and girls showed more favourable attitude towards the aesthetic sub domain than boys. Boy’s evidenced significantly more positive attitude toward physical activity as the pursuit of vertigo and as catharsis.