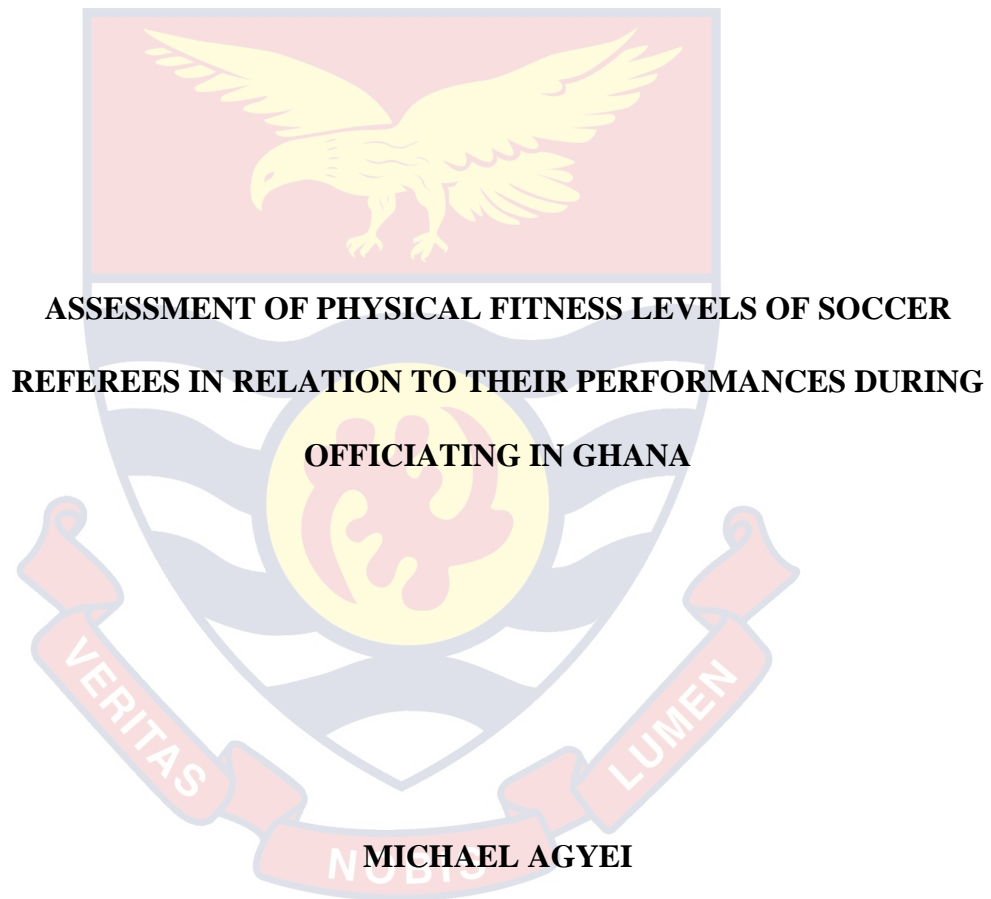


UNIVERSITY OF CAPE COAST



**ASSESSMENT OF PHYSICAL FITNESS LEVELS OF SOCCER
REFEREES IN RELATION TO THEIR PERFORMANCES DURING
OFFICIATING IN GHANA**

MICHAEL AGYEI

2010

UNIVERSITY OF CAPE COAST

ASSESSMENT OF PHYSICAL FITNESS LEVELS OF SOCCER REFEREES
IN RELATION TO THEIR PERFORMANCES DURING OFFICIATING IN
GHANA

BY

MICHAEL AGYEI

Thesis submitted to the Department of Health, Physical Education and Recreation
of the Faculty of Education, University of Cape Coast, in partial fulfillment of the
requirements for award of Master of Philosophy Degree in Physical Education

JUNE 2010

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this University or elsewhere.

Candidate's Signature: Date:

Name: Michael Agyei

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature: Date:

Name: Dr. Benhard L. Boateng

Co-Supervisor's Signature: Date:

Name: Dr. Silvanus L. Lamptey

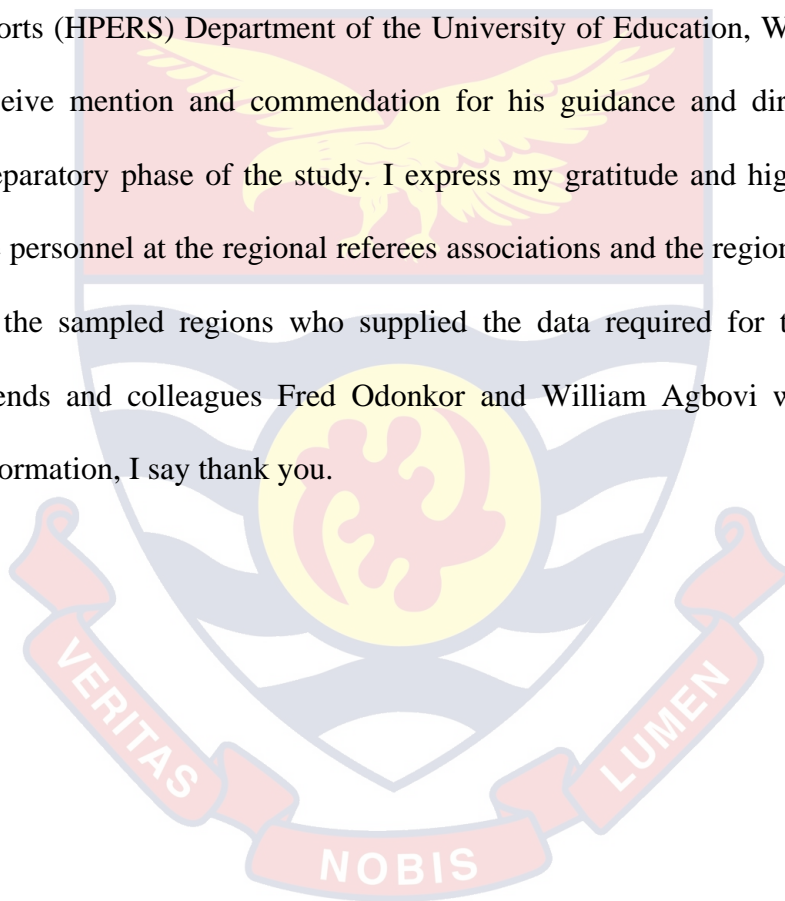
ABSTRACT

The study investigated the physical fitness levels of soccer referees in relation to the performances they exhibit during officiating in Ghana. The cross-sectional survey design was employed to shape the study. The stratified and proportionate multistage sampling techniques were used to select a sample of 65 from the three belts of the country. The physical fitness test results of referees accredited by the RAG were compared with the referees' officiating performance reports. Data covering the period 2003 to 2005 were utilised. The referees assessed in this study had a mean age of 31.8 (SD, 6.6 years), physical fitness test result of 2875.4 (SD, 178.8 metres), fitness in match of 1.5 (SD, 0.13 marks) out of 2, and officiating performance of 7.5 (SD, 0.62 marks) out of 10.

The data collected were analysed using the SPSS Windows 13.0 of means, standard deviations and percentages. The inferential statistics of Linear Regression and Chi-square were used to test the hypotheses at the .05 alpha level of significance. The results of the study indicated that soccer referees who exhibit significant physical fitness assessment levels perform better when officiating in Ghana, irrespective of their fitness level, age, and the part of the country they come from. Based on this, the RAG is admonished to continue to use the YYIRT to assess referees fitness. This should be organised every quarter at the district and regional levels. Also referees are to select physical conditioning regimens and choose appropriate modes of developing their endurance and fitness. Thirdly the RAG is admonished to review the age limit for referees in line with FIFA's.

ACKNOWLEDGEMENTS

I acknowledge the great and immense contribution of my principal supervisor, Dr. B. L. Boateng whose corrections, insistence and direction has made this project see the light of day. I am also grateful to Dr. S. L. Lamptey who co-supervised the work and whose invaluable inspiration urged me on. Dr. A. A. Akuffo; Lecturer and Acting Head of Health, Physical Education, Recreation and Sports (HPERS) Department of the University of Education, Winneba, must also receive mention and commendation for his guidance and direction during the preparatory phase of the study. I express my gratitude and high indebtedness to the personnel at the regional referees associations and the regional sports councils of the sampled regions who supplied the data required for the study. To my friends and colleagues Fred Odonkor and William Agbovi who offered some information, I say thank you.



DEDICATION

To my two daughters Wendy Nana Yaa Agyeiwaa and Yvette Frimpomaa Agyei who are my source of happiness.



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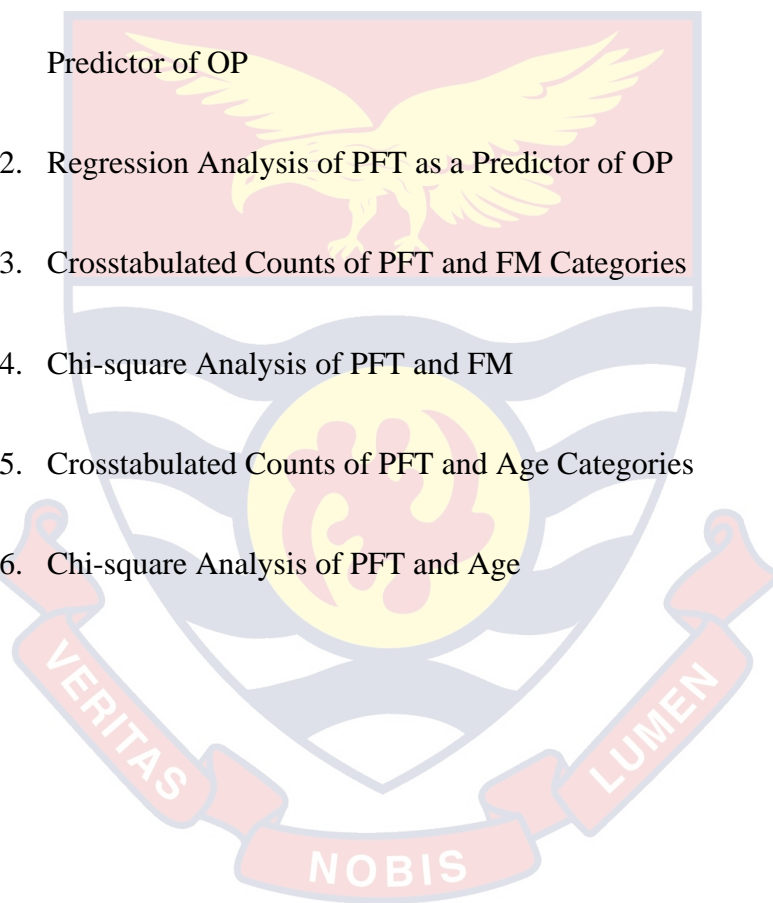
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CHAPTER ONE

INTRODUCTION

Background to the Study

Refereeing a game of soccer has become a herculean task that only strong personalities can hope to cope with the enormous pressure that comes with being a referee. Referees are usually charged with the interpretation of the laws of the game in a fair and firm manner, and to regulate the play behaviour of soccer participants. They watch the play for every second and bring the knowledge of the laws of the game to bear on the pattern of play of the teams. Recent studies have demonstrated that refereeing is an exercise model mainly related to the aerobic pathway (Da Silva & Rodrigue-Anez, 2001; D'Ottavio & Castagna, 2001; Krusturp & Bangsbo, 2001). The intensity of soccer referees' physical activities during official matches has been estimated by the recording of heart rate. This assesses the physical fitness levels of referees as an important phase of the general or overall development and promotion of refereeing in Ghana. The Referees Association of Ghana (RAG) is the sole arbiter tasked with that responsibility. The development programme covers a broader interest range than mere officiating and offers entirely new participatory opportunities to all referees rather than the gifted ones.

The physical fitness test is a test designed to measure physical strength, agility and endurance. The test is commonly employed in educational institutions as part

of the physical education curriculum, in medicine as part of diagnostic testing, and as eligibility requirements in fields that focus on physical ability such as the police or military. The usage of the test became eminent throughout the twentieth century when scientific studies revealed their usefulness in maintaining overall health, and more agencies began to incorporate standardised fitness testing. In this regard, Kenneth H. Cooper designed the Cooper Test in 1968, which originally was to run as far as possible within 12 minutes at a steady pace, to test physical fitness (Cooper, as cited at en.wikipedia.org/wiki/coopertest). (See appendix A for Cooper's standardised distances for the different age groups and gender). The outcome which is based on distance ran, age and gender is correlated with $VO_2\text{max}$; the maximal oxygen uptake or aerobic capacity of the subject during incremental exercise. The Federation of International Football Association's (FIFA) version of the Cooper Test, running a minimum of 2700 metres (m) for men and 2400m for women on a 400m oval within the stipulated 12 minutes, is applied to referees globally.

Ndovi (2009) asserts that two types of physical fitness can be identified; general fitness and specific fitness. Ndovi postulated that referees' Cooper Test falls in the domain of specific fitness. This is because it is task oriented and based on certain activities that help to tune the body to be able to perform specific activities. The advent of the physical fitness test procedure with emphasis on distance running to measure $VO_2\text{max}$ has made overall conditioning necessary for referees to stay in the best form of fitness. Long-term preparation of task-specific and overloads are usually employed by referees to achieve the right frame required for the test.

Majority of referees, however, are unable to run the minimal required distances and are deemed to have failed. Ndovi (2009) contends that because of the strenuous nature of the test, majority of the referees regard the test as a sort of a monster that has come to mess up their careers, and others do not see the rationale behind the fitness test at all. The author has however, reassured that much as it is too hard to stomach, the truth of the matter is that, it is a necessary evil, and that it is actually designed to enhance the referees' performance on the pitch.

Persons who undertake physically demanding tasks are required to be extremely fit physically, psychologically mentally and socially. Physical fitness will require the physical conditioning of the body to enable it respond adequately to lifetime activities bearing in mind the skill-related fitness components (agility, coordination, balance, power, speed and reaction time) and the health-related physical fitness components (body composition, cardio-respiratory endurance, muscular strength, muscular endurance and flexibility). Psychological fitness relates to the ability to adjust to changes in the environment and cope with stress. Mental fitness relates to critical thinking and decision making, which is the ability to perceive, analyse events and draw conclusions. Social fitness is the ability to interact well with people and the environment.

Fitness is not something that can be attained within a short period of time. It is a process, and even after one has attained the necessary levels it does not mean that one should relax, the next step is to maintain the fitness. These will enable such persons accomplish their duties with less stress and failures, but maximum confidence and efficiency. These fitness requisites have been related to refereeing in a game of soccer, which demands a stable and well-coordinated frame of

personality and mind to succeed. The referee to whom a matter in dispute is referred for decision or advice is an official who controls a sporting event and who makes sure the players do not break the rules. This assertion summarises to a large extent, the role of the soccer referee today. The referee controls, and decides on matters connected with a match. No referees handled soccer matches in the early years (just like a pick-up game today); it was a gentleman's game. The nineteenth century referee was a neutral man who waited on the touchline for appeals for decisions from umpires who were operating from within the field of play and acting on behalf of the two competing teams (The history of soccer referees, 2008; Yendale, 2003). The increased frequency of disputes referred to the referees by club umpires caused many irritative interruptions of the game thereby reducing the excitement and fun associated with the game tremendously. For this reason, towards the end of the century (1891/1892) it was thought expedient to transfer the referee into the field to deal with the players' disputes promptly and decisively while the club umpires assisted from the lines as linesmen (or as it had been started since 1996-"assistant referees"). This worked out perfectly, and gradually all accepted it. Absolute rules have been written and amended severally to specifically identify each area of officiating.

The effort to referee the game of soccer in Ghana started in 1905, a year after the formation of FIFA and two years after the introduction of soccer in the Gold Coast, now Ghana. The first club 'Excelsior' was formed comprising some of the students of the Cape Coast Local Government Boys School and others from the Cape Coast vicinity. This necessitated the formation of other clubs such as Hearts of Oak (1911), Great Olympics (1954), Asante Kotoko (1935), Cornerstones (1931), Dwarfs (1939), Vipers (1935), Eleven Wise (1919) and Hasaacas (1926)

who played in the first organised league in 1958, a year after independence. The formation of the clubs correlated with the interest in refereeing which makes the game of soccer and refereeing incompatible.

