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THE EFFECTS OF PHYSICAL FITNESS ON ACADEMIC ACHIEVEMENT OF GRADE 11 STUDENTS AT FITWARARI HABTMARIAM PREPARATORY SCHOOL, BAHIR DAR

MESAFINT, AGAFAR

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BY:

MESAFINT AGAFARI

AUGUST, 2018

BAHIR DAR, ETHIOPIA

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BAHIR DAR**

STUDENT S NAME MESAFANT AGAFARI

SIGNATURE.....

DATE.....

ADVISOR S NAME ZELALEM MELKAMU (PhD)

SIGNATURE.....

DATE.....

**A THESIS SUBMITTED TO SPORT ACADEMY, BAHIR DAR UNIVERSITY, IN
PARTIAL FULFILLMENT FOR THE REQUIREMENTS OF THE DEGREE OF
MASTERS OF EDUCATION IN PHYSICAL EDUCATION.**

AUGUST, 2018

BAHIR DAR, ETHIOPIA

DECLARATION

I hereby that this thesis is for the degree of MED in teaching physical education on **The effects of physical fitness on academic achievement of grade 11 students at Fitwarari Habtmariam Preparatory School, Bahir Dar** is my original work and that it has not previously formed the basis for the award of any Degree , Diploma or any other similar title .

Mr. Mesafint Agafari

Signature:

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ABSTRACT

The main objective of the study was to investigate the effect of physical fitness on students' academic achievement. Hypothesis had been formulated "there was no significant relationship between the physical fitness and academic achievement (GPA) of the students'. For this purpose, quasi-experimental research method was used taking 40 students as the study samples; these participants have been taken twelve minutes run(one mile run) test scores in meters, pull up test, push-up and sit and reach test as a pre-test. Regarding their academic achievement their 2017/18 grade 10 grade point average (GPA) was taken as a pre-test and the participants were taken a physical fitness pre-test and post-test to figure out change in achievement obtained before and after intervention. For academic performance their 2018 grade 11 grade point average (GPA) was taken as a post-test. Then an intervention of physical fitness (physical activity) was held for twelve weeks (once a week for 50' minutes each of cardio respiratory, muscular strength and endurance and flexibility events throughout the intervention, checklists were used to record the students performance zone and progresses each week in difference events. After the intervention was made post-test, an improvement was noticed in their physical fitness by a mean average difference of 37.725 and with a correlation coefficient of 0.845 analyzing through MICRO SOFT SPSS which was interparty very high relationship between the two physical fitness test. As their physical fitness performance zone improved, similarly, a significant positive effect has been shown on their academic performance. The mean average difference between the pre-test (GPA=45.6750) and post-test (GPA=51.4500) became 5.775 and the correlation coefficient became 0.774 as pearson product moment the correlation which was close to one and interpreted high relationship between them. From this, it was concluded that there is a positive relationship between physical fitness and academic performance. Based on the finding of the study, curriculum experts and teachers were recommended to put the positive effect of physical fitness for academic achievement during designing syllables and teaching physical education.

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LIST OF ABBREVIATIONS

GPA	Grade Point Average
GPZ	Good Performance Zone
HPZ	High Performance Zone
LPZ	Low Performance Zone
PE	Physical Education
PF	Physical Fitness
SPSS	Statistical Package for Social Science

CHAPTER ONE

1. INTRODUCTION

Efforts have been making to investigate the relationship between academic performance and physical fitness. The root for the effort is the findings that emphasize the impact of physical fitness on academic performance. One particular study states ‘‘children who are more physical active are more likely to achieve better academically ‘’(Government of Western Australia Department of sport and Recreation,2008,p.1).Recent studies support these recommendation ,as fitness level and academic achievement have been shown to be more consistently linked (Castelli; Hillmo, Buck,and Erwin,2007;Chomitz et al.,2009,and Caputo,2009).physical activity increases students’ capacity for learning(Kong,1999).

Poor health causes students to miss lectures (Jensen,1998; Keely and Fox,2009; wood Ward, 2009;Mujovic and Cubrilo,2012 which may impact their academic performance negatively (Tsouros el at., 1998; Chomitz et al.,2009). Various association between the mind and body have been cited, and have resulted in the belief that physical activity could assist learning (Shephard, 1997; Jensen , 1998 ; Vanpraag et al.,1999; Dwyer et al.2001 ; Chomitz et al .,2009). Regular physical activity has been shown to have positive effects on brain health(Colcombe et al., 2006; Chomitz et al., 2009; Al-Nader et al., 2013)and to result in a higher capillary volume (Kramer et al.,2002 ; Studenski et al ., 2006 , as wellas a greater density of neuronal synapses (Black et al .,1987 ; Trudeau and Shephard, 2008; Chamitz et al ., 2009).

Physical activity improves cardiovascular fitness (Thirlaway and Benton ,1992; Etnier et al ., 2006 ,Huang et al ., 2013; Plowman and Smith, 2014), which increases blood flow to the cortex of the brain (Hernolz et al ., 1987 ; Shepherd , 1997 ; Cotman and Berchtold , 2002; Barnes et al., 2003 ; Taras , 2005 ; Lambourne , 2006 ; Hall , 2007 ; Pereira et al ., 2007 ; Hillman et al ., 2008 ;Trudeau and Shephard, 2008 ; Dutoit et al ., 2011). This in turn leads to increase in the nutrients used by the brain (Hall, 2007) and helps with cognitive reasoning and functioning(Woodward , 2009).Physical activity also stimulates the prefrontal context which is used in problem solving and learning(Jensen,1998).It increases the level of brain derived neurotrophic factor /BDNF/ (Cotman and Berchtold, 2002; winter et al., 2007; Lou et al .,2008;

Huang et al 2001), which enables to brain to be more adaptive to change (Cotman and Berchtold, 2002 ; Colcombe et al., 2003).

Researchers have found that as exercise increases brain derived neurotrophic factor levels also increase in an area in the brain called the hippocampus ,which is related to memory and learning . This brain derived neurotrophic factor molecule has a direct impact on cognitive function, neurogenesis, and plasticity (Cotman and Berchtold, 2002; Rasmussen et al., Berchtold, 2002; Rasmussen et al., 2009)and how this molecule has a direct impact on cognitive function. This study gave researchers the evidence they needed to support the notion that exercise improves learning, mental performance, and long-term memory retention(Cotman and Berchtold,2002).

However its effect is not investigated in depth by intervening different physical fitness events in to effect .Thus, this study intervene four physical fitness events of cardio respiratory, muscular strength, muscular endurance and flexibility so as to identify the effect of physical fitness on academic performance

1.1. Back ground of the study

Physical education is an integral part of the total education curriculum. It is the only area of the school curriculum that teaches physical fitness, motor skill and an understanding of human movement and provides opportunities to facilitate the development, furthermore, physical education when thoughtfully planned and thought, can support learning across the curriculum. For example, physical education can integrate information about anatomy, physiology and physical fitness as well as nutrition. A well designed and sequenced physical education program helps developer students' physical fitness and attitudes conducive of lifelong learning, and important education goal. Physical education is essential component of any curriculum designer to educate the whole person.(Woest and Lembre, 2016) .

Physical education is a two headed coin one side represents development and maintenance of physical fitness characteristics including cardio respirator endurances, muscular strength, muscular endurance, flexibility, good posture, balance and neuromuscular skills. The other side represents what is happening to the total person as he develops these physical attributes and that is a growth in regard to self-perception ,attitudes ,interest ,aspiration , social and emotional qualities and agencies feeling of wellbeing on self -realization and (knapp , 2008) .

Its objective deals with the program of activities that build and maintains power in an individual though the development of various organic system of the body. It results in the ability to sustain adaptive effect, to recover and resist fatigue. Thus an individual will be more active, perform better and be healthier if the organic systems of the body are adequately developed and functioning properly (Smith and Hall, 2012).

Muscular activity plays a major role in developing and functioning the digestive, circulatory, excretory, heat regulatory, respiratory and other body systems. These muscular functions are also intimately related to the beneficial for health (Knotee and Hat Field , 2015)

Regular physical activity is a factor in healthy living. According to surgeon general report on physical activity and health, the benefits of physical activity for children and adolescence include building and maintaining healthy bones muscles and joints, reducing feeling of depression and anxiety and promotion of psychological well-being . In addition, physical activity helps reduce fat, build muscle and assist academic performance.

Researchers and educators agree that movement is essential to learning as the brain is active during physical activity, therefore, by incorporating physical activity, physical education can have beneficial effects on both in academic learning and physical activity patterns of students.

According to Etnier (1997); Hillman, Castell and Back (2005) Hollmann and Etruder(1996) Sibley and Etnier(2003) when the brain is activated during physical activity, existing brain cells are rejuvenated and new one stimulated. Specifically, there is an increase in cerebral blood flow, enhanced nutrient intake.

A significant positive relationship has been observed in the research on the relationship between cognition and physical activity. For example, Sibrog and Ethneir (2003) conducted a meta-analysis of 44 students that showed a positive correlation with a significant overall effect size of 0.32 between physical activity and seven categories of cognitive performance perceptual skills, intelligence quotient, performance, verbal test , mathematics test ,developmental level and academic readiness , among school-aged children .

Researches also, specifically, showed that physical fitness have a positive effect on academic performance, For example, according to , Larson and Zaichvowsky (1995) physical activity has been shown to develop greater academic performances in children . Moving by learning has implications for increasing academic performance. So, physical fitness also helps to extend the performance of students.

Physical fitness increase students' capacity for learning. Learning through movement is vital for a successful experience in school. According to Young (2001) physical fitness help children concentrate and focus. Being physically active in school has positive impacts on learning in the class room Therefore; physical fitness contributes a lot in enhancing the student's academic performance.

Trudeeau and Shephared (2008) reviewed the literature on the relationship between physical education school 'physical activity and academic performance. They concluded that physical fitness can be added to the school curriculum by taking time from other subjects without the risk of hindering student's academic performance.

Similarly Singh(2012) reviewed the prospective relationship between physical fitness and academic performance, It was concluded that participation in physical fitness program is positively related to academic performance in children. Farther more, Tiaras(2005) reviewed literate investigating the association between physical fitness and academic out comes among school aged children. It was recognized that physical fitness is well associated with improved overall health and reduce risk taking behaviors.

Although there have been several researches concerning the relationship between physical fitness and academic performance in general and physical fitness and academic performance in particular word wide, there is a limited effort in directly experimenting the association by intervention.

Therefore, based on the advocacy of scholars and experts in several literature, the current study tried to identify the effect of physical fitness on the academic achievement of grade 11 students' at Fitawrari Habtemriam preparatory school.

1.2 Statement of the problem

The purpose of this study was to explore and conducted on the “The effect of physical fitness on academic achievement of grade 11 students’. The underlying reason to bring this topics as research issue were due to the accountability pressures of child left behind and reaching adequate yearly progress, schools are feeling compelled to create more time to teach academic subjects that are assessed on standardized tests than on other non-academic subject , like physical education .

Secondly, the relationship between PF and academic achievement has received attention because of the increasing number of students who are poor PF. And schools are feeling the pressure to meet astandards (Maedar and Murata, 2004). A study found that PF test were positively related to academic achievement for secondary and preparatory students. Even though there are numerous positive effects related to being physical activity and PF, their effect on cognitive and academic achievements is not clear, these finding confirm that physical activity and PF may be beneficial to students cognitive health and academic achievement understanding the relationship between physical activity and academic has been a popular subject to research, but determine how PF effect students academic achievement is still unclear.

The underlying reasons to bring this topic as a research issue were limited efforts made in my school contacts to investigate the relationship between academic achievement and physical fitness through intervention in my school contacts.

Different researches have been made on the area, for example, Alicia and et al (2011) undertaken a meta-analysis study on the topic “Effects of physical activity and physical fitness on children’s performance and cognitive outcomes”. This research doesn’t directly address the relationship between physical activities and academic performance and even mentions that it is difficult to assure their relationship.

Another study found that physical fitness test was positively related to academic achievement for elementary setting (Castilli, Hillman, Buck, and Erwin, 2007). Perhaps, physical fitness may be related to academic performance in the classroom for secondary and preparatory students. Even though there are numerous positive effects related to being physical activity and physical fitness, their effect on cognitive and academic achievement is not clear.

