CHAPTER II

REVIEW OF RELATED LITERATURE

A study of relevant literature is an essential step to get full picture of what has been done and said abroad and in one's own country with regard to the problem under study. Such a review brings about a deep insight and a clear perspective of the overall field. This acquaints the researcher with up-to-date knowledge and techniques to his work. So, journals and dissertations were referred to.

Alfgeir, et al., (2008) experimented on health behaviour and academic achievement, the relative contribution of dietary habits, physical activity, Body Mass Index (BMI), and self-esteem among adolescents. This study tested a structural equation model to estimate the relationship between health behaviours, Body Mass Index, self-esteem and the academic achievement of adolescents. The authors analysed survey data from the 2000 study of youth in Iceland, a population-based, cross-sectional sample of 6,346 adolescents in Iceland. The model demonstrated good fit with chi-square of 2685 (n = 5,810, df = 180), p < .001, Comparative Fit Index value of .94, and a root mean square error of approximation of .049. Lower BMI, physical activity, and good dietary habits were all associated with higher academic achievement; however, health behaviour was positively and robustly associated with greater self-esteem. Self-esteem was positively influenced both through physical activity (\(\beta = .16\)) and the consumption of fruits and
vegetables ($\beta = .14$). In contrast, poor dietary habits negatively influenced self-esteem and academic achievement, and self-esteem was negatively influenced by increasing levels of BMI ($\beta = -.05$).

Amusa, et al., (2011) conducted a study on health-related physical fitness among rural primary school children in Tshannda, South Africa. The socio-economic transformation in South Africa over the previous decade may have created a less active lifestyle and a decline in fitness among South African children. This study seeks to present the data on the health-related physical fitness of the Tshannda rural school children in grades 1 to 7 and to evaluate age and gender differences in physical fitness among the Tshannda children of which information is not yet available. The stature, body mass and skinfolds of the children were measured and the Eurofit test battery was used to assess the children's physical and performance fitness. Percentage body fats, fat mass and fat-free mass were calculated. There was a progressive increase and improvement in the performance values from grade level one to seven. In the physical performance tests which require moving the body, power, and strength, the boys generally performed higher than the girls. Girls were superior to boys in the tests of flexibility. Body fat was higher in girls than in boys at all grades and increases with advancement in grades. The physical performance measures of our samples increase in grade levels and with the boys have higher values than girls as well as performing better in activities requiring physical exertion and expenditure of energy. In
contrast, the girls showed superiority in flexibility measures and accumulate more body fat than the boys. Physical fitness of these rural school children seems to be low, thus confirming the worldwide decline in fitness levels of children.

Ayal (2002) designed a study on Socio-Economic Determinants of Health and Physical Fitness in Southern Ethiopia. The purpose of this paper is to investigate the dependence of health and physical fitness indicators on the socio-economic situation of rural families in Southern Ethiopia with particular emphasis on the role of inequality. The literature shows mixed results about the effect of inequality on health and this paper contributes in several ways: it compares the results of objective and subjective health measures, it distinguishes between wealth inequality and nutrition inequality, and it evaluates the impact of nutrition inequality both at the village level and at the household level. The subjective health measures are morbidity (the number of days respondents were ill during the last month) and physical fitness (their ability to walk distances, carry heavy loads, and work in the field). The objective health measure is Body Mass Index (BMI).

We found that many effects of explanatory variables were significant in some of the equations but not in all of them. In some cases we even obtained contradictory significant effects. This emphasizes the need to rely on a single health measure. The results indicate that literacy is negatively associated with morbidity. Per capita wealth is positively associated with BMI.
Availability of satisfactory health facilities is associated positively with physical fitness and negatively with morbidity. Per capita wealth inequality is associated positively with morbidity and negatively with BMI. Within-household nutrition, inequality seems to have a complex association with health: the association is negative with BMI and positive with physical fitness, but only for household members whose nutritional status is above the household mean. While these results should be examined more carefully with regard to possible endogeneity of some of the determinants, they do indicate several variables with a positive association with health and physical fitness. These include literacy, wealth, and satisfactory health facilities. The role of inequality is less clear and certainly deserves further analyses at both the theoretical and empirical levels.