Referees all over the world play an important role in the success of any soccer programme. As the sole arbiters, they possess complete power in the discharge of their duties by judging events instantly as they occur on the field of play. This makes them special people. Whatever happens to the referees and their association, the RAG, is of great interest and concern to the Ghana Football Association (GFA), in exercise of the powers conferred on it to control the organisation and management of football in the country. From its beginning in 1936, the RAG has grown, trained and produced a number of referees at all levels of refereeing from potential through class 3, class 2, and class 1 to FIFA. Others have become Confederation of African Football (CAF) Instructors and others as Match Commissioners (MCs) after retiring from active refereeing.

The performance exhibited by referees on the field of play has been of utmost interest and importance to all stakeholders involved in the management of every soccer programme. Certain human traits have been known to be fundamental to excellent performance in sports. These traits include indices of physical fitness such as speed, balance, agility, flexibility, neuromuscular coordination and explosive power (Salokun & Ogungbenro, 2006). Performance as a construct refers to that relatively short term aspect of human behavior which is marked by activity towards the execution of observable, identifiable and discrete task (Papanikolaou, Nokolaidis, Patsiaouras & Alexopoulos, 2003; Dalloway as cited in Salokun & Ogungbenro, 2006). This means that an individual's level of

performance is influenced by the combination of the innate ability and what has been gained through practice and training.

To hit the limelight, Ghanaian referees undergo years of preparation and training from their status as potentials to class one, which covers a period of about seven years. Refresher courses are held annually and sometimes in the middle of the season where the correct interpretation of the laws of the game, positioning, flag techniques, psychology of refereeing, player management, fitness activities and a host of other related topics are taught the referees. This is outlined to help them keep abreast with current refereeing standings and uplift their performances whilst officiating.

The performances exhibited by referees on the field of play are usually assessed by the MC who makes the judgment on certain observable characteristics exhibited by the referee in contention, and award marks according to each characteristic. These characteristics are personality (10 marks), fitness (20 marks), interpretation and application of the laws of the game (30 marks), performance of his duties (20 marks), discipline and control (20 marks) all totaling 100 which is further scaled down to 10 marks (see appendix B for the MCs entry form). The appreciable performance of an individual can occur only when there is a harmonious balance between the state of both the mind and the body; a psychosomatic harmony. For the purposes of this study the components of performance that were assessed in relation to the physical fitness test levels were; the overall performance in a match, and the fitness of the referee as regards the ability to run and keep up with the players or follow play. Also the physical fitness test level in relation to the ages of the referees was studied.

Salokun & Ogungbenro (2006) making reference to the Association for the Advancement of Applied Sport Psychology (AAASP) asserted that, the key to high achievement and the cutting edge in sport training is personal development, and that the true champions are those who holistically develop themselves rather than just their bodies or sport skills. The authors indicated that for sports participants to improve in performance they must learn success skills (and not only sports skills) which include emotional control, positive mental attitude, leadership and risk taking, focus and concentration, handling pressure and setback, goal planning, positive self-concept, self motivation, problem solving and decision making, personal organisation, and creativity. These success skills have been likened to refereeing and all other occupational fields if the ultimate is the improvement in performance.

It is a thing of common knowledge that referees suffer a number of negative psychological conditions during officiating which affect their performances invariably. This involves high disturbances in mental and emotional processes which in turn inhibit musculo-skeletal functions. These negative conditions consequently lead to the making of wrong calls to the chagrin of players, spectators and all stakeholders. Such performances are unacceptable. It is, therefore, a normal feature for referees to be criticised before, during, and after matches for the performances they exhibit on the field of play. As part of their job they are to endure this type of scrutiny, not forgetting that the bigger part of their role is to make accurate decisions. However, incompetence and bias officiating attributable to monetary influence is not acceptable by the GFA, as it has on several occasions applied sanctions on referees who indulge in such practices. An

instance of the application of sanctions captioned “GFA bans two referees” was reported on the web on April 6th 2009, at

(<http://www.ghanaweb.com/ghanahomepage/sportsarchive>). It stressed that

The GFA has banned two referees for the remainder of the 2009 league second round for their abysmal performances in league matches; suspended one for

five matches for performing below average in a match and cautioned three for

exhibiting low work-rate and not applying psychology of refereeing (online).

The statement said the latest action by the GFA forms part of efforts aimed at phasing out under performing match officials whose actions often drag the image of the association into disrepute. To avoid being sanctioned by the soccer controlling bodies referees are required to live up to their duties and responsibilities, which have multiplied covering all aspects of the game, code-named the four pillars of football. The Daily Graphic’s account on “Referees Instructors course ends” enumerates the four pillars as Refereeing, Coaching, Sports Medicine, and Administration (Daily Graphic, 2006, Nov. 20).

It is repudiated by Goldstein (2009) that responses slow down in the aged as a result of central nervous system processes, and that, according to Casajus & Castagna (2006) and Westerkerp & Meijer (2001), physiological changes that accompany advancing age result in declines in aerobic and anaerobic performances with speed and power most affected. Referees have been found to reach the peak of their careers 10-15 years higher than players (Castagna, Abt, D’Ottavio & Weston, 2005; Golant, Pizzi, Lucarelli, Stefani, Gianassi et al, 2008; Weston, Castagna, Impellizeri, Rampinani & Beivik, 2008). The effect of this age

upon physical match performance does not appear to impact upon the older referees' ability to keep up with play.

Today, the referee is a superintendent who manages, directs and controls with authority the conduct of a football game. This was stressed by the GFA President, Kwasi Nyantakyi, at a 3-day course for Referees Instructors dubbed "Futuro III" at the Ghanaman Centre of Soccer Excellence at Prampram in Accra. The Daily Graphic with the caption "Referees Instructors Course Ends" quoted the president as saying that "a comprehensive programme to develop and enhance the skills of referees has been included in the GFA's 4-year plan for Ghana football" (p. 55). This, the paper reiterated, is to provide avenues for adequate training of referees to achieve high standards. In a similar vein, the Daily Graphic recounts, on the caption "Premier referees end course" (2006), that "a 3-day course has been organised for 76 Premier League referees, to prepare them for the real interpretation of the laws of the game" p. 48. They were taken through topics like; psychology of refereeing, amendments to the laws of the game, and referees concentration and alertness. Other topics were speed of reaction, flag techniques, positioning, dead ball situations, signals between referees and assistant referees, and players management. They were also introduced to the new fitness test of FIFA; Yo-Yo Intermittent Recovery Test (YYIRT), introduced in 2005 and implemented from the 2005-2006 league season in Ghana.

From the foregone, it suffices to state that there is more to refereeing than what the general populace see referees do on the field. The amount of preparation is enormous bothering on practice, the art of officiating matches and the exhibition of acceptable standards of performance, and also attaining an appreciable physical

fitness level so as to pass the physical fitness test conducted on them. This need to ascertain the interrelationship that exist between the results of the physical fitness test and the performances exhibited by referees in Ghana, in line with similar or related studies done elsewhere was the catalyst to the conduct of the research.

Statement of the Problem

At the commencement of every football league season, RAG organises a refresher and fitness course for referees, where they are made to undergo a physical fitness test (Cooper Test), formulated by FIFA and implemented by National Associations. This comprises a 12-minute run in which participants do a minimum of 2700 metres (m) and 2400m for males and females, respectively. (That is 6 $\frac{3}{4}$ rounds for males and 6 rounds for females on a 400m oval), two 50m, and two 200m runs in addition to a session that focuses on the interpretation of the laws of the game. It is forbidden to walk during the 12-minute run. The YYIRT, a new physical fitness test has, however, been packaged to replace the former from the 2006 season. Usually, medical examinations are conducted before the fitness tests. It comprises the submission of a chest X-ray and Electrocardiography (ECG) result, and the conduction of Resting Heart Rate (RHR) and Resting Blood Pressure (RBP) on the day of the fitness test.

The results of the test culminate in the selection of referees to officiate at the various levels of the league and for the promotion of others from one level to the other. Usually, referees who pass the fitness test are promoted to the next class or level of officiating, or maintain their present status, or are used in tournaments, although their level of mastery of the interpretation of the laws of the game and actual officiating may be far below expectation, unable to keep pace with the

pressures of the game, and also take accurate decisions. On the other hand, referees who exhibit a high level of mastery of the interpretation of the laws of the game, but fail to transcend it into passing the fitness test are sidelined. They suffer permanent jettisoning or demotion to the next lower level. For instance, only 121 out of the 205 names submitted to the GFA for consideration to officiate in the 2007/2008 premier league passed the YYIRT and were subsequently used for the league. Those who failed had their names struck out from the list of league referees, and were prevented from handling premier and division one matches. To worsen the situation, the Premier League referees who failed the fitness test from the 2007/2008 League season onwards have been further exempted from handling matches in Division One (the next lower division).

A dispute has therefore been identified between the results achieved in the physical fitness test and exhibited performance during officiating. This dispute is inhibiting the consistent development and progress of the referees and any developmental programme that might be outlined for them. This is affecting their enrolment onto the FIFA and CAF lists considering the fact that the country can boast of only 12 FIFA referees. This problem of passing the physical fitness test before being enrolled for refereeing assignments has left many people in the wilderness as to what constitute the art of refereeing, that is, whether good refereeing is based on the mastery of the interpretation of the laws of the game when officiating or merely passing the physical fitness test. It is on the strength of the above that this research is being conducted to investigate what actually constitute soccer refereeing in Ghana, vis-à-vis physical fitness test results, and performance during officiating.

The study is worth a hypothetical test involving the relationship between the physical fitness levels of soccer referees and their performances during officiating in Ghana.

Purpose of the Study

The research assessed the physical fitness levels of Ghanaian soccer referees in relation to the performances they exhibited during officiating. Specifically the study was designed to;

1. Assess whether or not the physical fitness test result of referees in Ghana can predict the performances they exhibit when officiating.
2. Establish the association between the physical fitness test results of referees and the exhibited fitness in matches.
3. Assess the impact of aging on the performance of the physical fitness tests of referees.

Major Research Question

Is the physical fitness test result a predictor of level of officiating performance?

Sub-research Questions

1. Is there any link between the physical fitness test results of referees and their fitness level in matches?
2. Are exhibited physical fitness test results influenced by the ages of the referees?

Major Hypothesis

It is hypothesised that physical fitness test level of referees would not be able to predict their levels of performance during officiating.

Sub-hypotheses

The following sub-hypotheses also gave direction to the study;

1. There will be no significant relationship between the physical fitness assessment levels and the fitness of the referees during match-play.
2. There will be no significant differences in the physical fitness assessment levels in relation to the ages of the referees.

Significance of the Study

The outcome of the study will be beneficial in the following ways:

1. To outline to the RAG and other stakeholders the relationship between physical fitness test results or aerobic endurance and refereeing performance.
2. It will help all Ghanaians to gain insight into the art of refereeing and what constitutes good performance, by reading and relating literature on refereeing to what they see referees do on the field.
3. To serve as a source of reference for future research work in the areas of assessing the relationship between physical fitness tests and performances during officiating and age-related effects on physical fitness levels.
4. To serve as a reference material for referees who want to update their

knowledge and skills in refereeing in the relationship between physical fitness levels and officiating performance to enable them perform creditably.

Delimitations

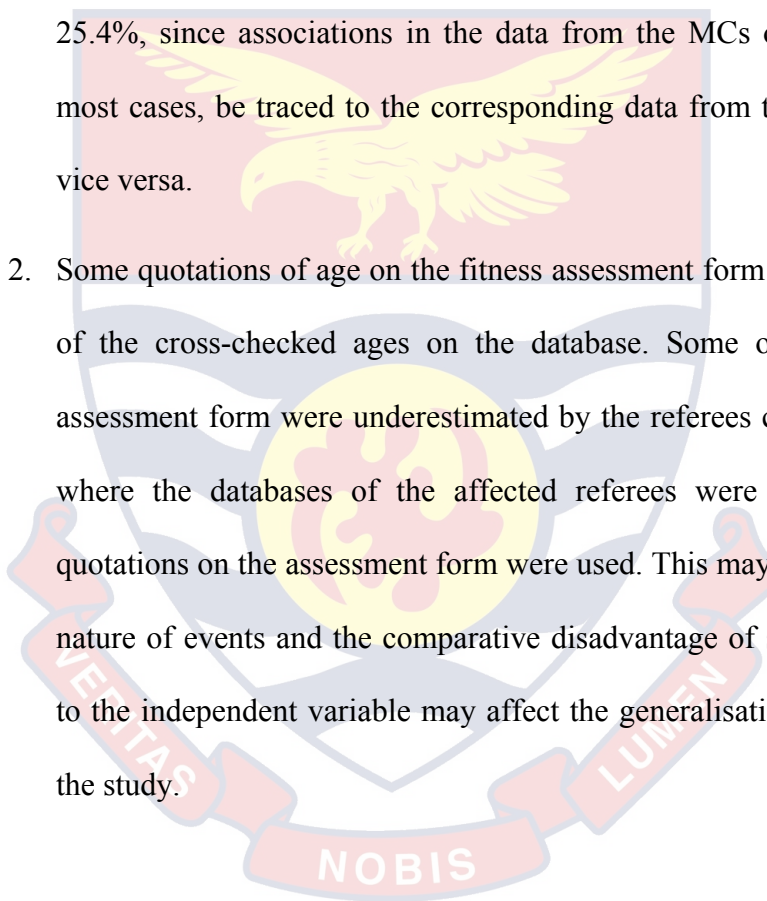
The research was delimited to;

1. Referees in the Northern, Brong Ahafo and Eastern Regions of Ghana, which form the Northern, Middle and Southern belts of the country, respectively. Referees are scattered all over the ten regions of Ghana, contacting all of them would have been a very difficult task. The concentration, therefore, was on referees in the aforementioned belts.
2. Two documentations which contained results of referees' physical fitness tests (Cooper Test) and reports on performance assessment during match-play.
3. Referees who had officiated in second division league matches organised in the aforementioned regions from 2003 to 2005.
4. Male referees in the study zone. This was to enable the research to make concise generalisations about refereeing. The male population was chosen because the female population within the period of the study formed only 4% (9) of the accessible population. Also all the accessed literature and studies dwelt on only male referees with the exception of one. This made it easy to compare the results of the studies.

Limitations

Although painstaking efforts were made to acquire every bit of information needed to conduct this research, the study was limited in the following:

1. Poor record keeping practices followed by the MCs and referees association personnel of the sampled regions. This led to a cut-down of the originally planned sample size of 40% of the accessible population to 25.4%, since associations in the data from the MCs outfit could not, in most cases, be traced to the corresponding data from the RAG outfit and vice versa.
2. Some quotations of age on the fitness assessment form were not reflective of the cross-checked ages on the database. Some of the ages on the assessment form were underestimated by the referees concerned. In cases where the databases of the affected referees were not available, the quotations on the assessment form were used. This may not reflect the true nature of events and the comparative disadvantage of such incorrect ages to the independent variable may affect the generalisation of the results of the study.



Definition of Terms

Colts; these are special football leagues organised at the District, Regional, and National levels for the youth (different age groups), to showcase their talents and gain selection to play for the various divisional and national teams. Under-12, Under-14, Under-17 and Under-20 teams can be identified.

Hyperthermia; a condition in which the body temperature rises above the usual level, usually as a result of intense physical exhaustion. This is reminiscent of sportsmen during intense physical activity.

Laws of the Game; the laws of the football association that have been written and are used by referees, players, coaches and administrators to guide the organisation and administration of soccer.

League referee; a referee who officiates in any of the country's highest leagues- Premier and Division One.

Physical fitness levels; this refers to the distances covered during the Cooper Test organised for referees nationwide.

Proprioceptive neuromuscular facilitation; this is a stretching technique for increasing flexibility. It involves some combination of alternating contraction and relaxation of both active and non active muscles (contracting and relaxing) e.g. a 10-second pushing phase followed by a 10-second relaxing phase. It is usually used to treat patients who have various types of neuromuscular

paralysis.

RAG Working Committee; the committee set up by the GFA and made up of 6 retired referees who see to the assessment, development and promotion of referees from one class or level to the other, and also appoint referees to league, national and international matches. The committee is the link between the GFA and the RAG.

Referees' Inspector/Assessor; a retired and experienced referee who assesses the performance of a referee officiating a match. The assessor reports on; knowledge and application of the laws of the game, co-operation among the trio, fitness, indication of hand signals, and movement and positioning, and offers advice during the halftime interval and also at the end of the match. The report is finally submitted to the GFA.

Second division; the next highest organised league after the premier and division one. This is organised at the regional level. It is from this level that teams qualify at the end of the season to play in division one.

Third division; this is the highest organised soccer league at the district level.

Qualification at the end of the season elevates a team to the second division.