Tudeauand & Sheppard (2008) reviewed the literature on the relationship between physical education, school physical fitness and academic performance. This cross-sectional study generally indicated a positive association between physical fitness and academic performance. However taking data at a single snap-shoot through cross-sectional study and reaching a conclusion might question the accuracy of the data, Thomas J.H. Keely & Kenneth R.Fox (2009) also reviewed the literature on the relationship between physical fitness, The majority of studies are cross-sectional and weak positive associations. There are several factors including level of motivation and aspirations, Cognitive skills, clustering of abilities within individuals, parental encouragement and logistic support, that could provide alternative explanations for associations between engagement in activity of sport, exercises and mental performance. Controlled intervention studies are therefore necessary to isolate cause and effect.

The main objective of this study was to investigate the effect of physical fitness on academic achievement of students’. For this study, however, was conducted quasi-experimentally particularly on students who have both low physically fitness level and academically performance (GPA) below 50%. To fill the gaps in identifying the association between physical fitness and academic performance, an intervention was made.

1.3 Research hypothesis

As Dinardo (2005) painted quasi-experimental research shares similarities with the tradition experimental design method although the intervention took place without random assignment. Thus, the investigator hypothesized that:

Ho 1-There will be no significant relationship between the physical fitness and academic achievement (GPA) of grade 11 students' at Fitawarari Habtmary preparatory school.

H1 2-There will be significant relationship between the physical fitness and academic achievement (GPA) of grade 11 students' at Fitawarari Habtmary preparatory school.

1.4 Objective of the study

1.4.1 General objective

The main objective of this study was to investigate the effect of physical fitness on students' academic achievement of the students'.

1.4.2 Specific objectives

The study specifically

- 1- Examine the significant relationship between the physical fitness (cardio reparatory endurance fitness, muscular strength and endurance and flexibly) on academic achievement (GPA) result on grade 11 students.
- 2- To assess the effect of the physical fitness and academic performance of the students'.
- 3- To compare the effect of physical fitness level on the academic achievement of the students on the same grade.
- 4- To find out the relationship between the aggregate mean average score of cardio-respiratory endurance, muscular strength and endurance and flexibility on academic achievement (GPA) score on grade 11 students'.

1.5 Significance of the study

The primary aim of the study was to determine the effect of physical fitness on academic achievement of grade 11 students at Fitawari Habtmriam Preparatory school.

This study has the contribution in

1-Creating awareness for teachers who are teaching physical education on the effect of physical fitness and students' academic performance (GPA) results of the students'.

2-There is need to bring importance of school-based physical fitness programs of activity impact on academic performance and that regular exercise may improve student's cognitive functioning.

3- Helping the students to have a better academic performance through physical fitness level increases.

4-It will be used as a resource for those who want to conduct farther researches in this area.

1.6 Delimitation of the study

This study was conducted in Amahara Region ,Bahir Dar town at Fitwarari Habtemariam Preparatory school. The study were conducted in academic years of 2018, among the six section (2017/18) 300 students' of 160 male and 140 female who have attending grade 11 at the school, 40 students (30 male and 10 female) and the age ranged between 17-20 were included as the study samples. The healthy condition that have not any disability students.

For those sample students Physical fitness tests were given on cardio respiratory, muscular strength, muscular endurance and flexibility through twelve minutes run (one mile run), pull-up, push-up and set and reach tests respectively. After the physical fitness pre-test held, the participants had been instructed to complete as much as possible that required the intervention. The practical session included as follow: To develop cardio-respiratory: practice skipping ropes, step-up, running on the spot, jogging and distance run were practice. To develop muscular strength and endurance were practice push-up, pull-up, sit-up, knee bent and squat trust to develop muscular strength and to increased flexibility were attained through flexibility exercises.

Regarding the academic performance 2017/18 grade 10 mean average score (GPA) of the 40 students' was taken and compared with the post-test 2018 grade 11 mean average score (GPA) result which was found . GPA was taken as pre-test and post-test since academic performance is assessed by standardized tests or academic grades in an educational setting(Strong et al., 2005; Tomporwski et al., 2008; Keeley and Fox, 2009); subjects or by means of national assessment tests (Keeley and fox, 2009).

1.7 Operational definition of term

This section provides a brief description of the terms and technical language that was used in the study, as well as meanings to explain and highlight tend throughout the study.

1-Academic achievement – refers to the level of school have successfully completed and the ability to attain success in your studies.(Education Oxford Bibliographie,2018)

Academic achievement includes standardized test scores in subject areas such as reading, language, art, skill, GPA (Grade Point Average), classroom test scores and other formal assessments. Academic achievement have measured factors they deemed related to academic success and correlated these with average percentage. (Fraser and Killer., 2003, Strong et al.,2005; Bener and Graham.,2009, Trudeau and Shephard,2010).

2-Academic performance- is an important variable that effects the advancement of students (Beck et al., 2011). Assessed by standardized tests or academic grades in an educational setting (Strong et al., 2006, Tomporowski et al.,2008; keeley and fox,2009; Woodward,2009; Grais,2011. It is after quantified by assessing achievement in specific subjects or by means of national assessment tests.(Keeley and fox, 2009).

3- Cognitive performance-refers to the child's performance when assessed components of cognition function. Tests assessed components of cognition such as reaction time, attention, working memory and stimulus response (collectively referred to as executive control). Cognition and academic performance are thought to interrelate as aspects of cognition such as attention and memory are vital for academic success.(Hillman et al.,2005)

4- Physical fitness- is described as asset of attributes either health related (cardio respiratory endurance, muscular strength and endurance, flexibility, and body composition) or skill related (balance, agility, power, reaction time, speed, and coordination) and these attributes are usually measured with a specific set of tests completed during physical education class.(Caspersen et al., 1985).

5- Quasi-experimental -is similar to an experimental design but lacks the important characteristic of random assignment to intervention and control or comparison groups. Though not considered

as regions as on experimental design, it is often considered the next best thing for establishing causality.(Dinardo,J.2008).

6- Preparatory -Nomination given by the ministry of education for students who are attending their education at grade 11 and 12 level to get reading for university education.(Ethiopian Minister of Education ,2002)

CHAPTER-TWO

Introduction

This review of literature was generally examined the effect of physical fitness on students' academic performance .The first section discussed basic concepts of physical education and physical fitness and the second section focus on the benefit of physical fitness for brain and academic performance .

2.1 Basic concepts of physical education

Physical education is a school based program that provides students with opportunities to be physical active and to acquire the skills and knowledge needed to establish and sustain an active lifestyle (National Association for sport and physical education, 2006).

According to Mekonnen and Dereje(2005)Physical education is an education which is given mainly through physical activities to develop and maintain all aspects of personality as- physical, mental, and social wellbeing. Therefore, physical education is education through physical activities.

Wuest and Lembrdo (2006) also emphasized physical education is an integral part of the total education curriculum. It is the only area of the school curriculum that teaches physical fitness, motor skill and an understanding of human movement and provides opportunities to facilitate the development. Furthermore, physical education, when thoughtfully planned and thought, can support learning across the curriculum. For example, physical education can integrate information about anatomy, physiology and physical fitness as well as nutrition.

A well designed and sequenced physical education program helps to develop student's physical fitness, skill and attitudes conducive of lifelong learning, and important educational goal. Physical education is an essential component of any curriculum designed to educate the whole person. Broadly defined, the physical education program encompasses the instructional program and other related program, physical fitness, intramurals, recreational program.

Mekonnen and Dereje(2005) generalized that Physical education is an all-encompassing term , including physical fitness , skill , movement , dance , recreation , health , games and sport plus

the appropriate vs. and knowledge of each. Physical education makes valuable contribution psychomotor domain and also in the cognitive and affective areas. It is becoming more apparent with each passing year that school programs must help students develop physical fitness and healthy life style, which include appropriate activities and attitudes for all stages of life.

2.2 The Benefit of physical education

Concerning the benefits of Physical education many ideas have been forwarded. For example, Manohar(2010) mentioned that it has the capability of encouraging young children to become physically active. These teachers can describe the benefits of remaining physically active, as well as show them different opportunities of how individuals can get physically fit. Physically activity can be encouraged during recess, and after school health program can be developed to involve students. Curriculum changes may need to be revisited (Pivarnik and Pfeiffer, 2002).wellness and health lessons need to integrated more in to the physical education classes. PE needs to encourage individuals to remain physically active throughout their entire live.

In addition to physical fitness, Carlson et al.(2009) believe PE impacts students academic performance, physiologically (increase in blood flow to the brain), psychologically (raising self-esteem and reducing stress and anxiety), and behaviorally (better participation and concentration), resulting in improved learning.

Moreover, Ploughman(2008) suggested If exercise is considered as brain food , physical activity truly play a role in increased cognitive function and improves academic performance , then the implication for education today must be discussed. There are three areas during the day where educators can incorporate exercise in to a student's day in order to enhance cognition and improve academic performance. These areas include:-

- a) Movement of students in the classroom,
- b) Physical education participation, and
- c) Extra-curricular activities

Research justifies the importance of school programs, reducing or eliminating PE programs will not increase academic performance. Schools' PE programs are crucial for promoting physical activity for young children and adolescents (Kelso, 2009). Students who live sedentary lives need to be encouraged to live a healthy lifestyle. Schools can create positive experiences with

physical activity for children as well as provide students with the knowledge on how to live active lives. PE must remain in schools and policymakers must stop trying to cut PE from schools. Physical activity opportunities should be maximized in order to teach the whole child (Lueprur, 1999).

Several studies also discuss the impact of physical activity on academic performance. One particular study states ‘‘Children who are more physically active are more likely to achieve better academically’’ (Government of Western Australia department of sport and recreation, 2009, p.1).

Based on the finding, it should be the role of society to provide many opportunities for children and adolescents to incorporate physical activity in to a life and thereby help lay the foundation for a life-long, healthy lifestyle.

One Canadian study conducted by Pica (2004) shows how academic scores increased when a third of school day was devoted to PE. Another study by Pica (2004) demonstrated children participating in five hours of vigorous physical activity a week had stronger academic performance in math, English, natural sciences, and French than children with only two hours of physical activity per week. Children who participate in daily PE have been shown to perform better academically and to have a better toward school (Sadler and Tentinger, 1993). Physical activity and fitness may actually help students do better in the classroom. While a number of studies have found that neither PE nor physical activity is harmful to academic performance (Dwyer, Coonan, Leitch et al.,1999) findings are inconclusive as to either it is actually helpful (Coe, pivarnik, Womack, Reeves and Malina,2006;Stevens,Stevenson, and Loch Baum, 2008).

For example, Sallis et at ,(1999) found that there was less of a decline in academic performance for students enrolled in PE compared to non-enrolled students, but no significant academic increases for enrolled students .However,Sheppard(1996) found that elementary school children ,in particular ,scored higher on performance tests when they enrolled in additional PE. To further complicate, the results, one study found that girls received academic improvements with increased PE time,(Carlson et al., 2008).

PE-The demands of standardized testing in schools have greatly increased since the no child left behind act of 2002. This act is designed to assess schools each year to determine if students are

improving academically on their annual goals. This pressure for student improvement creates a great deal of stress for school districts to find away to increase instructional time. The instructional time strain has caused some schools to reduce or eliminate PE classes in order to increase student's academic performance. However, no current research exists supporting the reduction of non- academic programs to improve academic performance. A study conducted by Sallis and Owen (1999)suggested "spending more time in PE did not have harmful effects on standardized academic performance test scores in elementary school children"(P.132). This study also showed "evidence that a two year health-related PE program has several significant favorable effects on academic performance".

Coe et al. (2006) suggested in his study taking 214 sixth grade students comparing engagement in moderate to vigorous activity in PE class to core academic grades. This study hypothesized students engaged in PE class would be improve academic performance more than students not engaged in PE class. The results of this study showed PE class enrollment did not influence academic performance .The hypothesis may not have been accepted, but the results of the study did show students who performed vigorous physical activity (according to the healthy people 2010 guidelines of 20 minutes or more a day in a week), did have significantly higher grades than those who did not meet the guidelines. This study suggests an increase in academic performance is associated with vigorous physical activity and not with moderate physical activity.