Ben, et al., (2007) conducted a study on physical activity which promotes academic achievement and a healthy lifestyle when incorporated into early childhood education. The detrimental effects of physical inactivity within children have enormous personal health consequences. These health conditions have the potential to impact the economic vitality of society as a whole. Studies have indicated that inactive children are far more likely to suffer from obesity, type II diabetes, and hypertension than their physically active peers. Research also indicates that these health problems tend to follow the individual into adulthood. Seventy per cent of obese adolescents will become obese adults. In addition to the health benefits of physical
activity, physical activity has also been positively correlated to academic achievement when integrated into early childhood educational programmes. This paper will primarily review the evidence that demonstrates the positive influence of physical activity on academic achievement in early childhood education. This paper will further provide basic guidelines for developing an early childhood education programmes.

Sibly and Jeniffer (2003) investigated the relationship between physical activity and cognition in children. The purpose of this study was to quantitatively combine and examine the results of studies pertaining to physical activity and cognition in children. The studies, which meet the inclusion criteria, were coded based on design and descriptive characteristics, subject characteristics, activity characteristics, and cognitive assessment method. Effect Sizes (ESs) were calculated for each study and an overall ES and average ESs relative to moderator variables were then calculated. ESs (n=125) from 44 studies were included in the analysis. The overall ES was 0.32 (SD=0.27) which was significantly different from zero. Significant moderator variables included publication status, subject age, and type of cognitive assessment. As a result of this statistical review of the literature, it is concluded that there is a significant positive relationship between physical activity and cognitive functioning in children.

Biddle, et al., (1998) investigated a study on general conclusions from the surgeon general's report on physical activity and health. People of
all ages, both male and female, benefit from regular physical activity. Significant health benefits can be obtained by including a moderate amount of physical activity (e.g., 30 minutes of brisk walking or raking leaves and 15 minutes of running or 45 minutes of playing volleyball) on most days of the week.

Brandi, et al., (2009) conducted a study on Physical Fitness and Academic Achievement in Elementary School Children. The benefits of physical fitness are widely acknowledged and extend across many domains of wellness. The association between fitness and academic achievement, however, remains to be clarified, especially in young children. Therefore, the purpose of this study was to examine the relationship between fitness and academic achievement in elementary school children. Data were collected from 134 students of third, fourth, and fifth grade. One mile run time, body mass index, curl-up, and sit-and-reach data were collected from Physical Education Instructors in Middle Tennessee. The percentage of questions answered correctly for mathematics and reading/language arts sections of the Terra-Nova achievement test was taken as a measure of academic achievement. A negative association (P < .01) was noted between one mile run time and mathematics scores (r = -.28), whereas a positive relationship (P < .05) was observed between muscular fitness and mathematics scores (r = .20). Relative to sex differences, inverse relationships (P < .05) were observed between one mile run time and reading/language arts and mathematics
scores in girls ($r = -0.31$ and $-0.36$, respectively), but no significant associations were evident in boys. Results from this study support a link between specific components of physical fitness and academic achievement in elementary school children.

Chomitz, et al., (2009) reviewed a study in relationship between physical fitness and academic achievement. They have received positive results from public school children in the northeastern United States to determine the relationship between physical fitness and academic achievement in diverse and urban public school children. This cross sectional study used public school data from 2004 to 2005. Academic achievement was assessed as a passing score on Massachusetts Comprehensive Assessment System (MCAS) achievement tests in Mathematics (fourth, sixth, and eighth grade, $n = 1103$) and in English (fourth and seventh grade, $n = 744$). Fitness achievement was assessed as the number of physical fitness tests passed during physical education (PE). Multivariate logistic regression analyses were conducted to assess the probability of passing the MCAS tests, controlling for students' weight status (BMI score), ethnicity, gender, grade, and socio-economic status (school lunch enrollment). The odds of passing both the MCAS Mathematics test and the MCAS English test increased as the number of passes of the fitness tests increased ($p < .0001$ and $p < .05$, respectively). Results show statistically significant relationships between fitness and academic achievement, though the direction of causation is not
known. While more research is required, promoting fitness by increasing opportunities for physical activity during PE, recess, and out of school time may support academic achievement.