VO₂max; the relationship between heart volume and maximum oxygen uptake. It is the maximum capacity of an individual's body to transport and utilise oxygen during incremental exercise, which reflects the physical fitness of the

individual. It is widely accepted as the single best measure of cardiovascular fitness and maximal aerobic power. An estimate of one's VO₂max can be calculated in several ways;

$$\text{VO}_2\text{max} = (35.97 \times \text{miles}) - 11.29$$

$$\text{VO}_2\text{max} = (22.351 \times \text{kilometers}) - 11.288$$

$$\text{VO}_2\text{max} = \frac{d_{12}}{44.73} - 504.9 \text{ mls/kg/min, where } d_{12} \text{ is distance in metres}$$

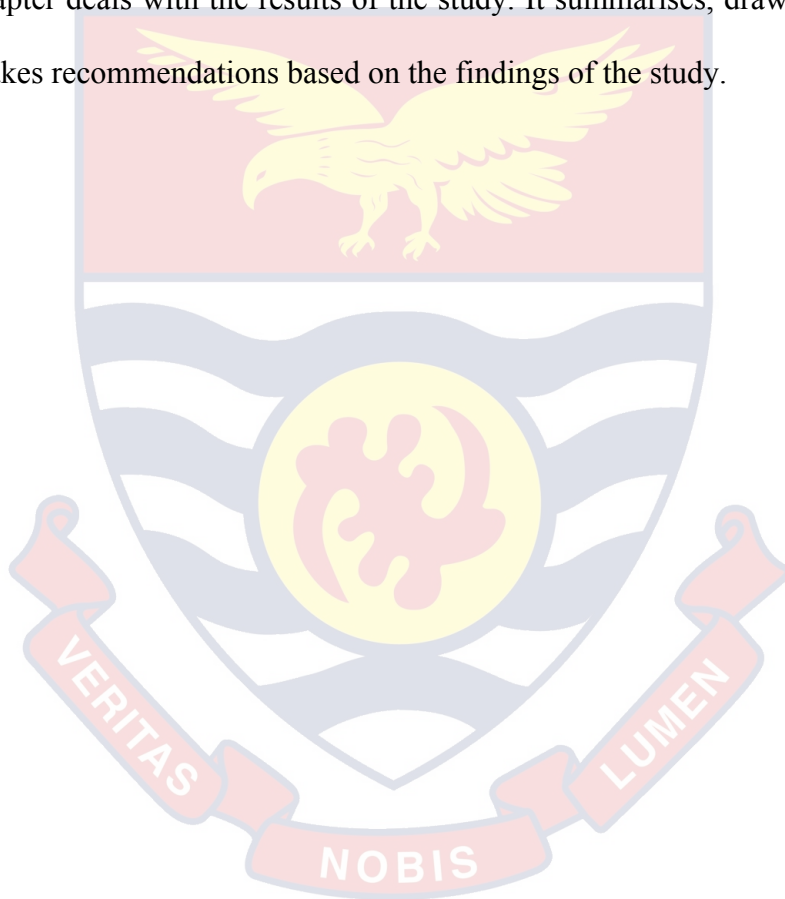
covered in 12 minutes.

VO₂max is expressed either as an absolute rate in litres of oxygen per minute (V min) or as a relative rate in millilitres of oxygen per kilogram of body weight per minute (ml/kg/min.). The latter expression is often used to compare the performance of endurance sports athletes.

Organisation of the Study

Chapter one of this work gives the background to the study. The statement of the problem, purpose of the study, research questions and the hypotheses that gave guidance to the study also received treatment. The chapter also concentrates on the significance of the study, delimitations, limitations and the definition of terms. Chapter two covers the review of related literature based on theoretical and empirical evidence under the following headings; origins and laws of soccer, physical fitness and the physical fitness test, meaning, powers and duties of refereeing, impact of physical and psychological fitness on the referees performance, impact of age on the referee's physical fitness performance,

psychology of refereeing, stress management, referees psychological demands, and energy expenditure. The third chapter deals with the research design and techniques and procedures employed in the study. It further examines population, sample and sampling procedure, instrument for data collection, administration of instrument and procedures used for analysing data collected. Chapter four is devoted to the presentation and discussion of findings of the study while the last chapter deals with the results of the study. It summarises, draws conclusions and makes recommendations based on the findings of the study.



CHAPTER TWO

REVIEW OF RELATED LITERATURE

The purpose of this chapter is to present a review of related literature on the relationship between the physical fitness levels of soccer referees and their performances in officiating. Specifically the chapter will review the following:

1. Soccer: Origins and Laws
2. Physical Fitness and the Physical Fitness Test
3. Refereeing: Meaning, Powers, Duties, and Qualities
4. The Impact of Physical and Psychological Fitness on the Referee's Performance
5. The Impact of Age on the Referees Physical Fitness Test Performance
6. Psychology of Refereeing and Stress Management, and
7. Referees' Physiological Demands and Energy Expenditure

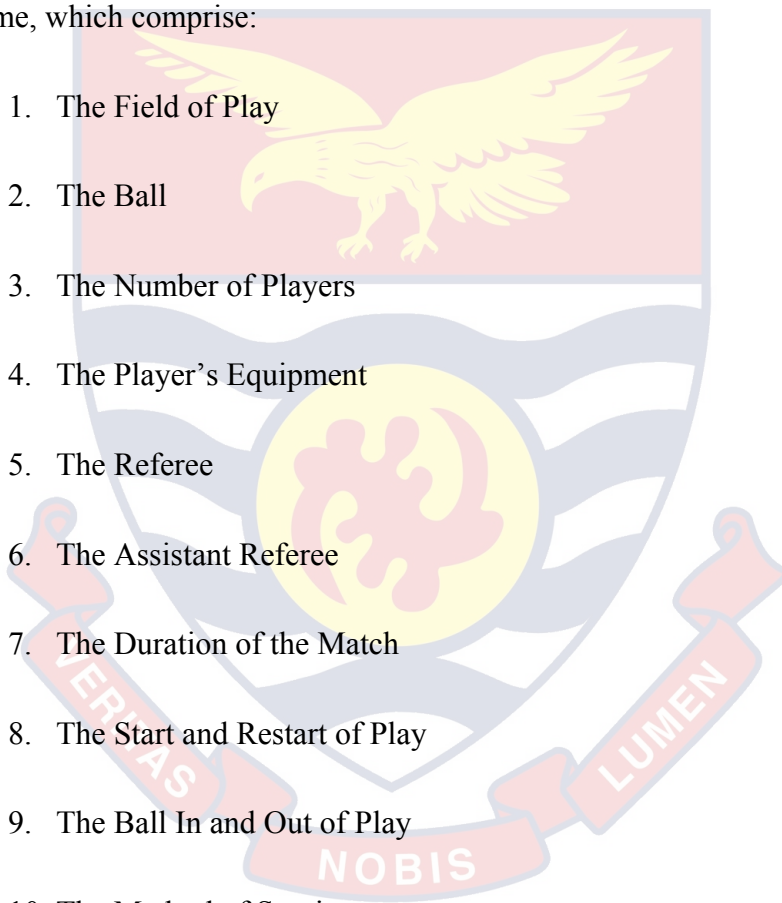
Soccer: Origins and Laws

Soccer is one of the numerous sporting disciplines in the country that has enjoyed greater enthusiasm in recent times. It is looked on as the number one sport and is always associated with large crowd attendance. The satisfaction that can be derived from soccer matches depends on the teams playing, the occasion, the stars to watch and the calibre of officiating officials in the middle of affairs.

Also the comportment of the team officials and spectators as a whole is indispensable.

Soccer is a type of football played with a spherical ball, which must not be handled except by the goalkeeper, and having eleven players at a side who try to kick or use their heads to send the ball into the goal of the opposing side. The game consists of two equal halves of time, and is played within the 17 laws of the game, which comprise:

1. The Field of Play
2. The Ball
3. The Number of Players
4. The Player's Equipment
5. The Referee
6. The Assistant Referee
7. The Duration of the Match
8. The Start and Restart of Play
9. The Ball In and Out of Play
10. The Method of Scoring
11. Offside
12. Fouls and Misconduct
13. Free Kicks
14. The Penalty Kick



15. The Throw-In

16. The Goal Kick, and

17. The Corner Kick, in that sequential order (Laws of the Game, 2008).

Information gathered indicated that soccer is the most popular sport in the world and is performed by men and women, children and adults with different levels of expertise. Stolen, Chamari, Castagna & Wisloff (2005) contended that soccer performance depends upon a myriad of factors such as technical or biomechanical, tactical, mental, and physiological areas. Stressing further, Stolen et al believed that one of the reasons why soccer is so popular worldwide is that “players may not need to have an extra-ordinary capacity within any of these performance areas, but possess a reasonable level within all areas” p. 504. Football in its varying forms is the most popular sport in the world, and the biggest global sport. Without mincing words about this fact Reilly (1997) quoted Reilly & Smith (1986) that

In 1993, the FIFA represented 179 national soccer associations which in total represent around 200 million active members (both male and female)...some 150 million are active players. Altogether, 1.3 million referees officiate weekly at soccer matches for some 600, 000 soccer clubs which represent 4.1 million soccer teams worldwide. Together there is an estimated 400-500 million active soccer players worldwide. This impressive number indicates that some 10 percent (%) of the world’s population is in one way or another participating in soccer (p. 113).

As of now, there are 208 national associations affiliated to FIFA which represents 260 million people actively connected to the game, including players, coaches, and administrators (FIFA Activity Report, 2005). To support the above assertion is the numbers of the world's population that for instance are attracted to the World Cup. In 1994, over two billion people watched the contests. This figure keeps increasing and an estimated number of 15 billion watched the 2006 edition.

Although the most popular sport, Reilly (1997) recounted that the origins of modern football are rooted in pagan blood rituals. The author recounted that ancient ball games such as the Persian buzkashi, the Mesoamerican peloya, or the Roman harpastum were extremely violent and cruel contests, which involved killings, blood sacrifices, and serious injuries. With the advent of Christianity, especially in the fourth century, the attitude of the Jews and Christians, with the idea of the holiness of life, was incompatible with the pagan spectacle. Several attempts were therefore made by the church, kings, and magistrates throughout the last 1500 years of history to ban these games, but neither the various types of mob football nor ancient blood sports could be erased entirely. The author lamented further that, the most powerful authorities gave up their battle against unlawful sports. For instance, between 1314 and 1667 football was banned on more than 30 occasions in England, but it was always revived. In most of these cases, football was outlawed because of its inherent violence. Medieval football was a wild and brutal game played according to oral rules, which allowed a high level of tolerated physical violence. During the nineteenth century, British Pedagogues finally abandoned their struggle against the brutal sport. Since they could not deny its popularity, they now joined in. Reilly further recounted that, as violence and rebellion in England's public schools rose steadily, schoolmasters

discovered that football could be functionalised according to their own interests as a safety valve and means of controlling extremely violent pupils. Consequently new regulations were introduced in order to give it a more organised and less brutal character. These developments finally constituted the basis of modern football.

The codifications and reformation of the rules of the game during the nineteenth century led to a reduction in the brutalities. This continued till the formation of well-conditioned football teams and associations and consequently the formalisation of the laws of the game to regulate the game. The above notwithstanding, assaults and grievous harm still persist in modern soccer. As soon as the popularity of the modern game began to attract large crowds of partisan supporters, disputes became common place with match officials often targeted as scapegoats. The October 2005 edition of the FIFA magazine laments that, reports of abuse and assaults on referees were on record and growing in frequency as long as 1883. What the magazine wonders is that away from a football pitch, most people would never act like ravenous animals smelling blood or demonstrate their ire with “frenzied and vulgar gestures”. “Regrettably, football, the sport acknowledged as the people’s game cannot escape certain social evils that disfigure the beauty of the sport” (FIFA Magazine, 2005, October, p. 10). A case in point is the Graphic Sports’ account of the match officials who were seriously assaulted in a 2009/10 Polytank DOL second round match between Vipers F/C and Medeama F/C at Cape Coast. Sympathisers of Dwarfs F/C, another Division One club who wanted Vipers to win so that they (Dwarfs) could topple Medeama from the top of the league table accused the referees of match-fixing. They subsequently attacked the referees after the final

whistle and to the surprise of everybody a search on the referee revealed an amount of GH¢ 4,000.00 (four thousand Ghana Cedis) stuck in his stockings. He confessed taking bribe and relayed that the money was given to him by some Dwarfs officials after he had been approached and persuaded by some colleague referees (Quao, 2010). His face (as revealed by the paper) was seriously battered by the fans. Could these incidents of referee rage be as a result of the influence of the ancient game on the modern, the case of the non-performance of the officiating officials, the players who do not understand the laws of the game, the spectators who get carried by emotions, or gamblers who must automatically win on their betting?

Physical Fitness and the Physical Fitness Test

A well trained athlete is likened to a serviced racing car in which the slightest mechanical malfunction is likely to cause a devastating effect in performance or lead to breakdown during competition. Minor malfunctions can have serious, even devastating, consequences. For example, a slight degree of anaemia will negate the effects of several weeks of endurance training. Occasionally the effects of such trauma are permanent and go a long way to determine the fitness level of the performer. Although fitness is difficult or impossible to measure, it is, as a concept quite firmly established. Part of its character is that it reflects the efforts of a person to attain it. The basic idea of fitness probably lies in the cultivation of habits of activity. It is known that activity brings arousal; the mere fact of activity sharpens the senses. The ideal is surely the kind of activity and the kind of arousal which is mental as well as physical. Fitness should add zest to living.

Fitness can be thought of as a state of functional preparedness, largely physiological in character and therefore relatively stable. Unlike psychological fitness, or intellectual fitness or moral fitness which are always qualified by reference to what the fitness is for, physical fitness and medical fitness are often referred to in quite a general way. This is because they are conventionally seen in relation to a much more readily understood range of tests, activities, and experiences than are other forms of fitness.

Fitness is like happiness, it is easier to tell when you have not got it. We all know when we are not fit. Fitness is a feeling, a glorious feeling of well being. Fahey, Insel & Roth (2003) opined that the ability to carry out daily tasks efficiently with enough energy left over to enjoy leisure time pursuits and to meet unforeseen emergencies is fitness. The authors quoted the Alliance of American Health, Physical Education, Recreation and Dance (AAHPERD), as seeing fitness as a multi-faceted continuum extending from birth to death. They said, affected by physical activity, it ranges from optimal abilities in all aspects of life through high and low level of different physical fitness, to severely limiting disease and dysfunction.

Fitness can be seen as a necessity which all must strive to achieve if attainment and maintenance of a high level of wellness is the requisite. It also depends on making appropriate lifestyle decisions to live life to its fullest potential. Many people believe that many diseases experienced later in life have their roots in childhood. For example, obesity and physical inactivity, two risk factors for coronary artery disease, hypertension and non-insulin-dependent diabetes, appear to begin in childhood. Children should, therefore, be challenged to accept

physically challenging lifestyles early in life so that it becomes part and parcel of them as they grow. An increase in fitness leads to an increase in self esteem, and that as one feels better about oneself, one is more likely to have a greater sense of control over the factors that influence ones health.

Hoeger & Hoeger (2002) concurred that several specific components contribute to an individual's overall physical fitness. They classified physical fitness into health-related and motor skill-related fitness. Aerobic fitness is just one of the components that need to be assessed if the physical fitness level of an individual, which Wuest & Bucher (2003) reiterated as the ability of the body systems to function effectively and efficiently, is to be achieved. Physical fitness means that a person has achieved an acceptably high level of his potential for doing physical work.

The evaluation of physical fitness involves assessment of aerobic endurance, body composition, muscular strength, muscular endurance, and flexibility. Fitness test items include the one mile walk or run, to test aerobic endurance; a skin-fold measurement, to assess body composition; the sit and reach test, to evaluate flexibility of the lower back and hamstrings; and modified sit-ups, to check abdominal strength and endurance.

Physical fitness can be seen as a relative concept, that is, it relates to the individual's work schedule or daily demands. For instance, the fitness required by a construction worker or factory-hand is different and more than that required by an office staff or worker. Running 400m in 50secs may indicate a lack of fitness in one athlete and the peak of fitness in another. We look at an athlete or a performer or an old man and assess their fitness by very different standards.

However, there is a minimal fitness level that must be maintained by all to prevent organic deterioration to ensure proper physiological functions.