Besides, Carlson et al. (2008) tracked the reading and math scores standardized tests of more than 5,000 students in kindergarten through fifth grade and found those who received the highest level of PE, 70 to 300 minutes a week scored consistently higher on their tests than these students who spent less than 35 minutes week in PE class. Their study concluded that increasing PE and reducing academic time does not appear to have negative effects on academic performance. They believe PE impacts students academic performance physiologically (increase in blood flow to the brain), psychologically (raising self-esteem and reducing stress and anxiety), and behaviorally (better participation and concentration), resulting in improved learning.

For Jensen (2005) if schools do not put into action a concrete PE –program they are truly creating a disadvantage for student intellect and the potential for improved academic performance.

The results of studies analyzed by Trudeau and Shephard (2008) showed adding an hour of PE to the school curriculum, thereby taking time away from other subjects, does not impede student academic performance. The study also supported positive influences on classroom behavior, concentration, memory, and cognitive function.

Based on the current research, clearly the quality of PE is most important for academic performance. While physical activity predicts higher academic performance, PE with insufficient duration and intensity levels of activity does not; Therefore, PE programs need to “increase activity levels, improve physical fitness, help control weight, and enhance academic performance and it should be an integral component of our educational systems” (Sattelmair and Ratey, 2009, p. 370).

Physical activity provides numerous health benefits from learner bodies and lower blood pressure to improved mental health and cognitive functioning. We believe that the school physical education program should promote physical fitness, should teach skills as well as change behavior and should be able to influence health and wellbeing across the life span. Also that a quality program of physical education must be a core requirement in school and a central component in a comprehensive schools health program. (Grissom,2005)

2.3 Basic purpose of physical education

Among those who explain the purpose of physical education, Knapp(2009), described that physical education is a two headed coin; one side represents development and maintenance of physical fitness characteristics including cardio-respiratory endurance, muscular strength, muscular endurance and flexibility, good posture, balance and neuromuscular skills. The other side represents what is happening to the total person as he develops these physical attributes, and that is a growth in regard to self-perception, attitudes, and agencies feeling of wellbeing or self-realization.

The physical education programmers were reduced in schools learns drop-out rates, as well as behavior problems and attention disorders, increased (Shepherd et al, 2011). The implementation of physical activity programmer’s attitudes, behavior, discipline and creativity of learners (Keays and Allison, 1995).

In the contrary to this Robert (2007), described in schools across the United states , physical education has been substantially reduced and in some cases completely eliminated in response to budget concerns and pressures to improve academic test scores , yet the available evidence shows that children who are physically active and fit tend to perform better in the classroom, and that daily physical activity does not adversely affect academic performance. Schools can provide outstanding learning environment while improving student's health through physical education.

2.4 Benefits of physical fitness

Before discussing the literature on physical activity in school settings, it is important to define the deference between physical activity, physical fitness, and exercise. While these terms are sometimes used interchangeably, they are clearly different terms needing further clarification when discussing studies relating physical activity to overall brain health.

Evans and Burghard(2008) describe physical activity as ‘an action that requires muscle contraction in your body.... This includes, walking, Chores(washing dishes), playing and in some cases even sitting ‘(p.94).

Physical fitness is defined as the ability of an individual to competently and capably perform ever day tasks without excessive fatigue, and with enough energy to enjoy spending free time, as well as to resolve unseal situations of sudden and unforeseen emergency(Cvejic et al., 2013, Council of Europe, 1983).

Caspersen et al., (1985).physical fitness is described as a set of attributes either health related (cardio respiratory endurance, muscular strength, flexibility, and body composition) or skill related (balance, agility, power, reaction time, speed, and coordination)and these attributes are usually measured with a specific set of tests completed during physical education class.

Exercise is a type of physical activity,” a dedicated time for repetitive actions with the purpose of increasing performance or physical capacity”(Evans and Burghardt,2008, p.94), such as conditioning for many athletic activities, in an effort to improve or maintain physical fitness. It is important to note ‘ although all exercise is physical activity, not all physical activity is exercise” (USDHHS, 2008, Chapter 2, P.7)

2.4.1 Health benefits of physical fitness

Regular physical activity has considerable health benefits. It builds and maintains bones, muscles, and joints (Centers for Disease Control and Prevention, 2008). The building of lean muscle ultimately reduces the fat (Saunders, 2009). Physical fitness prevents or reduces the risk of cardiovascular disease (Centers for Disease Control and Prevention, 2008). Additionally, it decreases the number of children struggling from diseases including diabetes, hypertension, elevated blood cholesterol, lowers the risk of colon cancer, and depression (Dimeo, Bauer, Varahram, Halter, 2001). For some children, the structured physical education class that receives at school may be the only preparation they have for an active lifestyle.

According to the U.S Department of Health and Human Services, (USDHHS;2008), physical activity as adults and adolescents reduces the likelihood that as adults these individuals will develop chronic diseases such as heart disease, hypertension, type-2 diabetes, and osteoporosis.

Regular physical activity in children and adolescents has been shown to improve cardio-respiratory fitness, strengthen muscles, support bone growth, promote healthy body weight, build self-esteem and reduce anxiety and stress(USDHHS).

Physical activity has great health benefits including improved cardio-respiratory and muscular fitness, higher bone mineral density (Debate et al., 2009). Regular exercise increases the amount of oxygen flowing through the brain(Galley, 2002).

Amounts of physical activity greater than 60 minutes provide additional health benefits(USDHHS, 2008).

2.4.2 Components of health related physical fitness

A- cardio-respiratory endurance is defined as the ability of heart and lungs, circulatory system, heart, lungs and blood vessels to supply oxygen to working muscle during exercise. Cardio-respiratory endurance has many health benefits. It keeps the heart muscle, blood vessel and lungs in excellent condition .(Grade 9 PE student text book, revised by Mekonnen Amde and DerejeSeme, Mega publishing enterprise, Addis Ababa, 2005(p.18)

Aerobic exercise increases the supply of blood and oxygen to the brain (Hannaford, 2005, P.107).

Aerobic fitness (Hillman et al., 2005) as well as stretching movements or marching can help improve attention span (Jensen,1998; Dwyer et al.,2001).

B- Muscular Strength

The amount of force that can be produced by a single contraction of a muscle. Having muscle strength can keep you from being easily fatigued. It can keep your muscle from becoming sore or injured, when you do things strong muscles also help you stand, sit and walk easily.(grade 9 PE student text book , revised by Mekonnen A and Dereje S, mega publishing enterprise, addis-Ababa,2005(P.19)

C- Muscular endurance

The ability of a muscle group to continue muscle movement over a length of time. Many daily activities require muscular endurance. It also helps you maintain correct posture. (Grade 9 PE student text book, revised by Mekonnen A et al, 2005 P.20)

C- flexibility- It is the ability to move joints and use muscles through their full range of motion. When you are flexible, your body does not get stiff easily. You are less likely to injure your muscles or to have lower back pain. (Grade 9 text book, Mekonnen A et at, 2005 P.19).

2.5 Academic performance

Academic performance is includes standardized test scores in subject areas such as reading, language, art, skill, GPAS, classroom test scores, and other formal assessments.

Studies investigating students' academic performance have measured factors they deemed related to academic success and correlated these with average percentage (Fraser and Killer,2003, Strong et at ., 2005; Benner and Graham,2009, Trudeau and Shephard, 2010).

Academic performance is assessed by standardized tests or academic grades in an educational setting (strong et al ., 2005; Coe et al ., 2006; Tomporwski et al., 2008; Keeley and Fox , 2009 ; Woodward, 2009 ; Grais , 2011).It is often quantified by assessing performance in specific subjects or by means of national assessment tests (Keeley and Fox, 2009).

Studies investigating students' academic performance have measured factors they deemed related to academic success and correlated these with the average percentage (Fraser and Killen, 2003; Strong et al., 2005; Benner and Graham, 2009; Trudeau and Shepherd, 2010).

Behr (1985) and Jawitz (1995) stated that the best single predictor of academic performance at tertiary level is a student's matriculation results, school performance, rather than intelligence quotient (IQ) tends to be a good predictor of a student performance. Well at school he/she acquires a sound attitude toward work (Behr, 1985).

2.6 The Brain

The adult brain in humans is a critical part of the nervous system (Jensen, 1998) and is able to gain knowledge through experience (Binder et al. 2009). Its weight which constitutes about 2 % of body weight (Davenport et al., 2012). Its most notable characteristic is the folds that form part of the cerebral cortex. The brain is made up of the right and left hemisphere and is divided into the occipital lobe(responsible for vision) (Jensen, 1998; Saladin, 2010), the temporal lobe (responsible for memory , hearing, language and meaning) (Jensen, 1998; Colcombe et al., 2003; Saladin, 2010). The parietal lobe(responsible for processing language and higher sensory functions), and the frontal lobe(involved with problem solving, creativity, judgment and planning)(Jensen, 1998, Saladin, 2010).

The hippocampus(Cotman and Berchtold, 2002,) is part of the limbic system (Zoeller, 2010). It is situated in the medial temporal lobe (Jensen, 1998; Kramen et al., 2006); Zoeller, 2010). A number of genes in the hippocampus are regulated through exercise (Cotman and Berchtold, 2002). The size of the anterior hippocampus increases with aerobic exercise training, which results in improved spatial memory (Kempermann et al.,1997 and 1998).

Oxygen is vital to the brain (Jensen,1998). Physical activity improves the oxygen supply to the brain, which increases one's capacity to learn (Rodenroth, 2010, Cited in Gallery, 2002), and help the individual make decisions (Rodenroth, 2010). If the brain's blood supply is interrupted, it results in loss of consciousness(Jensen, 1998).

How physical activity affects the brain:-

Cognitive skills and motor skills appear to develop through a dynamic interaction research has shown that physical movement can affect the brain's physiology by increasing:- Cerebral capillary growth

-Blood flow

- Oxygenation
- Production of neurotrophins
- Growth of nerve cells in the hippocampus (center of learning and Memory)
- Neurotransmitter levels
- Development of nerve connections
- Density of neural network
- Brain tissue volume.

Desai, Kurpad, Chomit, and Thomas (2015) state that aerobic exercise positively support mental health, influence health behaviors, and associated with academic performance.

2.6.1 Cognition

Effects of physical activity on adolescent brain

While it is known physical activity is important for important for improving cardiovascular health, emerging research focuses on the benefits of exercise on brain health.

Tompsonski et al. (2008) discussed how exercise may be the most simple and significant method for improving the aspects of children's mental performance central to cognitive development. Four important points on how exercise impacts the brain and improves cognitive processes involved in learning and memory are:-

- a) Enhancing circulation so individual neurons can get more oxygen and nutrients,
 - b) Stimulating the production of the mood enhancing neurotransmitter and nerve growth factors such as brain derived neuro trophic factor (BDNF).
 - c) Creating new brain cells in a process called neurogenesis, and
 - d) Improving plasticity (Jensen, 2008).
- a) Oxygen circulation: - The brain needs a continuous supply of oxygen and glucose as its source of fuel. While glucose comes from foods eaten, the oxygen supply comes from physical activity. As individuals perform physical activity this increases the number of capillaries in the brain which allows for the transport of oxygen in the blood. The amount of oxygen in the blood has an impact on the cognitive abilities of an individual, the more oxygen available to the brain, the better a student will perform cognitive tasks. Sousa (

2006) states “armed with the knowledge that movement is connected to cognitive learning, teachers and administrators need to encourage more movement in all classrooms at all grade levels” (P.233). As a result, it would be ideal for teachers to incorporate physical activity in to every lesson in order to oxygenate the brain and facilitate attentiveness in students.

b) Production of neurotransmitters and neurotrophins:-

Along with oxygenating the brain, Winter et al. (2007) found intense physical exercise improves cognitive function by increasing levels of neurotransmitters and neurotrophins responsible for relating mood and short and long term learning success. The research shows” exercise accelerates learned material” (P.607). While the neurotransmitter is involved in emotion, learning, and memory, brain-derived neurotrophic factor is involved in the survival and growth of neurons.