Chua, et al., (2006) investigated a study on Fitness, BMI and Academic Achievement. Studies have separately shown that obesity and physical fitness are associated with academic achievement. However, many studies do not take into account the combined effect of obesity and physical fitness on academic achievement. In this paper, we investigate the collective effect of obesity and physical fitness on academic achievement. The partial relationship between obesity, as measured by Body Mass Index (BMI) and academic achievement was non-linear. In addition, BMI appears to be confounded with physical fitness, and this suggests that schools could focus on a fitness programme rather than on merely a dietary programme to help raise student academic achievement.

Coe, et al., (2006) conducted a study on physical fitness and academic achievement in 2006 with 214 sixth-grade students, Michigan found that students enrolled in Physical Education had similar grades and standardized test scores as students who were not enrolled in PE despite receiving 55 minutes less of daily classroom instruction time for academic subjects. It has been reported that poor diet and physical inactivity might soon overtake tobacco which is the leading cause of death.
Cuevas, et al., (2010) investigated a study on the awareness of abdominal adiposity as a cardiometabolic risk factor study assesses the prevalence of cardiometabolic risk factors in adults with abdominal obesity (waist circumference ≥90 cm in men and ≥80 cm in women) and evaluates how physicians manage these patients. This is an observational cross-sectional study. Internists, cardiologists and endocrinologists contributed patients to the study. A standardized questionnaire was completed and registered demographics, anthropometric measurements, lab results from the medical files, and any treatment utilized to manage dyslipidemia, arterial hypertension, diabetes and cardiovascular disease. A total of 1312 patients were included.

The mean age was 49.3 ± 14.6 years and 834 (63.6%) were female. The primary reason for the physician consultation was treatment of obesity (47.5%), followed by management of arterial hypertension (27.7%), diabetes (18.3%), dyslipidemia (14.2%), and cardiovascular disease (7.1%). The majority of patients identified excess body weight as a health problem (81.4%). However, patients had lost a mean of 4.3 ± 3.5 kg. Only 63.4% of patients with arterial hypertension were on drug therapy. Few of them had reached target values for diastolic (24.1%) and systolic/diastolic (13.3%) pressure. Less than half of the patients with dyslipidemia were receiving lipid-lowering medication. Only 32.2% were at their target low-density lipoprotein cholesterol levels. In patients with type 2 diabetes, mean fasting
plasma glucose level (8.9 ± 3.4 mmol/L) was above the threshold recommended by current guidelines. The study describes the medical care given to individuals with abdominal obesity during daily clinical practice by general practitioners, cardiologists and endocrinologists in urban Mexico. Our data confirm that a large proportion of patients are undertreated. Only a small percentage of patients with obesity related comorbidities reach treatment targets. Interventions proven to be effective in the prevention of chronic complications have, in general, not been implemented.

**Darla, et al.,** (2007) designed a study on Physical Fitness and Academic Achievement in third and fifth-grade students. The relationship between Physical Fitness and Academic Achievement has received much attention owing to the increasing prevalence of children who are overweight and unfit as well as the inescapable pressure on schools to produce students who meet academic standards. This study examined 259 public school students in third and fifth grades and found that field tests of physical fitness were positively related to academic achievement. Specifically, aerobic capacity was positively associated with achievement, whereas BMI was inversely related. Associations were demonstrated in total academic achievement, mathematics achievement, and reading achievement suggesting that aspects of physical fitness may be globally related to academic performance in preadolescents. The findings are discussed with
regard to maximizing school performance and the implications for educational policies.