Physical fitness is also transient. The gains derived from undertaking fitness regimens lasts for a very short time after which prolonged inactivity leads to deterioration in gains. One must, therefore, engage in fitness activities on a regular basis to maintain or improve one's physical fitness level. For instance, a physically active lifestyle helps one to generate more energy, control weight, manage stress, and boost the immune system. It provides psychological and emotional benefits contributing to one's sense of competence and well-being (Fahey et al., 2003). One can assess an athlete, or a paraplegic, or an old man and say-'He keeps himself very fit'. This he does by (a) the avoidance of harmful habits and indulgences, and (b) exercise and practice. Experience has however shown that, a high level of physical fitness is no protection against common ailments such as colds, infectious diseases or digestive disorders.

Exercise to a large extent increases one's physical capacity to better able meet the challenges of daily life with energy and vigour. It must be stressed that movement and physical activity were basic functions for which the human organism was created to ensure health and longevity. However, human activity has negated most of this concept. The technological development or advancement of humanity coupled with the quest for material possession has brought in its wake the incidence of sitting at one place to undertake daily activities without using much energy. However, as social and environmental problems which put a strain on life and restrict free movement of people abound, there is the need to find solutions to them. This makes it important for people of all walks of life to

engage in physical activities to counteract the devastating effect of inactivity. This contention is in line with several reports (CDC, 1999; Doyle, 2005; Nutristrategy, 2004) that exercise is the sure route to physical fitness and a contributor to good health, and the major source to better able cover high intensity activities.

The ability to cover high intensity activities and the fact that exercise increases one's physical capacity to endure and condition oneself for strenuous activities is corroborated by the Specific Adaptation to Improved Demands' principles of conditioning, which states that when the body is subjected to physical activity overloads of varying intensities, it will gradually adapt overtime to overcome whatever demands that are placed on it. To Esposito (2010), the SAID principle is the bases for physiological changes due to the imposed demand of the specific training stimuli. This principle of conditioning has been recommended as the training mode for soccer referees to enable them access an effective and efficient aerobic and anaerobic training regimen.

Officiating soccer matches has been described as a herculean task since the game involves moderate and high intensity mode activities of motion. This puts a lot of strain on the physiological functions of the referees (Reilly, 1997). It is for this reason that referees are expected to be in training during and off-season, to keep fit mentally and physically to be able to keep pace with the pressures of the game and to be able to conduct 2 halves of a match without extreme exhaustion, even in tournaments such as Presidential and Festival cups, Nations Cups, school and community cups, and World Cup, where extra time and the taking of kicks from the penalty mark are played after full time in drawn matches to determine the winner. The increased endurance of the SAID principles of conditioning helps

to boost the referee's fitness in the performance of the physical fitness test. This advice has been seriously followed by one female Nigerian FIFA referee. She recounted in the June 2005 edition of the FIFA Magazine that, she has two trainers or instructors; one who takes her through the laws of the game all the time, and the other who takes her through physical exercise activities daily. This enables her to focus on the laws of the game and its interpretation and also stay in the best form of shape in readiness for any refereeing assignment, and for her daily work schedules (FIFA, 2005).

Physical Fitness Test (Cooper Test)

The physical fitness test is a test designed to measure physical strength, agility, and endurance. It was designed in 1968 by Kenneth H. Cooper for the United States military use as a test of physical fitness. Originally the test was to run as far as possible within 12 minutes, measuring the condition of the person taking it and therefore, supposed to be run at a steady pace instead of sprints and fast running. The outcome is based on the distance the test person ran, the age, and gender. The result is usually correlated with $VO_2\text{max}$. (Cooper Test, as cited at en.wikipedia.org/wiki/coopertest).

FIFA adopted the Cooper Test as a measure to test the fitness levels of referees for selection to matches and tournaments. This was because throughout the twentieth century, scientific evidence emerged demonstrating the usefulness of strength training and aerobic exercise in maintaining overall health and standardised fitness testing. FIFA's version of the Cooper Test is to undertake $6\frac{3}{4}$ rounds of a 400m oval for men and six rounds for women within 12 minutes. It is forbidden to walk during the test. FIFA's adoption of this test was no fluke as the

fitness and readiness of referees to cope with the increasing pressures on the demands of the game had been of tremendous importance. The referees' Cooper Test had been in vogue till 2005 when the new physical fitness test called Yo-Yo Intermittent Recovery Test (YYIRT), also testing muscular strength, muscular endurance, and aerobic capacity was instituted to replace the former. The latter was constituted because it associates itself with sprinting, jogging, and walking; the attributes of motion prevalent in refereeing soccer matches.

FIFA's adopted version of the Cooper Test entailed running the following distances in that order within the stipulated time.

1. 12-minute run (Cooper Test).....Male 2700m, Female 2400m (minimum)
2. 50m run (two times).....Male 7.0secs, Female 7.5secs (maximum)
3. 200m run (two times).....Male 32secs, Female 37secs (maximum)

Failure to run any of the 50m or 200m within the stipulated time attracted no or minimal sanction. A referee, however, failed the exercise if he or she was unable to cover 2700m for males or 2400m for females within the 12 minutes, irrespective of age. It was forbidden to walk during the 12 minute run. (See appendix C for the format).

New Physical Fitness Test (YYIRT)

This new test which replaces the former was introduced by FIFA in 2005. It contains running activities that are relevant to officiating soccer matches just as in many other sports. It evaluates the individual's ability to repeatedly perform intervals over a prolonged period of time. The test is given in two stages, one for the referees and one for the assistant referees (AR). The test itself is in two parts.

The first part comprises running a series of 6 sprints by 40m with a minute's interval between any two of them. For referees each is done in 6.2secs and for ARs, it is 6.0secs. When a referee fails to make the mark in any one of them, he or she is given the opportunity to run it once again. If the referee fails again, he or she is debarred from continuing with the second test. This means that the referee has failed the whole exercise. The second test is a series of interval sprints-150m to be run in 30-35secs, with a 50m recovery. The ARs run the same test, but their time is 30-40secs with the same recovery time. In all cases, referees are required to complete a minimum of ten laps (Krill, 2008). When a referee fails to cross the 150m mark within the stipulated time for the first time, he or she is cautioned by the show of the yellow card. A second failure attracts the red card. In this instance the referee is disqualified from continuing with the exercise.

Usually, the blood pressure and the pulse rate at rest and under exhaustion are conducted on the referees the night before or in the morning of the fitness test by specialists, to determine those who should and those who should not be permitted to run the test.

Refereeing: Meaning, Powers, Duties and Qualities

Every game has laws under which it is played and soccer is no exception. There are rules set out by the Technical Committee of the game to be administered and adhered to by all participants. The interpretation of the laws of the game requires technical people who have undergone training programmes over a period of time and have become well versed in it. From the origins of the game it is realised that the rules are made to govern the fast changing attitude of

man. It was a spontaneous need, as players and officials developed and respected their own rules.

Referees who are charged with the interpretation of the laws come in assorted sizes and shapes, of average, medium and above average, heights, but wear the same types of uniform. All, however, have the same creeds: to watch every play of every second and to call the players to show the best of their abilities. Referees follow rules and regulations enshrined in the Laws of the Game with the sole aim of interpreting them in a match.

Referees' calls are always based on facts, not empirism. They always have a whistle ready, looking, watching and anticipating some infractions. They enforce what they see about a situation and not what they think. Without referees football would be nothing. As at 2005, there were 720,000 referees including 40,000 women who officiated in millions of matches worldwide, from FIFA World Cup to the lowest amateur and youth leagues (FIFA Activity Report, 2005; FIFA Magazine, April, 2005).

The activity report further stressed that referees do not judge situations anyhow, they follow rules and regulations legitimated by order and handed over to them for interpretation and enforcement during games. Their presence spell calls to duty and not to submission of emotional allegiance to teams, group of players or spectators. Major qualities such as the courage to travel out of their stations, attend to training sessions, care not for wet and slippery fields, taking tough decisions, and always ready for the screaming of coaches and captains and irate fans, help to make one a good referee. Only strong personalities can hope to cope with the enormous pressure that comes with being a referee. It goes without

saying that officials need to show authority and handle players correctly, but they also have to be in excellent physical shape, understand football tactics and know the laws of the game inside out. They also have to show what is generally regarded as the games unwritten 18th law, common sense.

Mba (2001), a CAF/FIFA Instructor for referees courses, in a FIFA High Level Referees Course at Winneba in 2003, stated that, the referee has unlimited authority which he derives from the match organisers who have deemed him suitable and well equipped to conduct a particular match, and then from law five of the FIFA rules. The power of the referee relates to authority to act in a particular manner and to control others while the duties relate to the tasks that he is morally or legally obliged to perform. The referee is assisted in his duties by two assistant referees and, in high profile games, by a fourth official outside the sideline. According to Mba, duties and responsibilities can be discussed under four headings:

1. Discipline

- a. Allows no unauthorised person to enter the field of play
- b. Punishes the more serious offence when more than one is committed
- c. Cautions or sends off players when necessary
- d. Allows advantage when the player has been fouled against.

2. Injury

- a. Stops the match if in his opinion, a player is seriously injured
- b. Allows play to continue, if in his opinion, a player is only slightly injured

- c. Ensures that any player bleeding from a wound leaves the field of play for treatment.
3. Administration
 - a. Acts as a timekeeper and keeps record of the game
 - b. Provides a match report.
4. Laws of the game

- a. Enforce the laws
- b. Control the game in co-operation with his/her assistants
- c. Restarts the match after a stoppage
- d. Ensures the ball and players equipment are correct
- e. Stops, suspends, or terminates the match because of any outside interference.

The extent of power of the referee is underlined by the provision of law 5, which states “The referee’s decision regarding facts connected with play is final” (Laws of the Game, 2008, p. 24).

Elaborating further, Mba (2001) recounted that no one is born a good referee. Everyone has a number of inherent and variable psychological traits, personal attitudes, interest, needs, temperament and character which when developed well makes a great difference in outlook and performance. This is in agreement with the AAASPs (as cited in Salokun & Ogungbenro, 2006), assertion that the key to high performance is personal development and that true champions are those who holistically develop themselves rather than just their bodies or sports skills. Some

of the characteristics of a good referee are inherent, but others are developed through training and on-the-field experience. The basic qualities of a good referee according to Mba are, he must;

- have confidence in himself and must be able to command respect.
- naturally is an honest person.
- be able to exercise authority.
- be self-critical.
- have self-control and unruffled under critical situations to be able to manage them well.

Other qualities, he stressed, acquired by training and experiences over time are;

- greater understanding, interpretation and application of the laws of the game.
 - show eagerness to acquire more knowledge on how the game of football itself is played else will not be able to deal with players' deceptions.
 - be medically fit, pathologically focused and emotionally stable for a match.
 - ability to maintain a good positional movement in the field of play and co-operation and coordination with the Assistant Referees.
 - ability to maintain good stamina and mental alertness throughout a match
- (Mba 2001).

To qualify as a referee, the prospective applicant approaches a district branch to express interest in the art. He or she is asked to formally put in an application. Based on this an interview is conducted. Once enrolled, the applicant undergoes practical and theoretical training, and officiating of 3rd Division and Colts matches as a potential referee, till he or she writes the RAG annual exams, usually, in May each year. Obtaining a pass mark of 50% qualifies one as an accredited referee recognised by the RAG and subsequently rated a Class 3 referee. Here the referee qualifies to officiate second division matches in addition to the lower division ones. After three years of continuous dedicated service the referee again writes a second exam to qualify to Class 2 if a pass mark of 55% is obtained. At Class 2, the referee qualifies to officiate matches up to Division One if found to be a high performer. Three years afterwards the referee undergoes an assessment by officiating a specific number of matches in the region of officiating and the results are sent to the RAG. The pass list is later sent to the various regions for their perusal. A pass qualifies the referee to officiate in the National Premier League and below subject to the approval or recommendation of the RAG Working Committee.

After years of dedication and achievements in refereeing, one could be invited to attend FIFA Intermediate and High Level Courses by the GFA in collaboration with the RAG and made to justify inclusion into FIFA with a physical fitness test. The successful referee is enrolled and given the FIFA badge to qualify him to officiate any match organised under FIFA's jurisdiction. This includes sub-continental, continental, and global competitions and friendly matches. By age 45 years the referee retires from FIFA. The retiring age for RAG referees is 50 years. As part of the eligibility criteria, a referee in Ghana who is above 38 years at the

time of qualifying to be on the league is not enlisted for the league. Such a referee is only eligible to officiate up to the second division.

The worldwide popular nature of soccer accounts for the ever increasing numbers of referees attracted to the discipline. Soccer referees abound in Ghana with increasing figures each year. Although referees are exposed to a lot of dangers bothering on assault and death threats (by players, coaches, administrators, spectators, and gamblers), unfavourable weather conditions, injury-prone playing surfaces, psychological imbalances, uncomfortable travelling mechanisms and so on, the numbers keep increasing as a lot of people are attracted to the profession every year. Holt (2005) cited Rendall (Chairman of English Referees Association) who in a speech to the BBC stated that “there is greater disdain for authority with players, managers, and spectators more willing to behave badly, but there is no real shortage of people wanting to be trained as referees” (<http://www.news.bbc.co.uk/sport2/ni/foo>).

The Impact of Physical and Psychological Fitness on the Referees

Performance

According to Fahey et al (2003), refereeing can be likened to what is now known as worksite fitness and wellness. These are programmes instituted at work places to augment the physical fitness level of management and employees. They reported that these programmes have become common in the past decade and a half, for instance, by 1992, 83% of companies with more than 750 employees had such programmes in the United States of America (USA). Companies develop and sustain worksite fitness and wellness programmes because such programmes; reduce healthcare, increase productivity of employees, and reduce absenteeism.

This accounts for the springing up of several keep fit clubs all over Ghana, of late, and the sponsorship of varied sporting and fitness programmes by Individuals, Groups, Corporate Organisations, Non-Governmental Organisations (NGOs) and Governmental Agencies. This attests to the conviction that man has become more aware of the benefits derived from exercise or participation in all forms of physical activity.

To this end, the Graphic Sports reported in the March 6-9 edition that about 30 keep fit clubs have been invited to participate in a national sports festival in Accra on April 4th, 2009, mainly to promote healthy lifestyle and education among the members. The special sports festival was being organised "...to offer the selected keep fit clubs the opportunity to interact and compete for awards in football, volleyball, tennis, ..." (Sports Festival for Keep-fit Clubs, 2009, p. 11). Besides, the clubs attending the event will benefit from a special health talk on relevant subjects. The report further hinted that the early morning event will be preceded by a walk across some principal streets in Accra, which will climax in an aerobics session at the Aviation Social Centre, to stretch limbs towards the main action in the various disciplines.

Also worthy of mention is the organisation of the Olympic Day Run for people of all walks of life annually globally, by the International Olympic Committee (IOC) with support from all National Associations, to mark the founding of the modern day Olympic Movement. In Ghana it is organised under the auspices of the Ghana Olympic Committee (GOC) and sponsored by the Coca Cola Company. For instance, Ghana's edition of the 2006 Olympic Day Run took place at Nsawam and Asamankese. This attracted 765 participants who raced in the

non-competitive event which was held in 203 countries world-wide, annually. In a statement, the President of the IOC urged all to fully participate in sporting activities to ensure social development (Olympic Day Run, 2006). The 2007 edition took place at Ho in the Volta Region. The 2008 edition was held at Takoradi and Kumasi on June 28. At Takoradi the non-competitive race started from the Jubilee Park and ended at the Gyandu Park, whilst the Kumasi version started from the Baba Yara Stadium through town to the Asokwa offices of Vega Foods Company in Kumasi (Olympic Day Run, 2008).

Despite the ever increasing and popular acceptance of exercising as key to fitness and health, studies have revealed poor physical and health conditions of the youths of today. In studies on the American youths, East, Frazier & Matney (as cited in Fahey et al., 2003) and the American National Children and Youth Fitness Programme, have revealed that the youth had the higher percentage of fat and were in poorer cardiovascular conditions than at any point in recent history. They reported that over one billion adults worldwide are overweight, and at least 300 million of these are clinically obese. Ofei (2005) has stated that in developing countries about 115 million people suffer from obesity-related problems. Much of this dilemma does exist in our Ghanaian youths, although the statistics are not readily available. Quicoe (2005), however, found out that 5% of adults in Ghana are obese, and among women, the prevalence is 8 % while among men it is 3%. A study conducted by Amoah (2003) revealed that overall crude prevalence of overweight and obesity among adults aged 25 years and above was 23% and 14% in urban and rural Accra, respectively. These findings call for concerted efforts to rejuvenate physical education programmes in schools. It is a common practice to see most students shy away from physical education classes and sports sessions or

manufacture excuses to outwit their superiors so as to be excused from such sessions. This trend must be reversed.