Researchers have found that as exercise increases, brain derived neurotrophic factor (BDNF) levels increase in an area in the brain called the hippocampus, which is related to memory and learning. This BDNF molecule has a direct impact on cognitive function, neurogenesis, and plasticity(Cotman and Berchtold, 2002; Rasmussen et al., 2009). Cotman and Berchtold (2002) showed how exercise produces BDNFand how this molecule has a direct impact on cognitive function. This study gave researchers the evidence they needed to support the notion that exercise improves learning, mental performance, and long-term memory retention.

Ratey and Hagerman (2008) describes BDNF as” miracle grow for the brain”(P.40). He discusses the importance of this molecule for regulating neurotransmitters such as SEROTONIN involved in mood regulation, for encouraging new growth of neurons in a process called neurogenesis , and for enhancing , neurons known as plasticity. BDNF for the brain is like water for the body, essential. They both require much praise, because with out them the body and brain would die.

c) Near genesis:- one of the most profound advances in neuroscience and education is near genesis, or growth of new neurons (van praag, Christie, Sejnowski, and Gage,1999). While it was once believed neurons could not be replaced once they died, new research is showing how exercise has the ability to promote the birth of new brain cells.

This process of neurogenesis occurs in the HIPPOCAMPUS according to Van praag et al. (1999), exercise stimulates the growth of new brain cells in a process called neurogenesis. This study showed” physical activity can regulate hippocampal neurogenesis, synaptic plasticity, and learning “(P.13427).Neurgensis has become monumental in neuroscience because it refutes the old theory that dead brain cells cell can never be replaced. It was not until Cotman and Berchtold(2002) that the connection was made suggesting exercise results in the production BDNF which elevates the production of new neurons (neurogenesis), thereby enhancing learning.

- d) Plasticity:- a final outcome of exercise on improved learning is through a process called plasticity. Everything individuals do , think and feel, is regulated by how the brain cells are connected to one another (Ratey and Hagerman, 2008).IT is through the repetitive firing of these neurons that connections are strengthened which plays a role in how learning occurs. Cotman and Berchtold (2002) point out that exercise is a simple way to support and maintain brain plasticity by inducing BDNF and neurogenesis in the hippocampus. Physical activity results in higher levels of endorphins and norepinephrine(Taras, 2005;At-nader et al., 2013)

2.7 The relationship between physical fitness and academic performance of students

Research has indicated that physical activity levels and physical fitness may have an effect on academic performance (Dwyer et al., 2001; Kim et al., 2003; Al-nader et al., 2013). The implementation of physical activity programs in schools in schools has been shown to improve the attitudes, behavior, discipline and creativity of learners (Keays and Allison, 1995).Aerobic fitness(Hillman et al.,2005) as well as stretching movements or marching can help improve attention span (Jensen, 1998; Dwyer et al.,2001).Shephard (1997) showed that being physical active enhances academic learning per unit of class time.

Physical activity also increases alertness (Tuckman and Hinkle,1986), imagination, self-efficacy, emotional stability, conscientiousness (Lichtman and poser, 1983) enthusiasm, creativity (Tuckman and Hinkle, 1986)and concentration (Shepherd , 1983; , Caterino and polak, 1999 ; Taras, 2005; Trost, 2007, all of which can have a positive effect on academic performance. Research has also shown that physical activity increases alertness (Shepherd, 1983; Davranche

and Audiffren, 2004) , which may enable a learner to pay closer attention is the classroom (Shephard, 1983 ; Coe et al ., 2006).

Studies have indicated that physical active positively influences both self-concept (Taylor et al., 1985; Al-nader et al., 2013; Ayodele and Adebisi, 2013) and motivation (Kilpatrick et al ., 2005) students who lack motivation show high dropout rates (Hall, 2001).

Physical fitness is best described as a generalized state of well being or an ability to perform certain sports related tasks. In this paper physical fitness is measured by multiple tests performed usually during PE class to estimate aerobic fitness, muscular strength, flexibility, and body composition (Castelli, Hillman, Buck, and Erwin; 2007) looked at the relationship between physical fitness and academic performance in 259 third and fifth grade and found aerobic exercise was positively associated to academic performance on standardized test ; grade, and other measures of cognitive performance, While body mass index (BMX) was inversely related.

Grissom (2005) was one of the first researchers to analyze a sample size of 884,715 California middle school children, comparing FITNESS GRAM-R test results with Stanford performance test, a standardized norm-referenced performance test. His results indicate a positive relationship between overall student fitness and academic performance. As the overall fitness scores improved, the mean performance scores also improved. Grissom states” when administrators need to make decisions about where to focus resources in a climate of academic accountability, a proven relationship between physical fitness and academic performance could be used as an argument to support, retain, and perhaps even improve PE-programs” (p.12).

Similar research has also been found in California; students with higher levels of fitness were associated with higher academic performance. The California Department of education(2001) compared 954,000 fifth, seventh, and ninth graders’ FITNESSGRAM-R scores to their Stanford performance test and found a positive relationship. Another study conducted by Singh and McMahan (2006) analyzed scores in 253 elementary schools and found a positive correlation between academic performance (California standards test) and physical fitness scores. Singh and McMahan also emphasize that it is the responsibility of schools to promote physical activity and a life-long behavior change since” schools are the only institutions which have structured and continuous contact with nearly all children” (P.212).

Physical exercise may improve brain function and otherwise increase the capacity for learning (Delores king, 1999 b) regular exercise increases the amount of oxygen flowing though the brain, which increases children's capacity to learn (Galley, 2002 c).

One of the largest studies included more than 2.4 million Texas students. Welk and Meredith (2009) found several correlations between physical fitness and academic performance. The study reports students who are physically fit, measured by FITNESSGRAM-R test results, are more likely to do well on the state's standardized tests , have better school attendance, and less likely to have disciplinary referrals involving truancy, drugs, alcohol, and violence.

Physical activity has been found to have a positive effect on children's cognitive functions, such as memory, attention and general information processing and problem-solving skills. The latest studs indicated that increasing physical activity improved test results, in particular in tasks requiring executive functions and memory. However, there is still very little research on the direct effects of physical activity on cognitive functions and the results are somewhat inconsistent, research has also shown that good aerobic fitness has a positive correlation with memory and executive functions. Conversely, muscular fitness does not appear to have any link to cognitive functions. The connections between physical activity and cognitive functions may contribute to explaining the link between physical activity and academic performance. (Finnish National Board Of Education,2012,Status Review October, Physical Activity And Learning.)

The only intervention study was conducted recently by Davis et al (2007). They used a pre and post intervention aerobic fitness treadmill test and the CAS test, cognitive functioning. The intervention consisted of low and high-dose gymnasium based exercise programmed, focused around group games. Children in the low-dose group exercised for 20 minutes, five days per week for 15 week and the children in the high-dose group exercised for 40 minutes, both groups aimed to achieve an average heart rate of 150 bpm for each session. The high-dose exercise group differed significantly from the no additional exercise control group on the planning aspect of the CAS test. This well designed study provides initial evidence for an effect of exercise up on at least one aspect of executive function. It is of note that low and high-dose intervention groups did not differ significantly on the treadmill post-test, suggesting that difference in fitness gains made by the two groups were small. Factors other than fitness change may have been responsible for the difference in cognitive function.

Physical fitness and academic performance

The four studies, the three from north America and one from Australia, examined the relationship between physical and academic performance. Age ranged from 7 and 15 years with sample sizes ranging from 134 to 884,715. Two studies used the US fitnessgram which includes the following tests: PACER (cardiovascular endurance), pull-up and sit-ups (muscular endurance), sit and reach (flexibility) and body mass index. In the Eveland-sayers et al. (2009) study all but the PACER test of the US fitnessgram battery was used, replacing this with a one-mile run. The fourth study (Dwyer, Coonan, Leitch, Hetzel, & Baghurst, 2001) used a battery of tests including standing long jump (muscular endurance), sit and reach (hip flexion), skin fold thicknesses (fatness), lung function, 50 meter sprint (muscular power) and 1.6 kilo meter run (cardio respiratory endurance). Three studies used standardized tests to assess academic performance while one study used a rating of academic ability on a five point scale by an adult school representative (usually the school principal). Two studies (Bastelli, Hillman, Buck, & Erwin, 2007)

Dwyer et al., 2000) reported controlling for socio economic status and parental education.

Consistent moderate positive correlations between physical fitness and academic performance were seen across the studies. The strongest correlations were seen with cardio vascular fitness, with r values ranging from 0.41 when using the PACER to -0.20 using the increasing time run. Associations were also seen between measures of muscular force/ power and flexibility academic scores. Dwyer et al. (2001), PWC 170 that measures physical capacity at the heart rate of 170 beats per minute per kilogram of lean body mass.

In contrast to the field test of cardio vascular fitness, there was no relationship found with academic performance. This raises questions about the possible confounding of motivation, confidence, or cognitive skill factors when operating field test of cardio vascular fitness and academic performance when field tests are used as estimates of fitness, However, this was not confirmed by the only study that used a more precise laboratory-based measure of cardio vascular fitness.

There is a relationship between aerobic fitness, learning, and memory on task that involved remembering names and locations on fictitious map. Fitness and exercise has a significant

influence on hippocampus structure and function. Hippocampus is responsible, in part, for encoding information into memory (Lauren B. Raine and Kramer, 2013). Another Canadian study by Pica (2004) demonstrated children who were active a week had stronger academic performance in Math, English, natural sciences, and French than did children with only two hours of physical activity per week.

Physical activity and time spent in physical education related to academic performance have been assessed in several studies. The following include experimental, quasi-experimental, and longitudinal designs. Overall, researchers found that when students receive daily quality physical education, their rate of learning per unit of time increases. Also, there is a positive relationship with physical fitness and increased academic performance and when time is allocated for quality physical education a negative impact on academic performance does not exist. Finally, when physical education time is reduced, improvement in academic performance is not guaranteed (Smith and Lounsbery, 2009).

2.9 Theoretical framework

Move To Learn

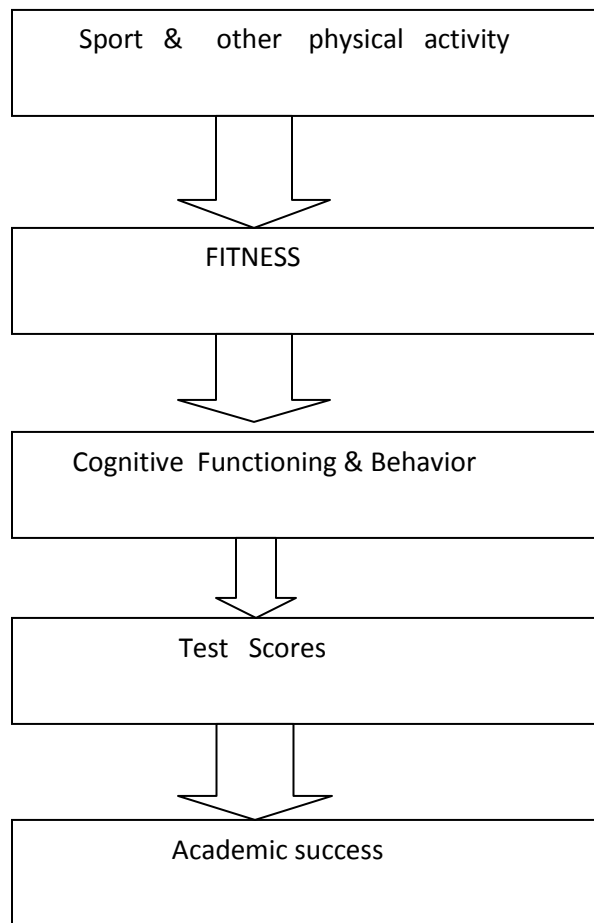


Figure: Move to learn, theoretical path ways linking physical activity, cognitive functioning & academic success. (Martin, 2010).

Based on the literature review it can be found that numerous studies have conducted separately in constructivism, jigsaw and technology also, many studies have considered.