David, et al., (2007) conducted a study on physical and sexual violence and adverse health behaviours in African children from the (GSHS) Global School-based Student Health Survey. Its objective is to examine associations between exposure to physical violence (PV) or sexual violence (SV) and adverse health behaviours among a sample of children in five African countries. In a cross-sectional analysis of data from Namibia, Swaziland, Uganda, Zambia, and Zimbabwe - countries that participated in the Global School-based Student Health Survey in 2003 or 2004 - we compared the relative frequency of several adverse health behaviours among children (primarily students 13–15 years of age) who did and did not report exposure to PV or SV. It is estimated that odds ratios (ORs) for such behaviours and their 95% confidence intervals (CIs) after adjusting for age and sex. Exposure to PV during the 12 month preceding, the survey was reported by 27-50% (average: 42%) of the children studied in the five countries, and lifetime exposure to SV was reported by 9-33% (average: 23%). Moderate to strong associations were observed between exposure to PV or SV and measures of mental health, suicidal ideation, current cigarette use, current alcohol use, lifetime drug use, multiple sex partners, and a history of sexually transmitted infection ($P < 0.05$ for all associations). For example, the odds of being a current cigarette smoker were higher in
children involved in one fight (OR: 2.20; 95% CI: 1.77–2.75), 2–5 fights (OR: 3.43; 95% CI: 2.54–4.63), or 6 fights or more (OR: 5.95; 95% CI: 4.37–8.11) (P for trend < 0.001) during the 12 month preceding the survey than in children unexposed to PV. Childhood exposure to PV and SV is common among African children in some countries and is associated with multiple adverse health behaviours. In developing countries, increased awareness of the frequency of exposure to violence among children and its potential health consequences may lead to heightened attention to the need for health promotion and preventive programmes that address the problem.

Davis, et al., (2007) tested the effect of aerobic exercise training on executive function in overweight children. Executive function includes skills which are important for planning, organizing, problem solving, concentration, resisting impulses, and using strategies to achieve goals. The children in the high volume activity group (40 minutes per day, 5 days/week for 15 weeks) had significant improvement on an executive function test compared with the control group (no physical activity). Those in the low volume group (20 minutes per day, 5 days/week for 15 weeks) showed about half of that improvement. The researchers also performed brain scans and found that the children who were exercising appeared to have more neural activity in the frontal areas of their brain, an important area for executive function.
Grissom (2005) conducted a study on Physical Fitness and Academic Achievement. The purpose of this study was to evaluate the relationship between physical fitness and academic achievement. To do so, scores on the FITNESSGRAM®, a physical fitness test, were compared to reading and mathematics scores on the Stanford Achievement Test 9th edition, a standardized norm-referenced achievement test. Subjects were all 5th, 7th, and 9th grade California school children enrolled in public school in 2002 for whom there were complete data on both the physical fitness and academic achievement tests. The sample size was 8,84,715 students. Results indicate a consistent positive relationship between overall fitness and academic achievement, that is, as overall fitness scores improved, mean achievement scores also improved. This relationship between fitness and achievement appeared to be stronger for females than males and stronger for higher socio-economic status (SES) than lower SES students. Results should be interpreted with caution. It cannot be inferred from these data that physical fitness causes academic achievement to improve. It is more likely that physical and mental processes influence each other in ways that are still being understood.

Harrison and Narayan (2003) and Marsh (1992) analyzed a study on association between participation in organized, community sport and recreation and academic achievement. One way in which physical activity levels can be increased is to increase children’s involvement in organized
community sport. Organized, community sport and recreational activities have been indicated as exerting a positive effect on academic success and attitude to school. Organized recreation may also have a positive effect on children's attitude and self esteem. Totally, organized extracurricular activity participation was examined in a cohort of high school students. The results of this study showed that total extra-curricular participation was positively associated with academic self concept, educational aspirations, coursework selection, homework completion, absenteeism, academic achievement, and college attendance. A study found that participants doing extra-curricular activity alone, or in combination with sports, had higher odds of doing more exercise, liking school and doing more homework. These results suggest that identification with school and school values is enhanced by involvement in organized community sport or recreation.