The study motivated me to undertake a fitness test on the 2007 Zonal award winning male and female table tennis teams of the Suhum Presby Senior High School. The test items comprised; pull-ups, sit-ups and the 12-minute Cooper Test. Of the 12 youngsters (15-19 years) tested, 41.6% (5) aged 15-17 years were unable to do more than one pull-up, while 33.3% (4) could not run the mile under 10 minutes. Only two managed to go beyond 5 sit-ups. Fitness exercises and training regimens made up of scoring runs, bend and reach flexibility exercises, push-ups, static and dynamic leg, trunk and arm stretches, and proprioceptive neuromuscular facilitation (PNF) exercises were conducted to enable them sharpen their reflexes, agility, flexibility, muscular endurance and cardiovascular endurance over 8 weeks. The two hours per 24 sessions (3 times a week) transformed their attitude and physique leading largely to the success of the team (Agyei, 2007).

In the refereeing setting, worksite fitness and wellness programmes cannot be eliminated. The referee needs a well documented and fashioned fitness programme to stay in the best form of shape to enable him or her undertake refereeing assignments. From the time a referee receives a notification for a competitive match, he or she starts to ponder how the match would be conducted. He or she immediately begins to consider all aspects of the match; what is at stake, the teams involved, the volume and type of spectators, the type of field and weather conditions. The ideal or competent referees consider every match they are

appointed to handle (whatever the grade) as equivalent to the final of an F.A. or World Cup match.

With the expectations of the teams, supporters, team officials, and gamblers, to win (per the attitude they portray), coupled with the pressure on the referee to perform well with the application of the laws equally, the psychological approach, apart from the physical, to every match, ought to be the same. This is often not the case; hence the reason for the varying standards of performance of different referees and even the varying performance of the same referee in various matches, and during two halves of the same match. Accounting for this, Mba (2001) opined, is the corresponding relationship between the Referee's Arousal Level (RAL) and the Decision Making Efficiency (DME). The RAL measures the amount of nervous impulses built up in the referee up to the amount of the commencement of the match, and the DME is related directly to the referee's personal qualities and the ability to make spontaneous correct decisions during the match. The higher the arousal level, the higher the referee's efficiency.

There are, according to Mba (2001), three stages in arousal level: Drowsy Level, Awakening Level and Maximum Level. If at the commencement of a match the referee has only attained the drowsy level (because he or she has not warmed up at all before the match), the performance cannot rise to more than 20%. The referee is bound to be casual, sluggish in movement and thought, and consequently, the DME will be very low.

At the awakening level, the referee is likely to achieve between 35% to 50% level of efficiency. If, however, before the commencement of the game the referee has achieved the maximum level; physically, mentally, and psychologically by

warming up, he or she would be able to reach 80% or more efficiency of performance to the admiration of the spectators, respect by the players, and inner satisfaction of himself or herself (Mba 2001).

Mba (2001) emphasised that a modern match can be perfectly controlled if the referee is in a good state of health and has excellent reflexes. A referee must constantly be in training to achieve the above. A referee who officiates without being physically, mentally or bodily fit runs the risk of not only giving a bad performance, but also of endangering his or her health. A regular medical check-up and constant training are essential, especially when one considers that referees are active from the age of 25 to 50, at which later age it is common for sudden deterioration in health and quality of performance to go unheeded.

It is, therefore, in the referee's own interest to train satisfactorily before the day of a match and warm up adequately before officiating a match, either as a referee or as an assistant referee, due to the eminent main biological effects gained from warming up, which include;

1. To speed up the blood circulation
2. To adjust the distribution of blood within the organism by the mobilisation of the reserves
3. To raise the amount of blood in the circulation by about 15%, corresponding to 4.5 litres of a gallon
4. To increase the cardiac output in terms of pulse-rate heartbeat up to 160-200 per minute, that is, 3 or 4 times above that in a state of rest.

In a bid to assess the impact of physical fitness on the referees' performance or assess the relationship between the physical fitness test and performance in officiating, Castagna, Abt & D'Ottavio (2002) conducted a study on 22 elite Italian referees on 11 match activity categories during a maximum of three Serie A matches as against the physical fitness test results (independent variable). The result demonstrated that the physical fitness test is a moderate predictor of officiating performance in elite referees. The authors recommended that the physical fitness test has implications for aerobic fitness and should have priority in the physical conditioning programmes of referees.

The Impact of Age on the Referees Physical Fitness Performance

Physical activity in older people is believed to slow down the natural aging process through its effects on disuse atrophy. Aging is a natural process spanning the entire life of an organism. According to Olowookere (2007), aging is a universal phenomenon that is both obvious as well as inevitable. Aging can be observed as a consistent pattern of changes that every human being undergoes, starting at a very slow rate at around age 30, progressing at a more rapid rate beyond age 60. At age 60 and above most adults, according to Akeredolu & Adefuye (2007), become inactive with some of them depending on any member of their household or walking stick in order to be able to move about, and are known to suffer from certain degenerative diseases such as stroke, cardiovascular disease, osteoporosis, diabetes and liver cirrhosis.

Aging itself is difficult to classify. This, to Gothelf (2008) is because some predisposing factors that may favour or adversely affect the individual in question

do exist. Gothelf, however, cited the World Health Organisation (WHO) as classifying aging under four stages as follows;

45-59 years as Middle age

60-74 years as Elderly age

75-90 years as Old age

90 years and above as Very Old age.

Scientists' measure aging with a test called $VO_2\text{max}$. This relates to one's maximal ability to take in and use oxygen (Markin, 2008). Markin, in a study to delay aging postulated that, intense exercise maintains fitness and that people who do not exercise lose 15% of their fitness per decade, those who exercise at low intensity lose 9%, while those who exercise intensely barely lose any fitness at all. In the words of Vander-Bij, Laurent & Wensing (2002), incorporating activity into normal duty routines (for example, walking or bicycling rather than driving) is one of the most effective strategies for becoming more active. It is prudent in this regard to state that activity level and age contribute to physical performance, but a lifestyle of physical activity appear to play a more dominant role in determining physical activeness than age.

Every athlete trains to compete or participate in physical activity. The demands of each sport and the specific environment of any contest are unique to the individual athlete's success. The specific adaptation of that athlete's organism to meet the demands of that sport is also unique. Adaptation also will vary according to whether it is a final or friendly, or at altitude or in high humidity, in pursuit of defense of title, the location, in a circadian or monthly cycle, at home or following

lengthy travel, and so on. These instances of adaptation cuts across all human spheres of competitive physical activity and have been found to be at variance with increasing age. For instance, it is difficult to differentiate slowness due to inactivity from slowness as a function solely of age. It is difficult to determine whether faster times of young athletes are the result of a more active lifestyle, a higher physical performance motivation level or age range. However, the belief that most of the slowing of responses in the aged is attributable to central nervous system (CNS) processing than activity decrements is repudiated (Goldstein, 2001).

Recent studies (Casajus & Castagna, 2006; Westerkerp & Meijer, 2001) postulate that the physiological changes that accompany advancing age result in declines in both aerobic and anaerobic performance, with speed and power most affected. On this premise Ndovi (2009) attributes the failure of some referees in the Cooper Test to the fact that their fitness is not specific, but general. He said the dreaded Cooper Test actually measures stamina, agility, speed, endurance, balance, reflexes, coordination and flexibility; attributes that are essential for a referee's maximum performance during a match. Unfortunately, Ndovi continued, referees lack the guidance and will power that can drive them to raise their fitness. They only train when there is an announcement that the Referees' Associations will conduct the fitness test. This invariably affects the aged ones. Ndovi contended, the fitness test is designed in such a way that anyone above 45 years, the retiring age for the profession, does it at his own risk, "you can cheat CAF and FIFA about your age but you cannot cheat the new fitness test if you are above 45" (<http://www.sundaytimes.bppmw.com/article.asp?ArticleID=963>).

Age cheating in refereeing has been condemned in studies (Asagba, 2005; Mba, 2009), to the extent that it has been suggested age cheats should be delisted and flushed out. This suggestion is upheld since increments in age have been found to correlate negatively to efficient aerobic and physiological function and positively with visual, temperamental, onset of fatigue, and decision making constraints. Most Ghanaian referees reduce their ages so as to beat the retiring age of 50 years. This is to enable them continue to officiate matches when they should have retired.

Studies (Castagna et al., 2005; Golant et al., 2008; Weston et al., 2008) on the age-related effects on physical fitness levels in elite-level soccer referees, stressed that referees assume the peak of their officiating careers at an averagely older age than competitively matched soccer players. An age bracket of 10-15 years was identified. They did not observe any group effect for the 12min performance whereas speed and acceleration tests were significantly better in younger referees. The authors advised younger officials to ensure that they develop appropriate levels of aerobic and anaerobic fitness to be able to match the demands placed upon them while refereeing throughout their careers. They further recommended that to promote this, physical fitness test standards should be age-related.

Weston et al (2008) examined the effects of age on the physical match performance and match physiological load of 22 professional elite-level soccer referees aged 31-48 over four consecutive seasons and found no age effect for distances from the ball, and average distance from fouls comparing younger referees to older ones, but indicated significant average age effects for total distances covered, the YYIRT and the short sprint. The authors concluded that the

reduced physical match performances associated with increasing referee age did not appear to impact upon the older referees' ability to keep up with play. They, therefore, admonished refereeing bodies to review their age-based retirement guidelines. Referees are subjected to proportionality increase in physical demands as the years go by. Indeed their peak performance, according to Castagna, Abt & D'Ottavio (2007), Golant et al (2008), and Weston et al (2008), is usually between 30 and 45 years of age after which cardiovascular athletic performance starts to decline.

During a soccer match the cardio-circulatory system of the referee is severely tasked, since research indicate that the referee does more running than the players (Golant et al., 2008). This places a lot of strain on the referee in the quest to exhibit huge levels of physical fitness. Referees need to be alert and near the scene of action, and their level of fitness must be such that fatigue will not impair their decision-making. This is corroborated by Golant et al (2008) who opinionated that referees are subjected to a proportionate level of physical activity as demanded by the variability of motion activities and exhaustion when officiating matches. This has serious implications for the efficient consumption, utilisation and processing of oxygen in the organs of the body, and the adequate physical activity demands imposed on the older referee, since in the words of Venkateswarlu (2009), "as we age, we lose muscle mass, flexibility, and bone mass, and aerobic capacity declines. Loss of muscle mass results in a decrease in body weight, while the percentage of body fat increases" (p. 136).

Psychology of Refereeing and Stress Management

The referees' concentration and alertness is built when he or she is able to apply psychology and also manage stress effectively. Weinberg & Gould (1999) defined sport (and exercise) psychology as the scientific study of people and their behaviour to sport (and exercise activities) and the practical application of that knowledge. In the words of Salokum & Ogungbenro (2006), it is “a construct relating to the application of the scientific principles and practices of psychology to predispose, precipitate and perpetuate favourable corresponding psychomotor responses to both the internal and external stimuli associated with sport situations” (p. 30). Psychology which in simple terms is the study of behaviour and mental processes seeks to read meaning into the actions of people. Behaviour can be an observed movement or speech and mental processes are in the form of abstract thoughts, memories, and emotions.

It must be stressed that apart from physiological (strength, fitness) and biomechanical (technique) factors, psychological factors also play a crucial role in determining performance (Graham & Hardy, 1990). A large proportion of athletes fail to perform to potential because they are unable to maintain their concentration in the face of distractions. This is a problem for all serious sports performers and officials, no matter their ability level. For example, it is suggested by Graham & Hardy (when they cited Patmore, 1986) that, golf is at least 90% psychological. The authors calculated that a golfer takes at least 16 hours to complete the 72 holes. The actual time used in swinging and striking the ball during these 72 holes is approximately 7 mins and 30secs, leaving 15 hours, 52 mins and 30 secs (99.2%) of thinking time. This clearly is ample time for even the most skilled

performers to distract themselves. One of the major concerns of many sports performers and officials striving for peak performance is to reach a psychological state which will facilitate that level of performance.

Psychology of refereeing refers to the action of the referee after he has read players mind and behaviour before, during, and after a match. That is, the response the referee dissipates as a consequence of the actions exhibited by the players. It also relates to the influences on the referee himself to behave in a particular manner in conformity with the laws of the game during a match. The referee's psychological skills, according to Albert Agbovi, CAF Instructor and Chairman of the RAG Working Committee until the beginning of the 2010/2011 football season, in a lecture to the 2007/2008 Onetouch Premier league referees at the annual course at Prampram, can be developed through:

1. Relaxation; to arrive at the match venue early enough so as to rest well before the match.
2. Visualisation; to put oneself in the game, that is, to run, blow the whistle, flag well, and take accurate decisions. By so doing the referee plays the game before it is actually played.
3. Psyche up (Stimulating emotional arousal); to convince oneself that one can braze through all odds and perform creditably. The referee must not see him or herself as a failure. At the same time the referee must eschew tendencies of over confidence.
4. Thought Control; not to allow negative thoughts of past events (poor performance, meeting the same team and so on) to linger on one's mind (Agbovi, 2007).

He lamented further that to be able to apply psychology, certain qualities are required of referees. This includes;

1. Ability to read the game or tactical awareness
2. Ability to handle pressure
3. Total concentration
4. Decisiveness
5. Correct tolerance level and
6. Good communication skills (verbal and non-verbal).

The above notwithstanding, some referees bring themselves into public ridicule by applying the laws of the game to the letter, irrespective of difficult situations that demand taking bold decisions in the spirit of the game (as a referee in the 2002 World Cup final held up play to allow a Brazilian player to change his shirt and join the team before continuing with play, when in fact the referee should have asked him to go off so play continues), committing too many mistakes in a single match, not keeping pace as a result of the inability to anticipate the next direction of play, and fixing matches to make sure a team wins at all cost. Such referees are regarded weak in the effective application of their psychology.

The following factors, however, to a large extent affect the referee's psychology;

1. Knowledge of the laws of the game and its appropriate application
2. The size of the spectators; overwhelmingly large

3. The composition of the spectators; GFA members, referees committee members, other referees, females, and so on
4. The distance of the crowd from the referee
5. The attitude of the crowd
6. Influence of the home crowd
7. The experience of the referee; years of refereeing, age in relation to the players, exposure
8. The health condition of the referee (Agbovi, 2007).

Stress is associated with every human activity. It is the nervous strain that one experiences as a result of what happens around the individual. Sports by its nature are highly competitive and the rewards for success are often great. Sport at the highest levels is like an experiment in which the central factor determining the quality of performance is the individual's ability to cope with stress. Welford (as cited in Hammed, Jimoh & Adesina, 2006) has revealed that stress among sportsmen arises whenever there is departure from optimum condition of demand which the individual is unable to correct. McGrawth (2002) argued that when a stressful situation occurs, then there is substantial imbalance between demands imposed upon an organism by the environment and the organism's inability to cope with those demands. In agreement with this, Seyle (1974) was quoted by Hammed et al as seeing stress as a state of manifestation by a specific syndrome of biological event, an act or situation that places physical or psychological demand upon a person, that is, as a reaction to noxious stimulus. It can also be defined as a pattern of disruptive physiological reaction to events that threaten our

ability to cope. Some level of stress is desirable to generate enthusiasm, creativity, good livelihood and productivity. This type of stress is known as eustress or good stress. Excessive levels of stress could be detrimental. This detrimental type of stress called distress, makes people irritable, dampens their spirit, and shortens their lives.

Various occupational settings require different skills, talents and attitudes that subject workers to stress, however, situations arise where the work is done continuously, such as daily practice, which most sportsmen go through in an effort to improve performance through training. However, stress may arise as a result of the incessant training or from feelings of inadequacy which often characterise boredom due to daily performance of events. Stress in simple terms is a result of an organism's inability to cope with external and internal demands which he or she is faced with. It might be physical or emotional; there is the stress overloads and stress underloads. It has been argued that stress affects sportsmen's effectiveness and precipitates serious health problems on them. Yet, without emotions, human beings will act like robots. However, the stress that is most harmful is those that come from frustration and continued anxiety or persistent fear or anger which most sportsmen exhibit during preparation of actual sporting events (Hammed et al., 2006). When these emotions exist for long in sportsmen, they create a host of health problems such as problems with lack of focus and flow of emotional imbalance, and other related psychological problems.