CHAPTER THREE

3. RESEARCH METHOD

3.1 Research design

The main objective of the study was to investigate the effect of physical fitness on student's academic performance. To achieve this objective, a quasi-experimental method of study was utilized. Since it designs allow the researcher to control the assignment to the treatment condition (Dinardo et al.,2005) and quasi-experimental method are also effective because they use the “pre-post testing”(Morgan,G.A.2000). This method was chosen to screen out 40 students. First from file department were found 60 students, those who had scores below 50 GPAs at grade 10 2017/18 and for those 60 students held PF pre-test. Finally had been selected and screen out 40 students specifically, who were scores low PF level during the pre-test and treated them in isolation as one group by intervention.(The GPAs score on grade 10, 2017/18 and 11, 2018 score had been taken as pre-test and post-test score not faces on specific subject.)

3.2 Population of the study

The total population of the study was 300 students (160 male and 140 female) of grade 11 students who have been attending their education at Ftawrari Habtemariam Secondary and Preparatory school. This grade level was selected since the investigator has been engaged in teaching at this level that he had a better understanding of the population.

3.3 Sample and sampling technique

The target population of the study was 300 students (160 male and 140 female) .The investigator used purposive sampling technique to select out academically poor and low physically fit 40(30male and 10 female) students. Concerning the age level of the sample students were ringed from 17-20 ages all most at the same maturity level (all adolescent).This technique was chosen so that it could clearly show the academic performance change made through physical fitness intervention.

Then to evaluate their physical fitness, physical fitness pre-test vs. academic achievement (GPA) were conducted so as to identify the change emerged in physical fitness after the intervention was held, side by side the effect of physical fitness change was compared in terms of the

difference in academic performance comparison was made between grade point average (GPA) of 2017/18 grade 10 (before intervention) and 2018 grade 11 grade point average (GPA) after intervention.

Table- 1 Population and sample

School	Population					Sample			Percent
	Grade	M	F	T	Age	M	F	T	
Fitawrari Habtemariam secondary and preparatory school	11	160	140	300	17-20	30	10	40	13.33

3.4 Data collecting instruments

3.4.1 Document analysis

Over all GPA data were collected via school administrative software. Document analysis was held to select the study samples that scored below 50 % GPA at grade 10 in 2017/18. Similarly, their 2018 (grade 11) grade point average (GPA) was taken and recorded after the intervention. The SPSS (Statistical package for social Science) of version 20 employed to obtain the results. the paired sample t-test correlation test used to measure the association between physical fitness and academic achievement than a significance level of used to test the significance of the results.

As academic performance pre-test the participants previous GPA they scored at grade 10 was taken from the file department to compare it via their grade 11 GPA score after the intervention. The reason that GPA performance is accessed by standardized tests or grade in an educational setting (Strong et al., 2005).

After words, the 2017/18 grade 10 GPA score of the 40 students was compared with their 2018 grade 11 GAP after intervention to see the effect, the change in physical fitness created on their academic performance

3.4.2 Physical fitness test

As it was mentioned in the sample of the study, the 40 students who scored below 50 % at grade 10 who were at grade 11 during the study had been given a physical fitness pre-test and post-test. To examine their cardio-respiratory endurance test of one mile run was held, concerning their muscular strength a pull-up test was conducted. Besides to measure their muscular endurance push-up test was used. More over their flexibility was examined though a sit and reach test.

3.4.2.1 Physical fitness Pre-and-post test

The physical fitness test, twelve minutes run in meter (one mile run), pull-up, ninety degree push-up and sit and reach test were conducted to test cardio respiratory, muscular strength, muscular endurance and flexibility respectively(Graham et al.,2005). Similar to this, the physical fitness a data was collected the one mile run, pull-up, push-up and sit-and-reach has been shown to be valid and reliable field test for the prediction of physical fitness in adolescents (Liu, plowman et al. 1992).

Concerning the physical fitness pre-test, twelve minutes run (one mile run test), pull-up, push-up and sit-and-reach test were conducted, to test cardio respiratory, muscular strength and endurance, and flexibility respectively before the intervention was held. Than the physical fitness pre-test was compared and level with rating scale of each test weather HPZ, GPZ OR LPZ scores (see Table-14-17) than an aggregate physical fitness score were determined than took the sum of a mean average percentile of the four test score as physical fitness pre-test score .

After the physical fitness pre-test held, the participants had been instructed to complete as much as possible that required the intervention. The practical session included as follow: To develop cardio-respirator: practice skipping ropes, step-up, running on the spot, jogging and distance run were practice. To develop muscular strength and endurance were practice push-up, pull-up, sit-up, knee bent and squat trust to develop muscular strength and to increased flexibility were attained through flexibility exercises.(see Teble-18)

After the intervention was taken place, post-test of physical fitness has been conducted with the same cases in the pre-test such as one mile run, pull-up, push-up and sit-and-reach tests to make a comparison made by using rating scale of three physical fitness zone HPZ,GPZ and LPZ (seeTable-14-17) had taken the mean average of the post-test results standardized test score .(Graham et al., 2005).

3.5 Procedures of data collection

The researcher sought permission from the principal of school first. All data was kept confidential anonymous students were not used in the study, but students were given a number. Then to begin with the 40 students' grade point average (GPA) or academic performance of 2017/18 at grade 10 had been taken from the file department. These grade point average (GPA) was documented to be used as a criteria to compare it with these students 'academic performance of 2018 grade 11 GPA' after an intervention was made.

Before the intervention physical fitness test were held on one mile run, pull-up, push-up and sit-and-reach test score collected data. Then the physical fitness intervention was held on cardio - respiratory, muscular strength, muscular endurance and flexibility for 12 weeks. For the intervention a session plan was presage incorporating the physical fitness event, involved the methods used week of implementation and assessment techniques using a field observation checklist help to know the progress and the existing participants' physical fitness performance from week to week was assessed.

Following the physical fitness intervention, post-test was conducted concerning the physical fitness to compare with the physical fitness average mean scores noticed in the pre-test then the effect of the change in physical fitness was compared with the effect it creates in their academic performance before and after the intervention was made. Finally an analysis was made comparing both the changes in physical fitness and academic performance taking mean and mean difference and a correlation coefficient. All analyses were preformed with SPSS version 20.

3.6 Conceptual Framework

Move to physical fitness & learn

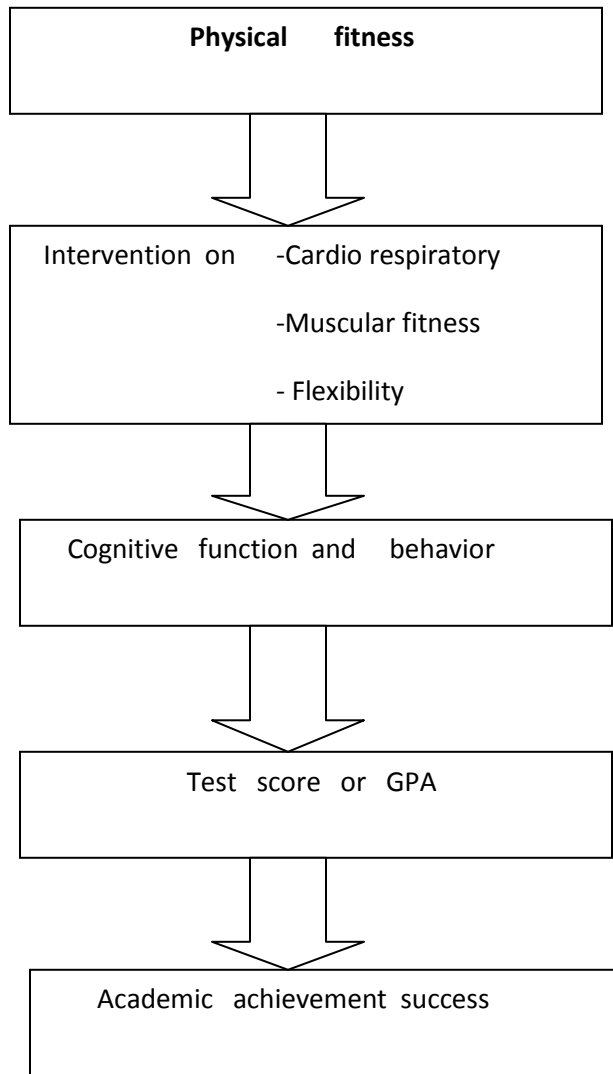


Figure: The students increases in fitness level and increases their academic achievement.

3.6 Method of data analysis

The collected data was analyzed to determine the effect of physical fitness resulted for their academic performance .The row data was found from file department document of academic performance(GPA) of the participant students than the assessments conducted physical fitness test before the intervention(pre-test average mean results). The intervention assessment were used to examine what was going on the actual practice apart from the final pre-and-posttests thus, after the intervention was made with physical fitness post-tests, like cardio-respiratory, muscular strength, muscular endurance and flexibility test.

The collected data were found from pre-and-post-test on both academic performance (GPA) and the physical fitness a mean average were entered in to SPSS, all analyses were performed with SPSS version 20 for MAC OSX (spss inc.chicage,IL, USA)and the quantitative data analyzed to assess the relationship among the collected data based on mean average difference and correlation coefficient of pre-and post-tests of physical fitness test score and the two GPA scores.

CHAPTER FOUR

4. FINDINGS AND DISCUSSION

4.1 Demographic Data

Table-2 Frequency of age

Age	Frequency	Percent
17	8	20
18	16	40
19	10	25
20	6	15
Total	40	100
M	30	75
F	10	25
Total	40	100

In all cases, the numbers indicated represent names of the participant students for ethical issue. The target population of the study was 300 students of grade 11 (160 male and 140 female) at Fitawarari Habtmariam Preparatory school in Bahir Dar. As it is shown in the table-2 below 30(75%) of the participants were male and 10(25 %) of them were female sample students, regarding their age 8 of the participant were at the age of 17, 16 at the age of 18, 10 at the age of 19 and 6 of them 20.

4.2 Data collected before intervention was discussed (pre-test)

Table- 3 Summary of PF pre-test score (aggregate mean average result) in present (%)

N0	Mile run	Pull-up	Push-up	Sit-&-reach	PF-pre-test mean	N0	Mile	Pull-up	Push-up	Sit & reach	PF pre-test mean
1	50	66	88	89	66	21	49	33	29	29	35
2	50	60	62	99	67	22	49	33	29	29	35
3	50	53	56	99	64	23	49	33	25	29	34
4	50	53	55	89	61	24	48	33	25	29	34
5	49	50	55	89	61	25	49	30	25	29	33
6	49	50	55	99	63	26	49	30	25	29	34
7	49	46	48	79	55	27	49	30	22	29	32
8	49	46	44	49	47	28	49	30	22	19	30
9	49	46	44	49	47	29	48	30	22	19	30
10	49	46	44	49	47	30	48	26	18	19	28
11	49	46	37	49	45	31	48	26	18	19	28
12	49	46	37	49	45	32	48	26	43	52	43
13	49	46	37	39	43	33	48	23	18	19	27
14	49	43	37	39	42	34	48	23	18	19	27
15	49	43	37	39	42	35	48	23	14	19	26
16	49	40	33	39	40	36	48	20	37	16	30
17	49	40	50	99	59	37	48	23	37	16	31
18	49	40	50	92	58	38	47	26	31	13	29
19	49	40	43	92	56	39	47	26	14	19	27
20	49	36	29	39	38	40	47	23	31	13	28

The data collected before intervention was discussed as follow, specifically faces on cardio respiratory, muscular strength, muscular endurance and flexibility on tests of 12 minutes run test in meter (one mile run test), pull-up test, push-up test and sit-and-reach test score respectively. The aggregate sum of the four testes score mean average was taken as pre-test PF result. Regarding the academic performance, the mean average of 2017/18 at the grade 10 GPA score was taken as the pre-test score. (table-8)

Data on cardio respiratory endurance before intervention (pre-test) one mile run test, as it is shown in the table-3 below, none (0%) of the study participants were able to reach at high performance zone. Only 4(10%) of them were in good performances zone, and 36(90 %) of the study participants were at low perform. Before intervention only five students of 3(7.5%) male

and 2(5%) female students scored the GPA average 50. However, 35 (87.5%) students were below the average academic performance.