Jette, et al., (1992) investigated fitness testing and counselling in health promotion. For the past 15 years the University of Ottawa has conducted on-site fitness assessments of over 5,000 federal public servants. The testing sessions and accompanying counselling session are conducted within a framework of health promotion to encourage managers to adopt a healthy lifestyle. The data, collected from this population, are quite unique since the managers represent a cross-section from across Canada, and it is an important source of information regarding associations among fitness, lifestyle, and health characteristics. The assessment includes a lifestyle and
stress questionnaire, a 12 hour fasting lipid profile, determination of resting and exercising heart rate and blood pressure, body composition, upper body strength and muscular endurance, flexibility, pulmonary function, and aerobic power (Canadian Aerobic Fitness Test). Results are presented in a computerized format and interpreted during the course of a debriefing session; an exercise prescription is also provided. The sessions foster awareness, influence attitudes, and identify health behaviour alternatives. Not only can testing be used as a diagnostic and intervention procedure but it also serves as an excellent education and motivational tool that could be integrated in a routine medical examination.

Johnson, et al., (2006) reported about the effect of an acute exercise bout on academic performance of kinesiology undergraduate students. This study compared the difference of academic performance on a standardized exam between a group who exercised beforehand and a group that did not exercise. To complete this test, we took 14 subjects who were all kinesiology major at the University of Wisconsin-Eau Claire. The test subjects were between ages of 21-35. Weight, height, and resting heart rate were 78.5 kg, 172.6 cm, and 64.9 bpm respectively. We used the resting heart rate to calculate their heart rate reserve which we then used as an exercise intensity level. Seven of the subjects were randomly chosen to exercise for 20 minutes prior to taking the test. For these subjects, we took their blood pressure before and after exercise as a safety precaution. The other seven subjects were
chosen to take the test only. The two groups were compared to see if there was a significant difference between the exercise and non-exercise group. We found no significant difference in test score between the exercise group (M = 74.1) and the non-exercise group (M = 72.4), t (12) = .368, p>.05. We suggest that further research should be conducted to determine if there is a relationship between exercise and cognitive functions.

Kelly, et al., (2011) conducted a study on tobacco and alcohol sponsorship of sporting events that provide insights about how food and beverage sponsorship may affect children's health. Determining children's exposure to food and beverage company sponsorship, the effect of this exposure is important in establishing the extent to which there may be health and societal consequences. This paper aimed to provide preliminary evidence on the scope and potential effects on children of unhealthy food and beverage sponsorship. A review of published literature, media, and marketing reports was conducted to determine the types of food and beverage sponsorship campaigns that children are exposed to, and the effect of corporate sponsorship (including tobacco and alcohol) on children and adolescents. A large range of food and beverage sponsorship activities, in Australia and internationally, were identified for both school and sport settings. In particular, food and beverage companies have attempted to develop a marketing presence at all levels of professional and community sport. No information was identified measuring the effect of food and
beverage company sponsorship on children and adolescents. However, empirical evidence from consumer studies relating to tobacco and alcohol sponsorship has repeatedly demonstrated that sponsorship has an impact on children's product recall and product related attitudes and behavioural intentions. While there is no research available on the direct effect of food and beverage sponsorship, the demonstrated effects of tobacco and alcohol sponsorship on children's product awareness, preferences, and consumption are likely to be applicable to food companies.

Kirkendall, et al., (1985) and Shephard (1997) conducted a study on medical (American Academy of Pediatrics Committees on Sports Medicine and School Health, 1987) and public health (U.S. Public Health Service, 1991; Centers for Disease Control and Prevention, 1997) authorities recommend quality school physical education for all ages because of the documented health benefits of physical activity. Just as interest in improving health through physical activity is increasing (U.S. Department of Health and Human Services, 1996), participation in physical education is decreasing (Centers for Disease Control and Prevention, 1997) because school administrators view physical education as reducing instruction time in core academic subjects. There is a historical resistance to physical education. Physical educators are continually trying to justify the value of their work to avoid cuts or elimination of requirements and funding. One long term strategy has been to claim that quality physical education will contribute to
the academic and intellectual development of students. "Physical educators were grasping for ways to justify exercise and physical education programmes. If it could be shown that activity programmes contributed to intellectual development, then they would gain credibility and be justified.