The referee is stressed when he or she visualises; the consequences of his or her own mistakes, the difficulty of refereeing particular matches, familiarity with certain teams because of handling their matches repeatedly, the fear of technical

mistakes and the damaging or unfavourable reports of the MC or Referees Assessor.

Stress in sports can be discussed under three headings. They are stress responses, stress and performance, and stress management or self regulation (see appendix D). Stress responses are almost universally referred to as anxiety and are focused on the period preceding competition. The reasons that were identified for this state according to Graham & Hardy (1990) when they cited Silver & Hardy (1984) are; the assumption that the athlete's mental set prior to competition can affect subsequent performance; that the athlete has some control over his mental preparation during the pre-competition period; that at a practical level, this period is much more accessible to researchers than the period of competition itself; that if pre-competition anxiety is a negative source of performance variance then the clinician can assist in developing an appropriate pre-competition state. On symptoms of stress; arousal, increase in pulse and increase in blood pressure and respiration are cited as the physiological symptoms. Cognitive symptoms observed are obsessive thought and inability to concentrate. Fear, anxiety, anger, excitement, embarrassment and depression are the identified emotional symptoms.

According to Graham & Hardy (1990) three indicators can be used to measure anxiety;

1. Cognitive self-report questionnaire. These are sport-specific trait anxiety, for example sport competition anxiety, competitive state anxiety.
2. Physiological;

- a. Respiratory and cardiovascular indicators, such as pulse rate, blood pressure and respiration rate.
 - b. Biochemical indicators, including adrenalin and noradrenalin studies.
3. Behavioural; this presents obvious problems in sport-related research as it is extremely difficult to distinguish between anxious behaviour and coping behaviour.

The stress and performance indices have been a major worry to researchers as the precise identification of the relationship between the two has proved elusive. Researcher's inability to precisely define and distinguish between key concepts such as arousal and anxiety accounts for the above contention. There are, however, stimulating research interests in the United States and Britain, especially using the Kerr's Application of Reversal Theory and the Thom's Mathematical Theory of Catastrophes.

The Kerr's Application of Reversal Theory is a theory of personality, motivation and emotion in the field of psychology. It focuses on the dynamic qualities of normal human experiences to describe how a person regularly reverses between psychological states, reflecting their motivational style and the meaning they attach to a given situation at a given time, for example, a crying baby creates sympathy, other times it causes irritation. The theory distinctively proposes that human experience is structurally organised into metamotivational domains of which four have been identified. Each domain consists of a pair of opposing values or motives, so that only one of each pair can be experienced in any given moment. The domains, according to Kerr (2007), are;

1. Means-Ends: (a) Telic (or serious) and (b) Paratelic (or playful). It refers to whether one is motivated by achievement and future goals, or the enjoyment of process in the moment.
2. Rules: (a) Conforming and (b) Rebellious (or negativistic). It refers to whether one enjoys operating within rules and expectations, or whether one wishes to be free and push against these structures.
3. Transactions: (a) Mastery and (b) Sympathy. This relates to whether one is motivated by transacting power and control, or by care and compassion.
4. Relationships: (a) Autic (or self) and (b) Alloic (or other). This refers to whether one is motivated by self interests (personal accountability and responsibility) or by interests of others (altruism and transcendence). (http://en.wikipedia.org/wiki/reversal_theory).

Appendix E gives a vivid description of the component characteristics of the four pairs of metamotivational states of the theory.

Reversal Theory links the motivational states to emotion by proposing that if one is in a state and things are going well, positive emotions result; if the needs of the state are not fulfilled, negative emotions result. Reversals are thought to be involuntary and sometimes unexpected, that is, a person cannot suddenly decide that he or she would prefer to be in , say, the telic state and consciously prompt a reversal to that state from the paratelic state. In “applying Reversal Theory to counsel athletes,” Kerr (2001) considers “human behavior to be inherently inconsistent and that reversal between paired metamotivational states form the basis of human personality, emotion and motivation”

(http://www.amazon.com/Counselling_Athletes_Applying_Reversal_Theory/pd/049261206). This signifies that an athlete who finds him or herself in the same situation on different occasions may behave in totally different ways.

In a similar vein the ‘Thom’s Mathematical Theory of Catastrophes’ developed by a French Mathematician; René Thom in the 1960s, stipulates that a small path change produces a large response change, or a smooth continuous input leads to discontinuous response (Poston & Stewart, 1998). The theory explains that small incremental changes in the value of a variable in a natural system can lead to sudden large changes in the state of the system, for example, the change in water from solid (ice) to liquid (water), to gas (steam); the crashing of a building to the ground, or the unexpected buckling and quaking of the earth. Catastrophe Theory has been used to explain how, through the interaction of various factors, a small change in one of the factors affecting a system can lead to a catastrophic change in the system.

Sports Psychologists have applied the theory to the development of stress in athletes during competition. Such stress emanates from physiological arousal (changes in heart rate, sweating, adrenaline secretion and so on) and cognitive anxiety (mental anxiety), which have been identified as the two main factors associated with stress among athletes. Sports Psychologists use the theory to explain why athletes subjected to a critical level of stress experience a huge and sudden loss of performance. They use a 3-D graph to assess the relationship between the two factors. The surface shape of the graph represents performance. It elaborates that when stress increases up to a critical level, performance improves. At the critical level the surface folds so that more than one level of

performance can occur. This leads to an athlete's performance leaping unexpectedly from one level to the other. Beyond the critical level, further increases in stress result in poorer performances.

Stress management and self regulation, the third component of stress, connotes ability to cope with stress. It is important to realise that, according to the interactional approach, stress does not always have negative connotations. Rather, the stress of competition may cause (negative) anxiety in one performer, but (positive) excitement in another. Of those who do experience anxiety, some may use it to facilitate performance, while others may find that it debilitates their performance (Graham & Hardy, 1990). The implication, therefore, is that stress management technique should be individually tailored to cater for these individual differences.

The fact that the referee usually has to hold down a professional job outside football is another source of stress. This brings them little sympathy from soccer spectators when refereeing decisions are not to their liking. This I am sure is why FIFA has demanded the professionalisation of referees to help uplift the standard of the game. To achieve this, FIFA resolved to reduce the size of the international list of referees in 2006 from 3000, because they claim the huge figure accounted for the gap in standards between referees. This they explained meant that each referee officiate too few matches so monitoring and assessing them on a regular basis was impossible. In line with this decision, the GFA President also agitated for a drastic reduction of the refereeing list in Ghana from the 2006/2007 soccer season. This was resorted to and implemented in the 2009/10 Glo Premier league when the list was reduced from 112 to 90.

Proffering solutions to the effective management of stress, Agbovi (2007) recounted that referees should;

1. Focus attention on the requirements of the match situation and to shut out preoccupied internal worrying behaviour.
2. Acquire constructive mood and positive approach at all times whilst working hard to overcome temporary frustrations and contingency occurrences especially in a match
3. Training oneself psychologically to be able to perform consistently well under pressure.

One other way of managing stress is to undergo self-regulation training, that is, coping with stress and enhancing the likelihood of peak performance. This can be done by;

- a. Setting specific challenging goals (short and long term)
- b. Relaxation; somatic (progressive muscular relaxation) and cognitive (meditation). Anxiety reduction may be more effective when relaxation strategies are matched to the precise modes of the anxiety responses.
- c. Imagery (it enhances learning, reduces warm up decrement, reduces anxiety and self confidence).

It suffices to state from the foregone that referees' psychological and stressful make-up has consequential implications on the performances they exhibit during officiating. As much as the referee has to manage stress efficiently, the application of psychology is of utmost importance in the discharge of refereeing

assignments. It must be borne in mind that stress is inevitable without which life is meaningless and that a complete freedom from stress is death.

Referees' Physiological Demands and Energy Expenditure

Studies by Da Silva, Fernandes & Fernandez (2008), indicated that the energy needs of individuals vary according to their age, sex and the physical activities they perform during the day. Healthy male individuals present an average energy demand of 2900 kilocalories per day (kcal/day), however; a professional soccer player's energy demand oscillates from 3500 to 4300kcal/day. The referee who is the key official in regulating play behaviour of soccer participants by implementing the laws of the game, observe the actions of players in an area that measures 8.250m² on average (Castagna et al., 2007). Approximately every 4-6 seconds, the referee changes motion activity (D'Ottavio & Castagna, 2001; Krustup & Bangsbo, 2001), equating to 1268 different activities during 90 minutes of an official match. Of these, 588 are consequence of low intensity activities (standing, walking, jogging) and 161 of high intensity (running and sprint) (Krustup & Bangsbo, 2001). These indicate that soccer refereeing is a high intermittent exercise mode. In other words, soccer referees have significant aerobic expenditure throughout a match and episodes of considerable anaerobic energy turnover.

The referee has to be decisive as a result of a relatively high level of physiological stress, and must also be strict, yet employ discretion where appropriate. The other officials, the two assistant referees, offer some assistance in cases of controversy, but the ultimate decision is charged to the referee. The referee is expected to keep up with play whatever its tempo in addition to

maintaining alertness throughout the game. These demands have implications for fitness required to officiate at a high level.

Da Silva et al (2008) in studies in Brazil indicated that, referees cover an average distance of 9155.5 (\pm 70.3m, 8411-9765) during a match, a value similar to that observed in other studies (Krustrup & Bangsbo, 2001), but lower than that observed by Castagna, Abt & D'Ottavio (2004) in Italian referees. Golant et al (2008) have also indicated distances of between 7000 and 10000 metres. Reilly (1996) referenced Caterall et al (1993) that referees cover a mean distance of approximately 9.5m. Also studies in Japan by Asami et al (as cited in Reilly, 1996) revealed mean distances of 10.5 km. In studies on ten female referees who officiated in the FIFA Under-20 Female World Championships held in Russia in 2006, Malo, Veiga, Subijana & Navarro (2010) observed average total distance covered during a match as 10km which 1.3km represented high-intensity activities. The authors also found out that the referees' highest mobility was achieved in the initial 15min of the match, covering greater distance and performing more intense exercise than in the final 15min of the game. They did not find any significant differences between 15min match periods, but realised mean distance from the referee to the ball to be 19.5 (\pm 2.4m), a figure more than twice higher than the 8.250m² reported by Castagna et al (2007) for male referees.

In all matches, the total distance covered during the two halves was not significantly different with 4625.2 (\pm 43.1m) covered in the first half and 4530.2 (\pm 43.0m) in the second half. Of these total distances an average 4591.5m walking, 2527.2m jogging, 1010.9m running, 122.7m sprinting and a backward running average of 852.6m were recorded. The distance covered by walking

increased significantly in the second half, to 2365.0 (\pm 45.86m) from a first half total of 2226.8 \pm 41.3m (Da Silva et al., 2008). The study revealed further that the distance covered by jogging significantly reduced in the second half from 1353.60 (\pm 355.3m) to 1224.0 (\pm 347.0m). The total distance covered by backwards running was 852.6 (\pm 262.6m), with significant differences observed from 467.3 (\pm 33.1m) in the first half to a much reduced 385.3 (\pm 27.5m) in the second half. The total distance covered in high intensity activities (running and sprint) were 1010.9 (\pm 74.5m) and 122.7 (\pm 19.3m), respectively. There were no significant differences for these activities between the two halves. Reilly (1996) also indicated that of the total distance of 9.5km, an average 47% is covered at a jogging pace, 23% walking, 12% sprinting and 18% reverse running.

The physiological strain incurred by soccer referees during official matches has been indicated by monitoring heart rate (Krustrup & Bangsbo, 2001; Reilly, 1996; Weston & Brewer, 2002). The average match heart rate found in a study by Da Silva et al (2008) indicates that referees attain 85% maximal heart rate. D'Ottavio & Castagna (2002) directly measured VO_2 responses using a portable light-weight gas analyzer in elite-level soccer referees officiating during a friendly match. They found that over the observed match period (first half) the referees attained 68% of the VO_{2max} , a value lower than the 70-75% reported (Reilly as cited in Da Silva et al., 2008) and the approximately 80% recorded by Golant et al (2008). Accurately measuring VO_{2max} involves a physical effort sufficient in duration and intensity to fully tax the aerobic energy system. In general, clinical and athletic testing usually involves a graded exercise test (either on a treadmill or on a cycle ergometer) in which exercise intensity is progressively increased while measuring ventilation and oxygen and carbon dioxide concentration of the inhaled

and exhaled air. VO_2 max is reached when oxygen consumption remains at a steady state despite an increase in workload (en.wikipedia.org/wiki/coopertest).

Reilly (1996) and also cited in Da Silva et al (2008) reported heart rates averaging 165 beats per minute (bpm) throughout whole matches on measurements of 13 referees during top-class league matches. Reilly used the short-range radio telemetry, a lightweight equipment worn around the shoulder of the referee without interfering with him in any way to conduct the measurements. In another study, Golant et al (2008) also indicated an average heart rate of 150 to 160bpm. The assertion by Reilly is supported by the figure in appendix F. From the figure it is evident that the heart rate prior to the start of the match is 150. This increases to 165bpm at the start of the game. Rest periods because the ball is out of play, walking because the ball is within playing distance, stopping play to assess injury to players and also to caution players, all contribute to decreased fluctuations in the level of the heart rate. During the half time interval there is a drastic reduction to about 100-120. This shoots up again during the second half, but steadily until about 35 minutes when it goes up sharply as the game increases in tempo. This time the losing team often steps up play to attempt to redeem their image and the winning team also tries to maintain their composure and winning way, and so thwart all opposing efforts. The urgency on the part of the losing team to move the ball quickly forward and press for a score means that the work-rate demands on the referee are unrelenting until the game is over. The heart rate experiences a drastic decline just after the end of the game to below 100bpm.

The maintenance of the high heart beat of 165 over long periods leads to a fatigue effect which is usually evident in referees as a fall-off in work-rate

towards the end of play manifests (Reilly, 1996). Energy expenditure values of each motion action were estimated from the time they spent in each motor activity during the match applying the equations provided by the American College of Sport Medicine (1988), cited in Da Silva et al (2008). Da Silva et al related that the total energy expenditure during the match was $734.7 \pm 11.9\text{kcal}$ ($903.2-641.3$) with significant differences observed between $374.7 (\pm 6.6\text{kcal})$ in the first half and $359.9 (\pm 6.3\text{kcal})$ in the second half. The reduced energy expenditure in the second half could be explained by the reduction in jogging and backwards activities. Direct measurements of oxygen consumption in soccer players during a match reported a value of energy expenditure of 1195kcal , and the value estimated by the recording of heart rate was 1565kcal in mean. These values of energy expenditure are significantly lower than the value of 1702kcal reported in English referees by Weston & Brewer (2002).

Reilly (1996) asserts that cognitive functions also diminish as a result of diminishing energy stores within the active muscles. The high level of exercise intensity associated with refereeing has consequences both for mental judgments and for fitness. Decrements in cognitive function are noted once the exercise intensity exceeds about $50\% \text{VO}_2\text{max}$. Appendix G and H expatiates on the above. Golant et al (2008) affirm that referees experience fatigue towards the end of a match. They cited depletion of energy stores, dehydration and hyperthermia as the factors responsible for the onset of fatigue in the later stages of a match. The authors said this consequently affect the decision making efficiency of the referee as there is an increase in mean distance from the infringements in the second period of the game, especially in the left attacking zone of the field, where the ability of the assistant referees to help was limited. Decrements in less

complex psychomotor and cognitive functions are observed at only marginally greater exercise intensities. In effect noticeable decline in mental perception, decision making and reasoning which is likely to lead to errors as exercise intensifies, is associated with refereeing during professional and international match play. From appendix G and H it can be concluded that an increase in workload is associated with a decrease in time on target and also on the number of correct responses made.

The overall pattern of a referee's activity is cyclical and varies in parallel with the players' actions. Players incur additional energy expenditure when directly involved in executing match skills, but they have a degree of choice in undertaking high intensity efforts off-the-ball. In contrast, the referee has to follow the play, irrespective of the intensity of previous movement and sometimes may not be able to keep up with it. The referee must therefore be able to anticipate the direction of play in advance and move accordingly. He or she does not display the acute-angled changes of direction which players make, but the overall work-rate profiles and the frequency of discrete events (a change in category of activity every 6 seconds) are broadly similar.