Data on muscular strength of the participants before Intervention (pull-up test) ,as it is shown in the table-3 ,none of the participants reached at a high performances zone, only 1(2.5%)male Student did a pull-up of 20(66.6%) and the remaining 39(97.5%) participants were at a low performances zone.

Data on muscular endurance and academic performance of students before intervention (push-up test), as it is shown in the table-3 , none of the students were able to do a push up above 29(male) and above 17(female) to reach at a high performance zone. 6(15) participants of 4(10%) male and 2(5 %) female were at a good performance zone who could perform 16-26(male) and 11-16(female) ninety degree Push up in one minutes . However, 26(86.6%) male and 8(80%) female participant students were at low performance zone less than 15 and 7 push up for male and female students respectively.

Data on Flexibility before intervention, as the data shown in table-3 ,6 (3 male and 3 female) participants of sit and reach test score reached at a high performance zone of flexibility.5(2 male and 3 female) at good performance zone of flexibility and 29(25 male and 4 female)sample students leveled at a low zone of flexibility using the standard 10.1 and above and 15.1cm and above high zone for male and female students respectively.

As the data shown in table-8 An the mean average of the percentage pre-test grade 10 2017/18 GPA was 45.6759 (table-8) and an aggregate and combined mean average physical fitness pre-test was 41.6500 score.

4.3 Intervention

According to the proposed action, the intervention was held for three months (12 weeks), three times a week, 50 minutes per day. These twelve weeks were distributed equally for the four physical fitness programs of cardio respiratory endurances, muscular strength, muscular endurance and flexibility. Each physical fitness category of exercises program had been incorporated every week that within a week all cardio respiratory endurances, muscular strength and endurances and flexibility types of exercises were held. The intervention for each physical fitness was held using an observation check list according to the nature of the activity as follow.

After the physical fitness pre-test held, the participants had been instructed to complete as much as possible that required the intervention. The practical session included as follow: To develop cardio-respirator, practice skipping ropes, step-up, running on the spot, jogging and distance run were practice. To develop muscular strength and endurance were practice push-up. pull-up, sit-up, knee bent and squat trust to develop muscular strength and to increased flexibility were attained through flexibility exercises (see table-18). From table 9 up to 12. As intervention was held the check list was taken at the fist week and the last 12 week on each test the run to level under high performance zone(HPZ), good performance zone(GPZ)and low performance zone(LPZ)have been rating on each performance see table-14 -17 (Mekonen and Dereje,2005)

An intervention on cardio-respiratory endurance the run to level under high performance zone, good performances zone and low performances zone for male and female students were held. .As it was shown in the check list during the first wek, among the 40participants, 36(90%)of them were at low performance zone, the remaining 4(10%) at good performance zone. However, at the last 12 week, the ranges of performance became 28(70%)of male 24(60%) and female 4(10%) reached at high performances zone, 8(20%) participants of male 6(15 %) and female 2(5%) at good performance zone ,However the remaining 4(10%) male 1(2.5%) and female 3(7.5%) of the study participants were at low performance zone.

Intervention on muscular strength, During the muscular strength physical fitness an observation check list was used to follow up their performance zone each weeks.(see table-10)Observation checklist for muscular strength by pull-up event. Among 12the week intervention ,when we see the data of one and twelve, in the first week one of the students were ranged at high performances zone but 4(10%) of male students leveled at good performance zone and the reaming 36(80%) at 26(65 %) male and 10(25%) female low, however at the 12 week, similarly ,no students were able to reached at high performance zone , 25(62.5 %) male 19(47.5)and female 6(15 %) students leveled under good performance zone. The remaining15 male 11(27.5%)and 4(10%)were leveled at low performance zone .

Intervention on muscular endurance , the intervention was held using an observation check list to face the change to come about during the 12 weeks of push up practice. The observation check list was settled considering the performance zone of male and female students. Table-11 Observation checklist for muscular endurance in push up event performance during Intervention

Among the twelve week intervention, when we see the data of week one and twelve ,in the first week, none of the students were ranged at high performance zone but 6(15%)of 4(10%)Male and 2 (5%) female were at good performance zone and the reaming 34(85%)of 26(65%) male and 8(20%) female. At the 12 week although no students were able to reached at a high performance zone, 38(95%) of male 28(70%) and 10 (25%).whereas, 100% in their female students leveled under good performance .The reaming 2(5 %) male students Leveled at low zone.

Intervention on flexibility, The flexibility was held for 12 weeks once a week for 50 minutes. Each week, an observation check list was used to register the practical changes in sit and reach performance.

From the data in table-12 about the all 12 week of intervention observation has shown that during the first check(15%)of 3(7.5%)male and 3 (7.5%) female were at high performance zone, 5(12%) of 2(5%)male and 3(7.5 %) were at good performanceZone.29(72.5) of 25(62.5%)male and 4(10%) female were at low performance. However, the data at the 12 week shows that 38(95%) of 28(70%) male and female 10(25%)reached at high performance zone. The remaining 2(5%) reached at good performance zone. None of the participants ranged at low performance zone.

4.4 Pre-test Vs. post-test results

As it has been describes in table-3 the 2017/18 grade 10 GPA (45.6750) of the sample 40 students were taken as pre-test academic performance.. The pre-test academic performance to be compared with the 2018 grade 11 GPA of the study participants after the physical fitness intervention. After physical fitness intervention had been made for three months, the study participants academic performance (51.4500GPA) results were put. Also includes the student's physical fitness performance before and after intervention as was described in for the pre-test result.

4.4.1 Pre-test (GPA) vs. Post-test (GPA) and PF pre-test VS. PF post-test score

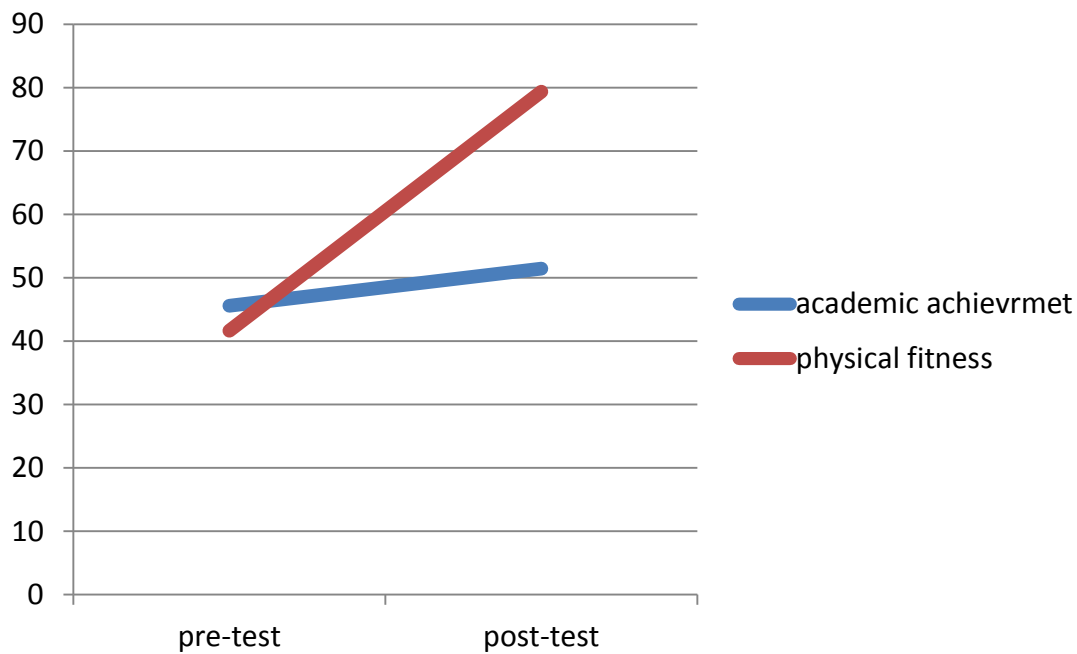
As the data shows (see table-below), the mean average of the pre-test grade 10 2017/18 GPA was 45.6750.And after the intervention had been made the mean average of the post-test their grade 11 GPA became 51.4500.The difference between the two mean averages of GPA was

5.775. Concerning the mean average of the physical fitness test score, an aggregate physical fitness the pre-test result was 41.6500 and an aggregate post-test a mean average after intervention it became 79.3750. The difference between the two mean average score became 37.72500.

Physical fitness pre-test and post-test in percent and 2017/18 grade 10 and 2018 grade 11 GPA scores

2017/18 grade 10 GPA Score as a pre-test	2018 grade 11 GPA score as a post-test	PF pre-test an aggregate sum of mean	PF post-test an an aggregate sum of mean
45.5750	51.480	41.650	79.3950

Graphs -1 Ranges of score in the pre-and-post mean averages of GPAs and physical fitness



As the graph shows, grade 10 2017/18 GPA mean average was 45.6750 and grade 11 2018 GPA ranged 51.4500. Concerning the PF the aggregate mean average of pre-test result was 41.65 and post-test the aggregate mean had 79.375.

4.5. Data Analysis

The main objective of this study was to investigate the effect of physical fitness on academic achievement (GPA) of the students at Fitawarari Habtemaram preparatory school.

First, the students 2017/18 grade 10 GPA was taken as pre-test similarly, the combination mean average of one mile run(in 12 minutes) , pull-up, push-up and set and reach test results were taken as a physical fitness pre-test. Then an intervention of physical fitness programs of exercises that developed such as cardio respiratory, muscular strength, muscular endurances and flexibility practical sessions were given for twelve weeks three times a week and once a week for each physical fitness events. And finally the 2018 grade 11 second semester participants GPA and the percentile mean average of physical fitness test score on the four strategies have been taken as posttest.

To analyze the data taken pre-test and post-test before and after intervention and a comparison was made between pre- and- post academic achievement (GPA).Concerning the PF an aggregate physical fitness a mean average percentile score were determined, by took the sum of pre and posttest mean score on each event.

The SPSS (Statistical package for social sciences) of version 20 employed to obtain the results similarly, the pearson correlation test used to measure association between physical fitness and academic achievement (GPA). A significance level of 0.05 used to test the significance of the result.

Table-4 Participants paired sample test statistics
T-test paired sample statistics

	Mean	N	Std. Deviation	Std. Error mean
Pair 1 aa	45.6750	40	3.45956	.54701
aa 2	51.4500	40	1.50128	.23737
Pair 2 PP	41.6500	40	13.00601	2.05643
PP 2	79.3750	40	9.61219	1.51982

KEY aa= academic achievement(GPA) grade 10

aa2= academic achievement (GPA) grade 11

pp= physical fitness pre-test score

pp2= physical fitness post-test

Table-4 Shows that the participant paired sample test statistics (T-test paired sample statistics) on academic achievement (GPA) of the pre-test and post-test mean comparison in academic achievement bases mean aa =45.6750 and mean aa2 =51.4500 respectively. Concerning the physical fitness the mean shows that the participant students sample test statistic of pre-test and post-test mean comparison in physical fitness bases. 41.6500 and 79.3750 respectively. The results of the post-tests was greater than the pre-test score.

Table-5 The participants pair samples correlations

	N	Correlation	Sig.
Pair 1 aa & aa 2	40	.774	.000
Pair 2 PP & PP2	40	.845	.000

Table-5 Shows that the participants samples correlations and significances in mean average of the physical fitness and academic achievement(GPA) of the pre-test and post-test in bases. Concerning the academic achievement the correlation coefficient became 0.774 correlation coefficient which was greater than 0.05. Between the physical fitness the pre-test and post-test became 0.845 which was greater than 0.05.

The correlation coefficient between aa and aa2 were became 0.774. It was interpret as high relationship between the two GPA score.

The correlation coefficient between pp and pp2 were became 0.845. It was interpret as very high relationship between the two physical fitness.