Lubans, et al., (2010) conducted a study on Fundamental Movement Skills in children and adolescents: review of associated health benefits. The mastery of Fundamental Movement Skills (FMS) has been purported as contributing to children's physical, cognitive and social development and is thought to provide the foundation for an active lifestyle commonly developed in childhood and subsequently refined into context and sport-specific skills, they include locomotor (e.g., running and hopping), manipulative or object control (e.g., catching and throwing) and stability (e.g., balancing and twisting) skills. The rationale for promoting the development of FMS in childhood relies on the existence of evidence on the current or future benefits associated with the acquisition of FMS proficiency. The objective of this systematic review was to examine the relationship between FMS competency and potential health benefits in children and adolescents. Benefits were defined in terms of psychological, physiological, and behavioural outcomes that can impact public health. A systematic search of six electronic databases (EMBASE, OVID MEDLINE, PsycINFO, PubMed, Scopus, and SportDiscus®) was conducted on 22nd June 2009. Included studies were cross-sectional, longitudinal or experimental studies involving
healthy children or adolescents (aged 3-18 years) that quantitatively analyzed the relationship between FMS competency and potential benefits. The search identified 21 articles examining the relationship between FMS competency and eight potential benefits (i.e., global self-concept, perceived physical competence, cardio-respiratory fitness [CRF], muscular fitness, weight status, flexibility, physical activity, and reduced sedentary behaviour). We found strong evidence for a positive association between FMS competency and physical activity in children and adolescents. There was also a positive relationship between FMS competency and CRF and an inverse association between FMS competency and weight status. Due to an inadequate number of studies, the relationship between FMS competency and the remaining benefits was classified as uncertain. More longitudinal and intervention research examining the relationship between FMS competency and potential psychological, physiological, and behavioural outcomes in children and adolescents are recommended.

Miller and Berry (2000) investigated a study on health-related physical fitness knowledge of student allied health professions. Each allied-health profession has their own particular expertise but also shares some commonalities. One such commonality should be knowledge of health-related physical fitness relating to the health and well-being of individuals. Although the benefits of health-related physical fitness have been well documented, a few studies have examined the level of health-related
physical fitness knowledge among allied-health professions. Therefore, the purpose of this investigation was to assess the health-related physical fitness knowledge of three allied health professions using a 40 item multiple-choice test designed to assess knowledge in five domains of health-related physical fitness. Results indicated that student athletic trainers scored significantly higher on the post-test versus pre-test. On the post-test, athletic training and physical therapy groups scored significantly higher than the nursing group. The information from this study may be valuable in aiding educators in developing appropriate curricula to better prepare students for their role as allied health professionals.

Mills, et al., (2006) reviewed strengthening health systems. Awareness has grown that international targets such as the Millennium Development Goals (MDGs) and the provision of antiretroviral treatment for HIV/AIDS patients cannot be achieved without the key elements of a functioning health system. The example of the reduction of maternal mortality in Sri Lanka demonstrates the improvements in health outcomes that are possible once a basic platform of functioning health services is available on which targeted initiatives can build (Levine 2004). Thus, the aim of this chapter is to review how health systems can be strengthened in differing country contexts to deliver interventions effectively, efficiently, and equitably. The chapter is mainly concerned with strengthening health services issues in managing core public health functions that are reviewed
elsewhere (Khaleghian and Das Gupta 2004). Although the chapter seeks to draw valuable lessons from all parts of the world, it focuses on countries with the least capacity, especially the poorer countries in Sub-Saharan Africa and Asia.

Montgomery, et al., (1984) conducted a study on the effects of physical fitness and exercise on cardiac awareness. This experiment was run to further evaluate the role of individual difference factors in perception of heart beats (cardiac awareness). The present study examined 24 male subjects who showed high and moderate levels of physical fitness.