Referees' proneness to error and the diminishing work rate when fatigued, especially towards the end of the match, has led to or resulted in the taking of wrong decisions and not being able to follow play appropriately, all to the detriment of the sport. A lot of criticisms have, therefore, come in from several officials, especially at the 2006 World Cup in Germany with a number of high profile incidents taking the attention away from the matches played. This has led to the FIFA President Sepp Blatter calling for the use of two referees in matches

in the future. Speaking on the topic “use of two referees”, he believed bringing in a second referee will help eradicate mistakes and reduce controversy (Blatter, 2006). The FIFA President lamented that tests in the use of two referees have been conducted in Malaysia and Sao Paulo, Brazil with encouraging results, but an unsatisfactory reaction in Norway and Italy. He likened it to ice hockey where two referees and two assistants on a much smaller arena are used and yet they have no clashes with the players because they know the game. On, “officiating at the World Cup”, Blatter for instance, criticised the referee who handled the Portugal 1-0 win over the Netherlands, during the 2006 World Cup, in which the Russian showed a World Cup record 4 red cards and 16 yellow. He lamented, "the referee's actions harmed what would have been an excellent football match" (Blatter, 2006, p. 48). To him the use of two referees is what the game requires now to relieve it of the numerous controversies as regards errors (wrong interpretations), total endurance for the whole match, match fixing allegations, violence on referees or referees' rage and so on.

Summary

Officiating or refereeing is compatible with sports. Soccer referees officiate soccer matches. The history of soccer is shrouded in mystery as soccer is believed to have originated from the ancient combat games practiced by the Persians, Romans and Mesoamericans which had war and brutish connotations rooted in rituals. One of such games has developed into modern day soccer. To curtail the violence associated with the sport, soccer was severally banned or outlawed, but still continued to exist because of the enjoyment associated with it. Now it is considered the most watched sporting event. From oral rules formidable

rules were formulated to guide the game and control the violence. To interpret the rules well demands the engagement of referees who have undergone rigorous training over a period of time, and accredited by authority, and graduated through the ranks to the highest level. They are charged with the interpretation of the 17 Laws of the Game coded by FIFA to guide the efficient and effective handling of the game. To solicit their endurance and speed, and also general health, the physical fitness test and medical test were incorporated into their training. They have specific physical assessment routines they undergo for selection and officiating at the various levels.

The physical, mental and psychological state of referees and the stress management skills at their disposal are very paramount in determining their success while officiating. With the enormous benefits derived from training and exercise, the referee is advised to train satisfactorily throughout the season physically, and in the interpretation of the laws of the game to make an impact in refereeing. The performances they exhibit on the field of play are of tremendous importance to all stakeholders.

Several studies conducted on international referees have revealed that, when officiating soccer matches, referees cover an average distance of 9155 ($\pm 70.3m$). Differences in game style and match intensity among countries account for the wide dispersion of total distances covered by referees. Motion activities of walking, jogging, running, sprinting and backward running accounted for the distances covered. Some of these activities are of low intensity and others of high intensity, an indication that soccer refereeing is made up of bouts of high and low intensity exercise modes. Mean energy expenditure was quoted as 734.7

(± 11.9 kcal). It was also indicated that the intensity of soccer referees' physical activities during official matches is estimated by the recording of the heart rate to ascertain the physiological strain incurred. Heart beats averaging 165bpm was recorded with fluctuations down to 100 when there is reduction in motion activity.

As energy stores diminish as a result of prolonged work rate, fatigue sets in and then there is a fall-off in performance. Results of studies suggest that referees experience fatigue towards the end of a match. Factors such as depletion of glycogen stores, dehydration, and hyperthermia may contribute to the development of fatigue in the later stages of a soccer game. Fatigue affects the decision making efficiency of the referee as studies revealed an increase in mean distance from infringements in the second period of the match, especially in the left attacking zone of the field, where the ability of assistant referees to help was limited.

As the key official in the implementation of the laws of the game and in regulating the behaviour of players, the referee's work rate is supposed to be higher than the players and must therefore remain focused on task, to avoid the numerous criticisms that spectators and other stakeholders lavish on them. To cut down on the inconveniences, a suggestion to have two referees in the middle of a match has been made and subsequent tests have been conducted in some countries. With this it is believed that the workload would decrease leading to an increase in the number of correct responses to be made. This notwithstanding, the referee is admonished to exhibit a high level of cardiovascular and muscular endurance to better able endure the entire duration of a match. This is important even if extra time is played to determine the winner of a match. The incidences of

a diminishing work rate and fall-off in performance even if fatigue sets in, would thus be relegated to the background.



CHAPTER THREE

METHODOLOGY

This was a hypothetical study which investigated the physical fitness levels soccer referees in relation to their performances during officiating in Ghana. The methods and procedures of obtaining data for the study are given treatment in this chapter. Specifically, it focuses on the following areas:

1. Research design
2. Population
3. Sample and sampling procedure
4. Instrument
5. Data collection procedure, and
6. Data analyses procedure.

Research Design

The cross-sectional survey plan was employed to conduct the research. This focused on the overall structure according to which the entire study was carried out. The inductive statistic concept was used to carry out the test on a group of three strata of referees based on the sample taken from the population, and the results were used to describe the whole larger group of referees in Ghana.

Three types of survey research design were identified; the cross-sectional design, where information is collected from one or more samples drawn from the population at one time and used to describe the population at that point in time. It is used to assess interrelationships among variables within a population and also to describe the characteristics of a population or the differences among two or more populations. It is ideally suited to the descriptive and predictive functions associated with correlational research; the successive independent samples design is a series of cross-sectional surveys in which the same treatment is given to each succeeding sample of different respondents. Limitations of this type are, they are not representative of the same population, are not very helpful in ferreting out the reasons for observed changes in responses; and longitudinal design, where the same sample of respondents are interviewed more than once over a period, for example, pretest and posttest. The major disadvantage of this design is respondent mortality.

Descriptive surveys are meant to describe one group and that only, any similarity to those individuals or groups outside the group to be studied cannot thus, be assumed. When descriptive survey cannot identify everyone, it assesses a representative sample and then makes inferences about the population. As this study concerns the assessment of the physical fitness levels of soccer referees in Ghana in relation to their performances during officiating, fitness assessment results were collected on referees from the Northern, Middle and Southern belts of the country from 2003-2005, and compared with their performances during match-play, their fitness levels in match-play, and their ages. The results from the analyses were then used to generalise the refereeing population in Ghana at that point in time.

In line with such cross-sectional design generalisations, Denscombe (2003) related that surveys are associated with getting purposeful and structured information from the main source. He laments that the very notion of a survey suggests that the research has involved an active attempt by the researcher to go out and search. Denscombe maintains that surveys are associated with getting information easily associated with large scale research, covering many people or events. It enables the researcher to collect enough data to determine the nature of the group to be studied as it exists at the time of the study. The scope of coverage means that the findings from a good research scores well when it comes to generalisation. The author further states that if the coverage is suitably wide and inclusive it gives credibility to generalised statements made on the basis of the research.

Commenting on the uses of surveys to complement Denscombe's (2003) stance, Bordens & Abbott (2002) states "... used to evaluate specific attitudes or behaviours and also to predict behaviour" (p. 219). Contrary to the above submission, Denscombe (2003) points out that irrespective of surveys' wide scope of coverage, the data that are produced are likely to lack much by way of detail or depth on the problem investigated. Also, the emphasis on wide and inclusive coverage limits the degree to which the research can check on accuracy and honesty of responses. In the view of Fraenkel & Wallen (2000), three advantages can be associated with descriptive surveys;

- I. It provides a meaningful picture of events and seeks to explain people's perceptions and behaviour on the basis of information obtained at a point in time.

- II. It can be used with greater confidence with regard to particular questions which are of special interest and value to the researcher.
- III. Follow-up questions can be asked and items that are not clear can be explained.

To make sure that the data produced would not lack depth but rather reflect total accuracy representative of the three refereeing belts in the country as a whole, similar data were collected and pilot-tested. This offered me the opportunity to assess the pattern of the study to investigate the real data collected according to the proposed proportions, relegating biases to the background. Also personnel who offered the information were assured of anonymity and confidentiality of the study subjects to enable them dig through their documents and files to offer the needed information.

Population

Population is a group of elements or cases that conform to specific criteria and to which generalisation of the test result can be made. The elements or cases could be individuals, objects or events. Fraenkel & Wallen (2000) described population as the group of interest to the researcher, “the group to whom the researcher would like to generalise the result of the study” (p. 104). In agreement with Fraenkel & Wallen, Creswell (2002) contends that population is a complete set of individuals (subjects or events) having common observable characteristics in which the researcher is interested. Bordens & Abbott (2002) also confirm that a population includes all people in a definable group. This implies that a population can be of any size and that it will have at least one (and sometimes several) identifiable characteristics that sets it off from any other population.

To obtain data for this study, the refereeing population in Ghana which is comprised in the ten regions of the country was considered. For the study to be reliable and to acquire a fair representation of the subjects and to be representative enough, the country was zoned into three belts or strata; Northern, Middle and Southern. The Northern, Upper East and Upper West regions represented the Northern belt. The Ashanti, Brong Ahafo and Volta regions were categorised under Middle belt. Regions that received treatment under the Southern belt were Central, Eastern, Greater Accra and Western. From the belts, the Northern, Brong Ahafo and Eastern regions, respectively, were randomly selected. All the referees in these three regions within the period of the study formed the accessible population. Northern region 48 (Northern Region Referees Association [NRRA], 2009), Brong Ahafo region 77 (Brong Ahafo Referees Association [BARA], 2009) and Eastern region 131 (Eastern Region Referees Association [ERRA], 2008) totaling 256 referees.

Sample and Sampling Procedure

Sampling refers to the process of selecting a portion of the population to represent the entire population. Generally, sampling enables the researcher to study a relatively small number of units in place of the target population to obtain a representation of the whole target population. Bordens & Abbott (2002) and Fink (2001) have related that a sample consists of a small number or a subset of a larger group. The authors are of the view that sample is a representation of the population with important characteristics (e.g. age, gender, status) which are distributed similarly in both groups. According to Sarantokos (1998), some of the common reasons why researchers opt for sample surveys are that in many cases, a complete coverage of the population is not possible; sampling provides a better

option since it addresses the survey population in a short period of time and produces comparable and equally valid results. Samples are thought to offer more detailed information and a high degree of accuracy because they deal with relatively small number of units.

Expatriating on the representativeness of a sample, Bordens & Abbott (2002) stated that regardless of the technique one uses to acquire a sample, the sample should be representative of the population, and that “a representative sample closely matches the characteristics of the population” (p. 239). To them a large sample is more likely to represent all segments of the population than a small one. However, it does not guarantee that representation in your sample will be proportionate to representation in the population. In this context a small sample that is representative enough of a population is more preferred to a large sample that does not fully represent all segments of the population. If the sample is completely random, according to Vernoy & Kyle (2002), then the sample mean should be a good estimate of the population mean. The larger the sample, the authors concluded, if it is random, the more likely it will be representative of the population. However, whether the sample is large or small, the mean of the sample is the best estimate of the population mean.

The sample size estimated for this study was 102 (40% of the accessible population), but records could only be traced to 25.4% of the study subjects. This reflected in a total of the 65 reached, out of the accessible population of 256 (Northern belt 48, Middle belt 77 and Southern belt 131).

To obtain the sample size a combination of the stratified and proportionate multistage sampling technique were used. First, the target population (Ghanaian refereeing population) was put into three strata or segments; northern, middle and

southern. This was to ensure that referees from the various parts of the country were represented, and in line with Bordens & Abbott's (2002) tip on stratified sampling, that one begins by dividing the population into segments or strata, and then selecting a separate random sample of equal size from each stratum. Fraenkel & Wallen (2000) also saw the technique to be a process in which certain subgroups or strata are selected for the sample in the same proportion as they existed in the population. Next, the regions that fall into each stratum were identified based on their location and proximity to each other: Northern belt; Northern, Upper East and Upper West regions, Middle belt; Ashanti, Brong Ahafo and Volta regions, and Southern belt; Central, Eastern, Greater Accra and Western regions. A simple random using the balloting technique was then conducted from the sets of regions to arrive at the selection of the Northern, Brong Ahafo and Eastern regions, respectively. Using the multistage sampling, the cluster of refereeing districts that fell under each of the selected regions and their numerical strength were then identified. The details were;

Northern region; Tamale 23 (47.9%), West Gonja 11 (22.9%), and Yendi 14 (29.2%) totaling 48 (100%).

Brong Ahafo region; Berekum 20 (26%), Sunyani 41 (53.2%), Techiman 5 (6.5%), and Wenchi 11 (14.3%) totaling 77 (100%).

Eastern region; Asamankese 17 (13%), Kibi 13 (9.9%), Koforidua 45 (34.3%), Mampong 10 (7.6%), Nkawkaw 14 (10.7%), Nsawam 12 (9.2%), and Suhum 20 (15.3%) totaling 131 (100%).

To access a sample representative of the individual districts, their enrolments were subjected to a proportionate calculation of 25.4% to arrive at the final sample for the study. This gave out the following figures;

Tamale 6, West Gonja 3, and Yendi 4 totaling 13.

Berekum 5, Sunyani 10, Techiman 1, and Wenchi 3 totaling 19.

Asamankese 4, Kibi 3, Koforidua 11, Mampong 3, Nkawkaw 4, Nsawam 3, and Suhum 5 totaling 33.

The totals of 13, 19 and 33 yielded the final sample size of 65 used for the study. Although this size of 65 might look too small compared to the population, the study was considered scientific since it was an economic size that fairly represented the strength of the study subjects and did not portray any biases. Also accounting for such a small sample was the inadequate data covering the originally proposed proportion of subjects for the study. The combination of stratified and multistage sampling techniques was used due to the claim by Bordens & Abbott (2002) that there is a guarantee that each segment of the population is usually represented in the sample.

The demographic characteristics of the sampled referees retrieved from their database indicated an average age of 31.8 (\pm 6.6 years, range 18-52). Referees in the middle belt of the country were found to be younger than their Northern and Southern counterparts. The number of females identified from the accessible population, within the study period, was only 9. This indicated a female to male ratio of 1:28. Close to 50% of the referees were class one referees (118) with the remaining 138 being class two and three referees. The least number of years spent in refereeing was three years. Some had been referees for as long as 15 years. With the exception of fifteen referees who did not indicate their educational background and three who possessed the Middle School Leaving Certificate (MSLC), the rest had accessed a minimum of second cycle education. One hundred and eighty-nine referees were in various employments, twenty-six were

students, six were educated farmers and twenty were educated but unemployed. All the MCs were also into gainful employments with majority of them being teachers. This did not cast doubts about their abilities in the entries they made in the assessment of the referees' performances.

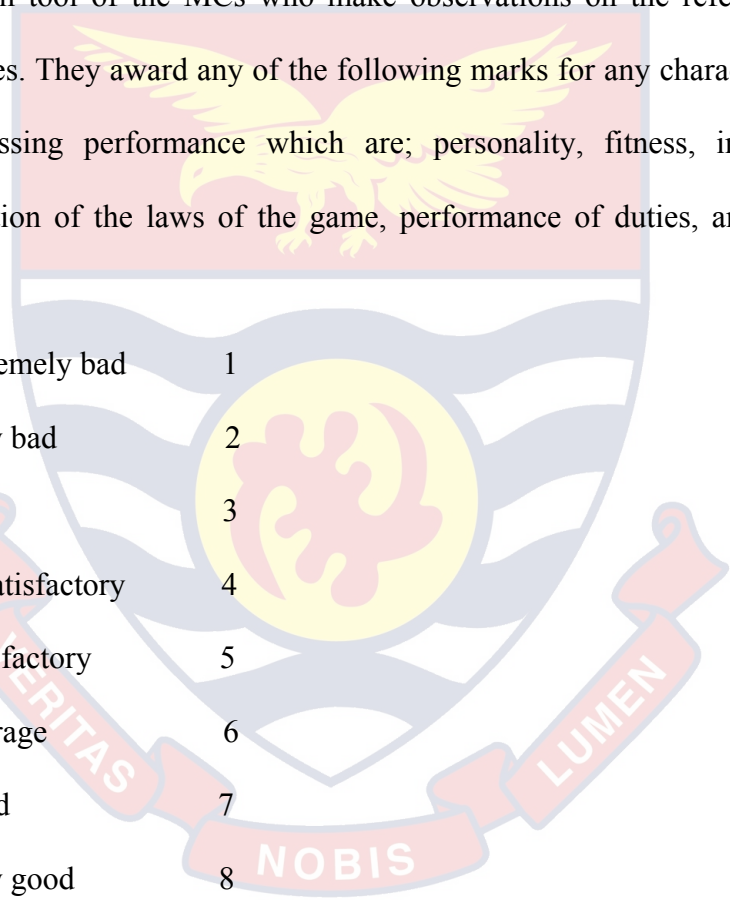
Instruments

Educational research lends itself to the use of several data gathering methods. Special areas of study have peculiar methods of gathering data. Others are also selected based on the suitability of an instrument used for the gathering of the data. Two forms of documentation were utilised for this study; data on physical fitness test results of referees covering 2003 to 2005 collected from the Regional Referees Association secretariats of the sampled regions, and match assessment reports collected from the secretariats of the Regional Football Associations (RFAs) on the sampled referees over the same period. Further, demographic characteristics of the study subjects were retrieved from their files and databases.