Table-6 Pre-and post-test mean difference and significant of participant students
Paired samples test

Paired differences						t	Df	Sig. (2-tailed)
	Mean difference	Std. deviation	Std. Error mean	95% confidence interval of the difference				
				Lower	Upper			
Pair1aaaa2	5.77500	2.48573	.39303	-6.56997	-4.9800	-14.69	39	.000
Pair 2pp-	37.7250	7.08913	1.12089	-39.9922	-35.457	-33.65	39	.000

Table-6 Show that the participant the mean difference between the two means of academic achievement (GPA)-5.77500. The results was indicts the mean of post-tests in academic achievement (GPA) was greater than the pre-test scores. Concerning the physical fitness the mean difference between pre-test and post-test mean became -37.72500. The result was indicts the mean of post-test in physical fitness was greater than pre-test.(see table-4).

To see whether there was significant relationship between physical fitness and academic achievement (GPA) score result before and after the sample t-test was ran. The mean difference was significant because $p < 0.05$ ($0.000 < P < 0.05$) and similarly there was significant because $P < 0.05$ ($0.000 < P < 0.05$) in both.

As table- 6, Indicates that ,there was a significance difference between the pre-test and post-test result of participants. The result showed that there was a significant relationship between physical fitness and academic achievement (GPA) therefore, the null hypothesis (H0) which said “there is no significant effect between the physical fitness and academic achievement (GPA) of the students has been rejected. Whereas, the alternative hypothesis which was ‘there is significant effect between physical fitness and academic achievement’ has been accepted.

Based on the table-5 above the correlation coefficient between the pre-test (GPA) of 2017/18 grade 10 and post-test (GPA) of grade 11 was 0.774. It was greater than 0.05. Concerning the physical fitness the participants score in posttest after intervention have 0.845 which was greater than 0.05.The participants score in posttest after intervention have high physical fitness level

than before intervention pre-test. Physical fitness was positively associated with the results on academic achievement.

4.6 Discussion

This study analyzed same empirical data to outline whether physical fitness level had any effect on Fitawarari Habtemariam preparatory School at Bahir Dar grades' 11 students academic achievement.

The discussion has been made in a certain procedure. First the physical fitness changes made through an intervention of cardio-respiratory endurance, muscular strength, muscular endurance and flexibility had been described. Then the change which has been made in academic performance has been discussed after the physical fitness intervention.

Farther more, Cotman and Berchtold (2002) the hippocampus is part of the brain limbic system, It is situated in the medial temporal lobe. A number of genes in hippocampus are regulated through exercise. More over physical exercise improves cognitive function by increasing levels of neurotransmitter and neurotrophins which is responsible for relating mood, short and long term learning success (Jensen,1998). Thus, those physical fitness were intervened for twelve weeks:

For Plowman and Smith(2014)cardio-respiratory fitness(event) increases cardiac dimension .It is associated with a low resting heart rate, which is an indication of a healthy heart. It was also mentioned that in one mile jogging test highly trained personal are not require.

There for, an intervention was made on cardio-respiratory endurance. To notice its effect a pre-test of one mile run was conducted and the mean average of the study sample was 49.17,where was rated as low performance zone, After intervention of one mile running for12 weeks, The mean average became 97.75which was greater than the post -test scores. This test was chosen since field test like one mile run are preferred methods of measured cardio-respiratory endurance (Heymaard.,2006,Plowmay and smiz.,2014).It's relationship with academic performance has been justified in together with other physical fitness.

Muscular strength refers to the force or tension that muscles or a muscle group is able to exert in one contraction a gains a resistance(Fox et al.,1993,Hyward.,2005,Reachie and Eavle 2008,plowman and smith,2014)one mechanism of testing muscular strength is push-up (Dlayer et al.,2001 ,Dutoil ,et a.t, 2011).

For this reason, a push-up pre-test was given for the study samples and their mean average was 37.37, which rated at low performance zone. However, after intervention of push-up for twelve weeks, they scored a mean average of 60.42 which was 23.05 greater than the pre-test. This result was added to the total physical fitness preface to identify its effect on academic performance in

Muscular endurance is improved through physical activity (strong et al. 2005; Mujovic and Cubriko, 2012)

To measure muscular endurance, push-ups or chain-ups can be used (Baechle and Earne, 2008).

Hence push-up test was implemented to identify the muscular endurance changes between before and after intervention. As shown in the data collection part, before intervention, the mean average of pre-test was rated as low performance zone (35.75). After intervention, the post-test result became 69.79 which was 34.04 greater than the pre-test.

Flexibility is important for muscular performance (Fox et al., 1993) and it refers to the range of movement of a group joint (Heyward, 2006; Macauley, 2007; Baechle and Earle, 2008). Flexibility can be improved through physical activity. (Mujovic and Cubriko, 2012)

The most popular field test used to measure flexibility is sit-and-reach test Plowman and Smith, (2014). Hence, sit-and-reach test was used to measure flexibility before and after intervention.

During the pre-test, the mean average of the sit-and-reach test rated at low performance zone of 46.33 score. However, after intervention, their sit-and-reach test score rated high performance zone of 89.8 which was 43.5 greater than the pre-test. This shows that the sample students' flexibility was changed from low to high performance zone after a twelve week of flexibility intervention practice.

4.7. Discussion on the relationship between physical fitness and academic Performance

This study analyzed some empirical data to outline whether had an effect the physical fitness on grade 11 students' academic achievement at Fitawarari Habtmariam preparatory school. The

study utilized design that compared the difference between pre-post-test average mean result of physical fitness and grade 10 and 11 students GPA score before and after intervention.

Regarding academic performance (GPA), the mean average of the sample students GPA during the pre-test was 45.67500 and after the intervention was made it became 51.4500. The correlation coefficient between the two tests was 0.774 which was greater than 0.05.

After the twelve weeks practice of cardio-respiratory endurance, muscular strength, muscular endurance and flexibility, the participants physical fitness test result of one mile run in 12 minutes, pull-up, push-up and sit and reach test together enhanced from 41.65(pre-test) to 79.3750(post-test) .The correlation coefficient was 0.845 which was greater than 0.005.This shows that as the participants physical fitness increase their academic performance also improved. In the long run of the study, through an intervention of physical fitness activity for twelve weeks, a significant positive relationship was found between physical fitness and academic performance.

CHAPTER FIVE

5. SUMMARY, CONCLUSION, AND RECOMMENDATION

5.1 SUMMARY

The main aim of the study was to investigate the effect of physical fitness on students academic achievement, thus a twelve weeks intervention was conducted especial on physical excurses or activities which are advocated by scholars' that develop physical fitness and cognitive skill and there by academic performance .

Using a quasi-experimental method 40 students has been taken as a sample of the study to make the intervention of physical fitness such as cardio respiratory endurance, muscular strength, muscular endurance and flexibility. As Dinardo(2005) painted quasi-experimental research shares similarities with the traditional experimental design method although the intervention took place without random assignment (purpose sampling technical was used). Thus, the investigator hypothesized that "there is no significant relationship between the physical fitness and academic achievement (GPA) of the students'

One day a week was allocated to practice an exercise on each of the four physical fitness events. In other words, there have been twelve session for each of them. Before intervention the mean average of the sample students GPA was 45.6750 after the intervention the academic performance has enhanced in to 51.4500, the correlation coefficient of the two mean GPA became 0.774likewise, the mean average of physical fitness after intervention enhanced from 41.6500 to 79.370.The correlation coefficient of the two mean became 0.845 which was greater than 0.00500 as described in the analysis part.

From the series of data collected before and after intervention. The following summary has been find based on the hypothesis formulated.

- ❖ There is a direct relationship between physical fitness and students' academic performance.
- ❖ Cardio-respiratory endurance has a direct contribution in improving the student's academic performance.
- ❖ There is a direct relationship between muscular strength and academic performance.
- ❖ There is a direct relationship between muscular endurance and academic performance.

- ❖ There is a direct relationship between flexibility and academic performance.

5.2 Conclusion

The study attempted to study on” the effects of physical fitness on academic performance of grade 11 students in Bahir-dar Town at Fitwarari Habtmariam preparatory school, the following conclusions were made based on the major findings of the study. The collected data showed that there was a significant relationship between PF and academic achievement therefore, the null hypothesis (Ho) which said “there is no significant effect between the PF and academic achievement of the students has been rejected. Whereas, the alternative hypothesis which was there is significant effect (relationship) between PF and academic achievement has accepted.

Based on the finding of the study it was concluded that –

-Cardio-respiratory endurance, muscular strength, muscular endurance and flexibility types of exercises regularly practices develop the students physical fitness and their by their academic achievement.

Hence:

-Physical fitness had a positive effect on academic performance.

-There are several possible mechanisms by which physical fitness and regular physical activity could improve academic achievement, including physical exercise improves cognitive function by increasing levels of short and long term learning success. Physical activity could improve academic performance, .

-Those actions that allow the regular practice (curricular and extracurricular) of physical exercise (especially healthy related physical fitness) in the school environment are recommended, as this practice will improve physical fitness and can contribute to improve the academic performance of students

From all points mentioned above, the researcher concluded that higher level of physical fitness has been associated with academic performances of students, since brain functions, such as, attention and memory these brain function are foundation for learning both motor and cognitive skills.

5.3 Recommendation

1-Curriculum experts need to consider the impact of physical fitness during curriculum, syllables and text book preparation.

2-Physical education teachers should engage their students in different additional physical fitness programs to enhance both the students' physical fitness and academic performance side by side.

3-The school principal should consider when to allocate physical education period during programming. As literature proves, students better perform with energy and interest after a certain physical fitness activity.

4-For decades, PE was given in schools for its benefit for health, physical fitness and related purposes, However, current findings including this study proved that it has the significance more than that .Physical education should be considered as an important driving force for learning. Thus, during preparation of school curriculums, syllables and text books, attention must be given for the discipline to enhance the students learning in different subjects through physical education. Moreover, during teachers training, trainees of all departments need to be aware of the association between physical fitness and academic performance be sides; different approaches should be developed to maximize the students learning by taking physical education as one component of teaching start.

5-Further studies should be made in different grade levels concerning the relationship between physical fitness and academic performance.

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Appendix – A

1-Demographic data

Table- 7 Demographic data of participant

Ethical issue -In all cases, the numbers from 1 up 40 indicated represent of the participant student for ethical issue.

Number	Sex	Age		Number	Sex	Age
1	M	18		21	M	18
2	F	17		22	M	18
3	F	18		23	M	18
4	M	17		24	M	17
5	M	19		25	M	19
6	M	20		26	M	19
7	M	17		27	M	17
8	M	18		28	M	20
9	M	19		29	M	18
10	M	20		30	M	18
11	M	18		31	M	18
12	M	20		32	M	19
13	M	17		33	F	20
14	M	18		34	M	19
15	M	18		35	M	20
16	M	19		36	F	18
17	F	18		37	F	19
18	F	17		38	F	18
19	F	19		39	M	19
20	M	18		40	F	17

Table-8 Summary of PF pre-test and 2017/18 grade 10 GPA scores as pre-tests

Subject number	Sex	Age	One mile run in 12 minutes score	Pull up test score	Ninety degree push up test in one minutes	Set and reach test score	2017/18 grade 10 GPA SCORE	Mean average of PF pre-test
1	M	18	50	66.66	58.62	89.10	50.5	66
2	F	17	50	60	62.5	99.33	50.5	67
3	F	18	50	53.3	56.25	99.33	50	64
4	M	17	50	53.3	55.17	89.10	50	61
5	M	19	49.82	50	55.17	89.10	50	61
6	M	20	49.82	50	55.17	99	49.50	63
7	M	17	49.65	46.6	48.14	79.20	49	55
8	M	18	49.65	46.6	44.44	49.50	49	47
9	M	19	49.65	46.6	44.44	49.50	49	47
10	M	20	49.47	46.6	44.44	49.50	49	47
11	M	18	49.47	46.6	37.03	49.50	48.5	45
12	M	20	49.30	46.6	37.03	49.50	48.5	45
13	M	17	49.30	46.6	37.03	39.60	48	43
14	M	18	49.30	43.33	37.03	39.60	47.5	42
15	M	18	49.30	43.33	37.03	39.60	47.5	42
16	M	19	49.30	40	33.33	39.60	46.5	40
17	F	18	49.78	40	50	99.33	46	59
18	F	17	49.56	40	50	92.71	46	58
19	F	19	49.13	40	43.7	92.71	46	56
20	M	18	49.30	36.66	29.62	39.60	46	38
21	M	18	49.30	33.33	29.62	29.7	46	35
22	M	18	49.13	33.33	29.62	29.7	46	35
23	M	18	49.13	33.3	25.92	29.7	45	34