Cardiac awareness was examined using Brener-Jones type discrimination trials. Subjects were discriminated first while standing quietly on a treadmill (32 trials), then while walking briskly on a motorized treadmill (32 trials), and finally during recovery from exercise (elevated HR but behavioural quiescence) (16 trials). Results showed that only the moderate fitness group showed heightened awareness during exercise, while both groups showed greater than chance awareness during recovery from exercise. Neither group was highly aware while resting before exercise. These results fail to support notions that high fitness distance runners are highly aware of cardiac function during exercise. A number of reasons for this finding are discussed.

Raju (1970) conducted a survey of 44 middle schools in Delhi on the status of school health programme and showed that health education in
schools does not get sufficient time or attention and most teachers are not equipped to deal with this subject. This survey showed that only 12.5% of the teachers had received training in health education. Support facilities like books and audio-visual material were minimal in all the surveyed schools. Apart from health education activities, less than 50% of the schools offered games and physical training and less than that was devoted health teaching. The school health services were available to around 22% of the schools, the remaining did not have any significant input. As a result, regular monitoring of children did not take place at all. This survey also looked at the physical surroundings of the school in terms of ventilation, cleanliness, drinking water, and latrines. The schools fared poorly on all these inputs and therefore are bound to affect their health in the long run. A morbidity survey among the children in these schools revealed that they are related to poor nutrition and lack of access to safe water and sanitation facilities.

Reed, et al., (2009) investigated a study and the purpose of the study was to analyze the relation between Body Mass Index (BMI), Cardiorespiratory Fitness (CRF), and levels of Physical Activity (PA) from sedentary to very vigorous intensities, measured by accelerometry, in middle and high school students. This cross-sectional study included 111 children and adolescents, aged 11 to 18 years. PA was assessed with an accelerometer for 7 consecutive days (1 minute epoch) using specific cut-points. PA components were derived using special written software (MAHUffet). CRF
was assessed by maximal multistage 20m shuttle run. T-test was used to test differences between BMI groups, Pearson's correlation was to analyze correlations between all variables and multinomial logistic regression and to predict the value of BMI categories. This paper provides evidence that BMI was inversely and significantly correlated with CRF. Only CRF was correlated with vigorous and very vigorous PA levels and total amount of PA.

Singh and McMahan (2006) experimented an evaluation of the relationship between academic performance and physical fitness measures in California schools. The purpose of this study was to evaluate the relationship between academic achievement and physical fitness in California schools. Data from the academic year 2004-2005 FITNESSGRAM were compared to reading, mathematics and science scores on the California Standards Test (CST) of 253 elementary schools in the Orange County School District. Physical education teachers from the 10 lowest scoring and 10 highest scoring schools were interviewed regarding the content of the physical education classes in their school. Simple correlation coefficients revealed a positive linear relationship between academic scores and physical fitness scores. The interview with the teachers revealed that most of the 10 lowest scoring schools did not have a designated physical education teacher. All of the 10 highest scoring schools had designated physical education teachers
and followed the physical education guidelines recommended by the California Education Board.

**Terence, et al., (2001)** investigated the relation of academic performance to physical activity and fitness in children. The objective of this study was to examine the association of scholastic performance with physical activity and fitness of children. To do so, school rating of scholastic ability on a five-point scale for a nationally representative sample of 7,961 Australian school children aged 7-15 years were compared with physical activity and fitness measurements. Consistently across age and sex groups, the ratings were significantly correlated with questionnaire measures of physical activity with performance on the 1.6 kilometers run, sit ups and push-ups challenges, 50 metres sprint, and standing long jump. There were no significant associations for physical work capacity at a heart rate of 170 (PWC). The results are concordant with the hypothesis that physical activity enhances academic performance, but the cross-sectional nature of the observations limits casual inference, and the disparity for PWC gives reason to question whether the associations were due to measurement bias or residual confounding.

**Thomas, et al., (2009)** conducted a study through the impact of physical activity and fitness on academic achievement and cognitive performance in children. The potential for physical activity and fitness to improve cognitive function, learning and academic achievement in children
has received attention by researchers and policy makers. This paper reports a systematic approach to identification, analysis, and review of published studies up to early 2009. A three step search method was adopted to identify studies that used measures of physical activity or fitness to assess either degree of association with or effect on a) academic achievement and b) cognitive performance. A total of 18 studies including one randomized control trial, six quasi-experimental and 11 correlational studies were included for data extraction. No studies meeting criteria that examined the links between physical activity and cognitive function were found. Weak positive associations were found between both physical activity and fitness and academic achievement and fitness and elements of cognitive function, but this was not supported by intervention studies. There is an insufficient evidence to conclude that additional physical education time increases academic achievement; however there is no evidence that it is detrimental. The quality and depth of the evidence base is limited. Further research with rigour beyond correlational studies is essential.

Tomporowski, et al., (1986) conducted a study on Physical Activity Interventions and Children's Mental Function. This review provides a historical overview of Physical Activity Interventions designed by American educators and an evaluation of research that has assessed the effects of exercise on children’s mental function. Historical descriptions of the emergence of American physical education doctrine throughout the 20th
century were evaluated. Research results indicate that exercise fosters the emergence of children's mental functions, particularly executive functioning. The route, by which physical activity impacts mental functioning, is complex and is likely moderated by several variables, including physical fitness level & health status. Physical activity interventions for children should be designed to meet multiple objectives e.g., optimal physical fitness, promoting health-related behaviours that offset obesity, and facilitating mental development.

**Tunder (2011)** reported a status of the impact on health economics. Health is not everything, but without health, everything is nothing (cited from Arthur Schopenhauer, German philosopher, 1788-1860). The relationship between medicine and economics could not have been put more precisely. On the one hand, there is the need for a maximum of medical care and on the other hand, there is necessity to economize with scarce financial resources. The compatibility of these two aspects inevitably leads to strains. The present article intends to raise awareness to regard the "economization of medicine" not just as a threat but also as an opportunity. Needs for economic action are pointed out and insights as well as future perspectives for the explanatory contribution for health economics are given.

**Utriainen, et al., (2011)** conducted a study on health science students' experiences of group supervision of the bachelor's thesis. This study aimed to describe health science university students' experiences of
group supervision of the bachelor’s thesis. Sixty-one students responded to questions on an open data collection form and the data were analyzed by using qualitative inductive content analysis. According to the students, group supervision is supportive in terms of joint learning as well as commitment enhancing and participative learning, but it also can be useless from the viewpoint of an individual student’s own thesis. Teachers’ role as experts and active directors of the group, students’ commitment to learn together, and workable practical organization of the group were promoting factors, whereas students’ timetable problems, mismatch between received and needed supervision, and difficulties in supervising other students were restraining factors. The results can be used for developing group supervision in higher health education.

Welk, et al. (2010) investigated the association of health-related fitness with indicators of academic performance in Texas schools. This study examined the associations between indicators of health-related physical fitness (cardiovascular fitness and body mass index) and academic performance (Texas Assessment of Knowledge and Skills). Partial correlations were generally stronger for cardiovascular fitness than body mass index and consistently stronger in the middle school grades. Mixed-model regression analysis revealed modest associations between fitness and academic achievement after controlling for potentially confounding variables. The effects of fitness on academic achievement were positive but
small. A separate logistic regression analysis indicated that higher fitness rates increased the odds of schools achieving exemplary/recognized school status within the state. School fitness attainment is an indicator of higher performing schools. Direction of causality cannot be inferred due to the cross-sectional nature of the data.

Physical inactivity and sedentary behaviour are less clearly defined. Physical inactivity refers to low levels or the absence of physical activity. It represents the lower end of the activity spectrum. Sedentary behaviour includes a number of occupations that have very little energy expenditure in common. Time, spent in front of TV, is an indicator of sedentary behaviour.