24	M	17	48.95	33.3	25.92	29.7	45	34
25	M	19	49.95	30	25.92	29.7	45	33
26	M	19	49.95	30	25.92	29.7	45	33
27	M	17	49.95	30	22.22	29.7	44	32
28	M	20	49.95	30	22.22	19.80	44	30
29	M	18	48.78	30	22.22	19.80	44	30
30	M	18	48.61	26.66	18.51	19.80	43	28
31	M	18	48.61	26.66	18.51	19.80	42	28
32	F	19	48.70	26.66	43.75	52.98	42	43
33	M	20	48.43	23.33	18.51	19.80	41	27
34	M	19	48.26	23.33	18.51	19.80	41	27
35	M	20	48.26	23.33	14.81	19.80	41	26
36	F	18	48.70	20	37.50	16.55	40.5	30
37	F	19	48.27	23.33	37.50	16.55	40.5	31
38	F	18	47.84	26.66	31.25	13.24	40.5	29
39	M	19	47.91	26.66	14.81	19.80	40	27
40	M	17	47.41	23.33	31.25	13.24	39	28

Aggregate mean average PF pre-test result 41.6500

Aggregate mean average of 2017/18 grade 10 GPA 45.6750

TABLE- 9 Observation checklist for one mile run in 12 minutes during intervention

week	Day	HPZ			GPZ			LPZ		
		M	F	T	M	F	T	M	F	T
1	Mar12-18/2018	-	-	-	2	2	4	28	8	36
2	19 – 25	-	1	1	5	2	7	24	8	32
3	26-Apr1	6	-	6	6	4	10	18	6	24
4	Apr2 – 8	6	2	8	6	4	10	18	4	22
5	9-15	7	2	9	10	2	12	13	6	19
6	16 -22	10	2	12	8	4	12	12	4	16
7	23 – 29	12	2	14	12	6	18	6	5	11
8	30-May1-6	12	3	15	13	5	18	5	2	7
9	7 -13	12	3	15	13	5	18	5	2	7
10	14 – 20	16	4	20	10	4	14	4	2	6
11	21 – 27	22	2	24	5	6	11	3	2	8
12	28-Jun3	24	4	28	5	3	8	1	3	4

Table-10 Observation checklist for muscular strength by pull-up during intervention

Week	Day	HPZ			GPZ			LPZ		
		M	F	T	M	F	T	M	F	T
1		-	-	-	1	-	1	29	10	39
2		-	-	-	4	-	4	26	10	36
3		-	-	-	8	2	10	22	8	30
4		-	-	-	8	2	10	22	8	-30
5		-	-	-	14	13	27	6	7	13
6		-	-	-	17	2	19	16	7	21
7		-	-	-	26	4	30	4	6	10
8		-	-	-	27	3	30	3	7	10
9		-	-	-	25	4	29	5	6	11
10		-	-	-	19	5	24	11	5	16
11		-	-	-	19	5	24	11	5	16
12		-	-	-	19	6	25	11	4	15

Table-11 Observation check list for muscular endurance in push up performance during Intervention

Week	Day	HPZ			GPZ			LPZ		
		M	F	T	M	F	T	M	F	T
1		-	-	-	4	2	6	26	8	34
2		-	-	-	6	6	12	24	4	28
3		-	-	-	6	6	12	24	4	28
4		-	-	-	7	8	15	23	2	25
5		-	-	-	8	9	17	22	1	23
6		-	-	-	11	9	20	19	1	20
7		-	-	-	26	9	25	14	1	15
8		-	-	-	17	10	27	13	-	13
9		-	-	-	21	10	31	9	-	9
10		-	-	-	26	10	36	4	-	4
11		-	-	-	27	1	28	2	10	12
12		-	-	-	30	10	40	-	-	-

TABLE-12 Observation checklist for flexibility in sit and reach performance during intervention

Week	Day	HPZ			GPZ			LPZ		
		M	F	T	M	F	T	M	F	T
1		3	3	6	2	3	5	25	4	29
2		7	2	9	6	2	8	17	6	23
3		10	2	12	10	4	14	10	4	14
4		11	3	14	11	5	16	8	2	10
5		12	3	15	15	4	19	3	3	6
6		11	4	15	16	4	20	3	2	5
7		13	5	18	12	5	17	5	0	5
8		22	4	26	4	5	9	4	1	5
9		23	6	29	3	4	7	4	-	4
10		25	7	32	3	3	6	2	-	2
11		26	10	36	4	-	4	-	-	-
12		26	10	36	4	-	4	-	-	-

Table-13 Post-test 2018 grade 11 academic performance (GPA) and physical fitness after intervention (post-test)

Subjects code number	GPA	Cardio-respiratory	Muscular strength	Muscular Endurances	Flexibility	PF average in percent
1	55	100	80	81	100	90
2	54	100	73	87	100	90
3	54	100	70	87	100	89
4	54	100	80	81	100	90
5	53	100	80	81	100	90
6	53	100	80	81	100	90
7	53	100	80	81	100	90
8	53	100	76	81	100	89
9	53	100	76	81	100	89
10	53	100	76	74	99	87
11	52	100	76	74	99	87
12	52	100	73	77	99	87
13	52	100	73	74	99	86
14	52	100	73	74	99	86
15	52	100	70	74	99	85
16	51	100	70	74	99	85
17	51	100	70	81	100	87
18	51	100	66	75	100	85
19	51	100	70	68	100	84
20	52	100	70	70	89	82
21	50	100	66	70	89	81
22	50	100	66	70	89	81
23	50	100	66	70	89	81
24	50	100	66	70	89	81
25	51	100	60	66	79	76

26	51	100	60	66	79	76
27	50	100	53	66	79	74
28	51	100	53	66	79	74
29	52	100	50	62	69	70
30	51	100	50	62	69	70
31	51	100	40	62	69	67
32	50	99.1	40	62	99	75
33	50	85.41	50	59	59	63
34	52	83.33	46	59	59	62
35	51	81.59	40	59	59	60
36	50	99	36	56	99	72
37	49	94.82	33	50	99	69
38	50	94.82	30	50	99	68
39	49	81.59	40	59	59	60
40	49	90.51	30	50	99	67

Aggregate mean average PF post-test result 79.3950

Aggregate mean average of 2018 grade 11 GPA 51.450

Table-14 Summary table of Physical fitness pre-test and post-test in percent and 2017/18 grade 10 and 2018 grade 11 GPA scores

	2017/18 grade 10 GPA	2018 grade11 GPA	Physical fitness pre-test in percent	Physical fitness post-test in percent
1	50	55	66	90
2	50	54	67	90
3	50	54	64	89
4	50	54	61	90
5	50	53	61	90
6	49	53	63	90
7	49	53	55	90
8	49	53	47	89
9	49	53	47	89
10	49	53	47	87
11	48	52	45	87
12	48	52	45	87
13	48	52	43	86
14	47	52	42	86
15	47	52	42	85
16	47	51	40	85
17	47	51	59	87
18	47	51	58	85
19	47	51	56	84
20	47	52	38	82
21	47	50	35	81
22	47	50	35	81
23	45	50	34	81
24	45	50	34	81
25	45	51	33	76

26	45	51	33	76
27	44	50	32	74
28	44	51	30	74
29	44	52	30	70
30	43	51	28	70
31	42	51	28	67
32	42	50	43	75
33	41	50	27	63
34	41	52	27	62
35	41	51	26	60
36	40.5	50	30	72
37	40.5	49	31	69
38	40.5	50	29	68
39	40	49	27	60
40	39	49	28	67
Total av.	45.575	51.45	41.65	79.375

APPENDIX-B

Evolutions personal physical fitness

Indicators of physical fitness performance zone.

(Evaluation of personal fitness) based on grade 12 text book (Mekonen & Deraji., 2005) have be classified as follow-

1-High performance zone is a good indicator of adequate physical fitness, it is not necessary to reach this level to experience good health benefits.

2- Good fitness zone is an indicator of having enough specific fitness component, help to reduce the risk of specific hypo kinetic condition, assuming that you maintain an active life style.

3- Low fitness zone it indicate that you probably less

Evaluating cardio respiratory

Rating scale of one mile run in twelve minutes evaluating cardio respiratory

Table-14 Rating scale of one mile run in twelve minutes(one mile run)

Classifications	Male	Female
High performance zone	Greater than 2880 m in time 240m/min	Greater than 2320 m in time 2320m in time 193m/min
Good performance zone	2480m- 2319m in time 206.6m/min	2000m- 2319m in time 166.6- 193.3 m/min
Low performance zone	Less than 2150m in time 179m/min	Less than 1040m in time 86.6m/min

Evaluation muscular strength

Table-15 Rating scale of pull-up test

Classifications	Male	Female
High performance zone	Greater than 30	Greater than 28
Good performance zone	19-29	17-27
Low performance zone	Less than 19	Less than 17

Evaluating muscular endurance

Table-16 Rating scale for ninety degree push-up in 60 second test

Classification	Male	Female
High performance zone	Greater than 27	Greater than 16
Good performance zone	15-26	7-15
Low performance zone	Less than 15	Less than 7

Evaluating flexibility

Table-17 Rating scale of sit and reach test

Classification	Male	Female
High performance zone	Greater than 10.1cm	15.1cm
Good performance zone	5-10cm	2.5-14.9cm
Low performance zone	Less than 5cm	Less than 2.5cm

APPENDIX-C

Table-18 Session plan for the twelve weeks intervention

week	Objectives At the end of the lessons the students will be able to:	Physical fitness programs (exercises)	Method	Evaluation
1 2 3	-Enhance their performance of twelve minutes run with minimum requirement. -Improve their pull-up performance with minimum requirement. -Improve their push-up performance with minimum requirement. -Improve their set and reach with minimum requirement.	-cardio-respiratory -Muscular strength -Muscular endurance -Flexibility	Teacher centered approach	Wholistic assessment
4 5 6	-Enhance their performance of twelve minutes run with medium requirements. -Improve their pull-up performance with medium requirements. -Improve their push-up performance with medium requirements. -Improve their sit and reach performance with medium requirement.	-Cardio-respiratory -Muscular strength -Muscular endurance -Flexibility	Mixed approach Student-teacher approach	-Group assessment with teacher intervention
7 8 9	-Enhance their performance of twelve minutes run with sufficient requirements. -Improve their pull-up performance with sufficient requirements. -Improve their push-up performance with sufficient requirements. -Improve their sit-and-reach performance with sufficient requirements	-Cardio-respiratory -Muscular strength -Muscular endurance -Flexibility	Group practice -Pair practice	-Group assessment with teacher
10	-Enhance their performance of twelve minutes run with maximum requirement.	-Cardio-respiratory endurance	-Autonomous (self)learning	Selfassessment

11	-Improve their pull-up performance with maximum requirements.	-Muscular strength		
12	-Improve their push-up performance with maximum requirements. -Improve their sit-and-reach performance with maximum requirements.	-Muscular endurance -Flexibility		

Table-19 Session plan for week intervention (different amounts of physical activity and exercises program for week)

Intensity- Moderate exercises program

Types of PF	Exercises	Frequency	Duration	Set	Repetition	Remark
Cardio-reparatory	Walking Jogging basketball	One day	50 minutes	-	-	
Muscular strength & endurance	Pull-up Abdominal curls, Benchpress, Bicep curls, Set-up,	One day	50 minutes	3 for each activity	5	
Flexibility	Set-and-reach Calf-stretch Side-lunge Step stretch Hurdle-stretch With other endurance and strength exercises	One day	50 minutes	2 for each	2	

APPENDEX -D

Study participant photo

Figure-3 Taken study participant photo



Figure:4 Measurement taken for the twelve minutes run test



Figure:5 Measurement taken for the pull-up test



Figure: 6 Measurement taken for the ninety degree push-up



Figure: 7 Measurement taken for the sit and reach test