The documents on the Physical Fitness Test (Cooper Test) gave details of the ages and distances covered in the test items; 50m, 200m and the 12 minute run. The 12-minute run was basically used as the main assessment tool. It stipulates the maximal oxygen uptake of the referee. Here, the referee runs a 400m course severally within 12 minutes, and is expected to cover a minimum distance of 2700m for men and 2400m for women. Any performances below these are considered failures. Walking is forbidden during the race. The ages (in years) of the referees in the year of the test are also given attention on the form. Here the referee registers the current age against the name. There is always the tendency to underestimate the age which makes a meaningful comparison of the age and the Cooper Test a mirage. For the purposes of the analysis, the recorded ages were

crosschecked with the date of birth as at the time of joining refereeing (as indicated in the personal files and database). The instrument used to collect data on referees Cooper Test is presented in appendix C. This was singularly used to respond to research question three.

The Match Commissioners (MC) match assessment report collected from the RFAs was the second main document used for the analysis. This report form is the main tool of the MCs who make observations on the referees as the latter officiates. They award any of the following marks for any characteristic observed in assessing performance which are; personality, fitness, interpretation and application of the laws of the game, performance of duties, and discipline and control.



Extremely bad	1
Very bad	2
Bad	3
Unsatisfactory	4
Satisfactory	5
Average	6
Good	7
Very good	8
Excellent	9
Optimum	10

The awarded marks are then manipulated under each observable characteristic and then totaled to arrive at the final performance of the referee under perspective. The scoring of the scale is usually between one and ten, one being the lowest and 10 the highest. The characteristics for observation are presented in appendix B.

The report form also includes details of the match concerning; general organisation, comportment of teams, attitude of spectators, security service, medical service, weather conditions, conditions of the ground and equipment, and protest. Also inclusive are cautions and expulsion of players, substitutions and goals scored, which are of no consequential importance to the study.

The final mark arrived at in conjunction with the referees physical fitness result was used to answer research question one. Marks awarded at observable characteristic A2 (see appendix B) was singularly used together with the referee's physical fitness result to respond to research question 2.

The mean values of the referees' physical fitness test, their performances during officiating, their fitness in matches and their ages over the 3-year period, were computed from the two forms of documentation and used for the study.

The documentation utilised for the study have been assessed to meet face, content and construct validity and reliability by FIFA and hence their adoption. At the highest level, several observations and scientific studies were conducted on subjects leading to Cooper's categorisation and stipulation of the different distance performances of the Cooper Test by different age groups and sex.

Cooper reported a physical fitness test correlation of 0.90 between $VO_2\text{max}$ and the distance covered in the 12-minute run (Cooper Test Validity, cited at <http://www.topendsports.com/testing/tests/cooper.htm>). In another development the author stressed further that, other published studies generally have a correlation of 0.65 or better for runs greater than 9 minutes or a mile (<http://www.topendsports.com/testing/tests/walk-run.htm>). It was certified that the test is highly reliable depending on practice, pacing strategies and motivation

level. The author concluded that the test is advantageous because large groups can be tested at once, and it is a very cheap and simple test to perform.

Similar studies were conducted on referees based on refereeing in general. Observations were made on certain characteristics whilst the referee officiated, and marks awarded according to the degree or extent of the exhibited characteristic. The observable characteristics are; personality (10 marks), fitness (20 marks), interpretation and application of the laws of the game (30 marks), performance of his duties (20 marks) and discipline and control (20 marks). The scores summed up to 100, which was further scaled down to ten. An inter-rater scrutiny and coding, on referees performance assessment (“Study finds,” 2009), yielded a co-efficient of 0.82. FIFA’s adoption of these documents for the assessment of referees’ physical fitness levels and officiating performances, for use by global, continental and national associations, was in the right direction, as such their usage for the study.

The above notwithstanding, and to determine the validity and reliability of the instruments myself, a pilot study was conducted on referees in the Agona East Municipality. The data collected on the referees were analysed using descriptive statistics computed through the SPSS Version 13.0 for Windows, and compared with FIFAs figures. The Cronbach alpha coefficient, a measure of internal consistency, was used in the determination of the reliability. Since the instruments dwelt on Cooper Test results and officiating performance records, the internal consistency and reliability coefficients were analysed separately. Whilst the Cooper Test results gave out an internal consistency reliability coefficient of 0.71, officiating performance yielded 0.68. These coefficients were equal to the 0.70

that Fraenkel & Wallen (2002) stipulated to be the minimum acceptable figure for statistical analysis.

Data Collection Procedure

To ascertain the format, trend, and analysis procedure to be used and to determine the validity and reliability of the study, a pilot study was carried out on 20 referees who officiated in the third division organised in the Agona East municipality of the Central region in the 2003-2005 season, although the documents have been validated and have been found to be reliable by FIFA already. This was in line with the assertion by Bordens & Abbott (2002) that "... once you have organised your instrument it should be administered to a pilot group of participants matching your main sample to ensure that the items are reliable and valid" (p. 225). They further posited that after establishing reliability and validity in the small sample, you then administer your instrument to your main sample. A pilot study is a preliminary piece of research conducted with a sample of research participants drawn from the study population. Pilot studies can be used for several purposes; they can consist of observational or correlation research conducted to determine if it would be worth the time and effort to conduct an experiment; they are conducted as a final test of research procedures prior to beginning data collection; they help to detect any demand characteristics present in the research, know how much time is required for the research tasks, and also acts as the final smoothing of the rough edges of the procedures.

After selecting the municipality, the referees whose match assessment reports and physical fitness test results could be traced from the Agona East Sports Council between 2003 and 2005 were utilised. This was because information traced to certain referees in the Cooper Test lacked corresponding association

with the match assessment reports. This made it difficult for comparison since the study dwelt on association or relationships between two variables at every point in time. These referees were used because they were considered as having the same characteristics with the referees that were sampled for the actual study. This afforded me the opportunity to identify the pattern of the study, ascertain the reliability and validity of the instrument and apply the appropriate statistical tools for the analysis. The contents of the instruments were found to be relevant to the characteristics being measured (content validity) and that it actually measured all the variables postulated (reliability).

Introductory letters seeking permission to enable me carry out the research were sent to the sampled regional offices of the RAG and MCA (appendix I), after an agreement regarding the information to be accessed had been reached with the supervisors. Personal contacts were made with the Secretaries and Chairmen of the two associations, to explain the rationale behind the study and further expatiate on the requirements of the study. Originally data were to be collected on 40% of the accessible population. Information could not be traced to all the required subjects in the Northern region. The proportionate figure was thus, limited to 25.4% to avoid biases in selecting different samples for the different belts. This led to a usable total of $N = 65$ (25.4% of 256 subjects).

With this background arrangement the required information on the physical fitness test results covering 2003 to 2005 and the match assessment reports within the same period, were collected personally with the exception of the final test results of some referees sent to me in a sealed envelope through a friend, per an arrangement with the regional secretary of the NRRA. Two of the study subjects in the Northern region were also contacted personally to indicate their

performances during the test in 2003. They could supply the information because usually after each exercise the results were mentioned for all referees to write down their marks.

Each sampled region was visited not less than thrice from 2007 to October 2009. On each visit shelves and cabinets containing files and documents were thoroughly searched to access the required data for the analysis. It must be placed on record that I had a difficult time accessing the information, especially in the Northern region where proper record keeping practices were nonexistent. On several occasions I had to spend more than a day in some regions to help the personnel go through the files and documentation to identify the records of the sampled referees. On two occasions, two days of search could not yield the required results. The availability of the personnel was also a problem to contend with, since they had to be contacted on telephone to indicate their availability before I could make any journey. Accessing information from the Eastern region was less difficult. Proper records were kept which resulted in the researcher making only three journeys to the personnel at the NSC and ERRA. Demographic data were also collected on characteristics such as age (as a potential and within the period of the study), number of years in refereeing, level of officiating, and educational background, although not of consequential effect on the study, but for a later study.

Despite the identified inconveniences, all the information required on the sampled referees was finally gathered after about two and a half years.

Data Analysis

Osuala (2001) describes data analysis as the ordering and breaking down of data into constituent parts and performing of statistical calculations with the raw

data to provide answers to the research questions which initiate the research. The first step of data analysis in this study was to properly ascertain the subjects who fell under the research scope and calculate the means of their scores from the study variables (physical fitness test results, officiating performance, fitness in matches, and age) since data were collected over a period of three years. In the case of the match assessment records which gave out two variables; officiating performance and fitness in matches, it was realised that most referees attended a minimum of six matches in a season. The seasonal means from the minimum six matches were calculated and summarily used to identify the final mean performances of officiating performance, and fitness in matches over the period or duration of the study. The age of the referee in 2004 was basically used since it fell in the middle of the range (median). Also the mean of the physical fitness tests from the 3-year period were used for the analysis. Data from the three refereeing belts were collated and put together for the analysis. Comparisons were made on the above variables as follows;

1. Physical fitness test (PFT) vs. performance in officiating (OP)
2. Physical fitness test vs. fitness in matches (FM)
3. Physical fitness test vs. age.

Each pair of variables was analysed separately from the others. Data (mean values) from the above variables were subjected to rigorous analysis separately based on the hypotheses and research questions advanced, using the Statistical Product for Service Solution (SPSS) software Version 13.0 for Windows. Inferential statistics of Linear Regression and Chi-square test were utilised. Also the descriptive statistics concept of mean, standard deviation, range, percentages

and graphs, were employed to elaborate further on the findings at the .05 alpha level of significance.

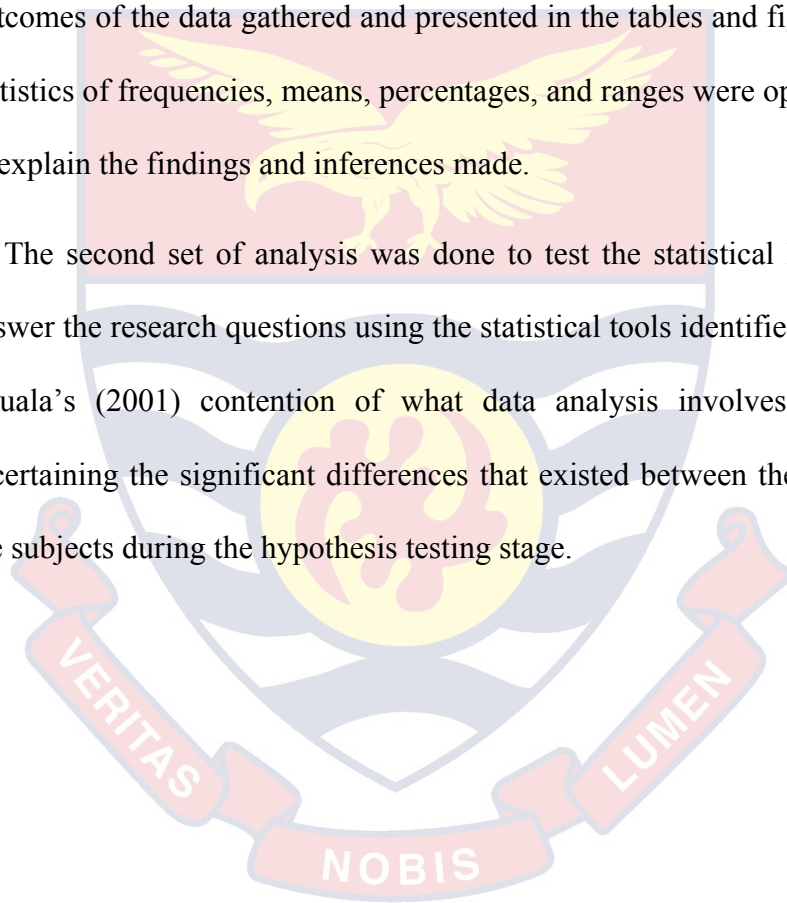
The Linear Regression Analysis model was used to test the major hypothesis formulated that PFT (Cooper Test) achievement would not be able to predict level of performance during officiating. The decision criterion was set at the .05 alpha level of significance. This model was used because it is the linear regression that estimates the coefficients of the linear equation involving one or more independent variables that best predict the value of the dependent variable. In this case the independent variable was PFT and the dependent variable was OP. According to Vernoy & Kyle (2002), the simplest way to make accurate predictions based on means, standard deviations, and the correlation coefficient is to use linear regression.

Comparisons between the PFT and FM assessed the influence of the PFT on the fitness exhibited by the referee when officiating. The Non-parametric Chi - square test of significance was used to test the data at the .05 alpha level of significance. This is because the Chi-square (X^2) test is the statistical tool used to find the significance of differences among the proportions of subjects, objects, events, and so forth, that fall into different categories. Breakwell, Hammond, Fife-Schaw, & Smith (2006) and also Vernoy & Kyle (2002) are of the view that the tool is useful for comparing categorical information to what one might expect to encounter by chance. For the purposes of the analysis, the PFT scores were categorised into three thus, < 2750, < 2950, and < 3350 (range 2357-3313) and coded low, moderate and high, respectively. The fitness scores in a match was also categorised into low; 1.3-1.5 (n = 35), and high; 1.6-1.8 (n = 30).

The third analysis focused on the association between the age of the referee and the PFT performances exhibited. Again, the X^2 test of significance was used to analyse this data. The PFT categorisation used in analysing research question two was again employed here in addition to an age categorisation of young, 18-35 and old, 36-53 (range, 18-52 years).

Generally, the first set of analysis was done to describe or explain the outcomes of the data gathered and presented in the tables and figures. Descriptive statistics of frequencies, means, percentages, and ranges were optimally employed to explain the findings and inferences made.

The second set of analysis was done to test the statistical hypothesis and to answer the research questions using the statistical tools identified, and in line with Osuala's (2001) contention of what data analysis involves. This helped in ascertaining the significant differences that existed between the performances of the subjects during the hypothesis testing stage.



CHAPTER FOUR

RESULTS AND DISCUSSION

The study sought to assess the physical fitness test (PFT) levels of Ghanaian soccer referees in relation to the performances they exhibited during officiating (OP). To this end the refereeing population in Ghana was zoned into three belts with two belts made up of three regions each and the third composed of four regions. The stratified and proportionate multistage sampling techniques were used to select the sample. Documented data was collected from two sources; the RAG and MCA secretariats based on the PFT and OP performances exhibited from 2003 to 2005, in the aforementioned zones. The tested hypothesis dwelt on relationships between:

- I. The PFT and the OP
- II. The PFT and Fitness in Matches (FM)
- III. The PFT and Age of the referee (Age). Data (mean values) from the above variables were analysed separately based on the hypotheses and research questions advanced, using the SPSS Version 13.0 for Windows. Inferential statistics of Linear Regression and Chi-square test were utilised. Also the descriptive statistics concept of mean, standard deviation, range, percentages and graphs, were employed to elaborate further on the findings. The decision criterion for all analysis was set at the .05 alpha

level of significance. The results of the study and their discussion are hereby presented.

Summary of Results in Response to Research Question 1: Is PFT result a Predictor of level of OP?

This assessed if physical fitness results is a good measure to predicting levels of performance when officiating soccer matches. Data collected on the sampled referees are summarily presented in appendix J.

It is evident from the data, that the scores relating to the PFT and OP were varied. The highest OPs of 8.8 and 8.6 were recorded by referees with PFT of 2850 and 2700 respectively. Also the lowest OPs of 6.0 and 6.2 were respectively recorded by referees with high PFTs of 2970 and 3055. The modal PFT mark was 2811 (2) and that of the OP were 7.8 (6) and 7.9 (6). By the standards set, as many as ten referees recorded marks below the minimum set PFT mark within the period of the study.

Figure 1 is the scatter plot representation of the tested variables. The plot which pitched PFT on the abscissa against OP on the ordinate axis revealed a wide dispersion of points, an indication of a low or marginal correlation; that only a small amount of association existed between PFT performances and OP scores. The only exception was the highest fitness assessment mark of 3313 which correlated with a high OP of 8.2.

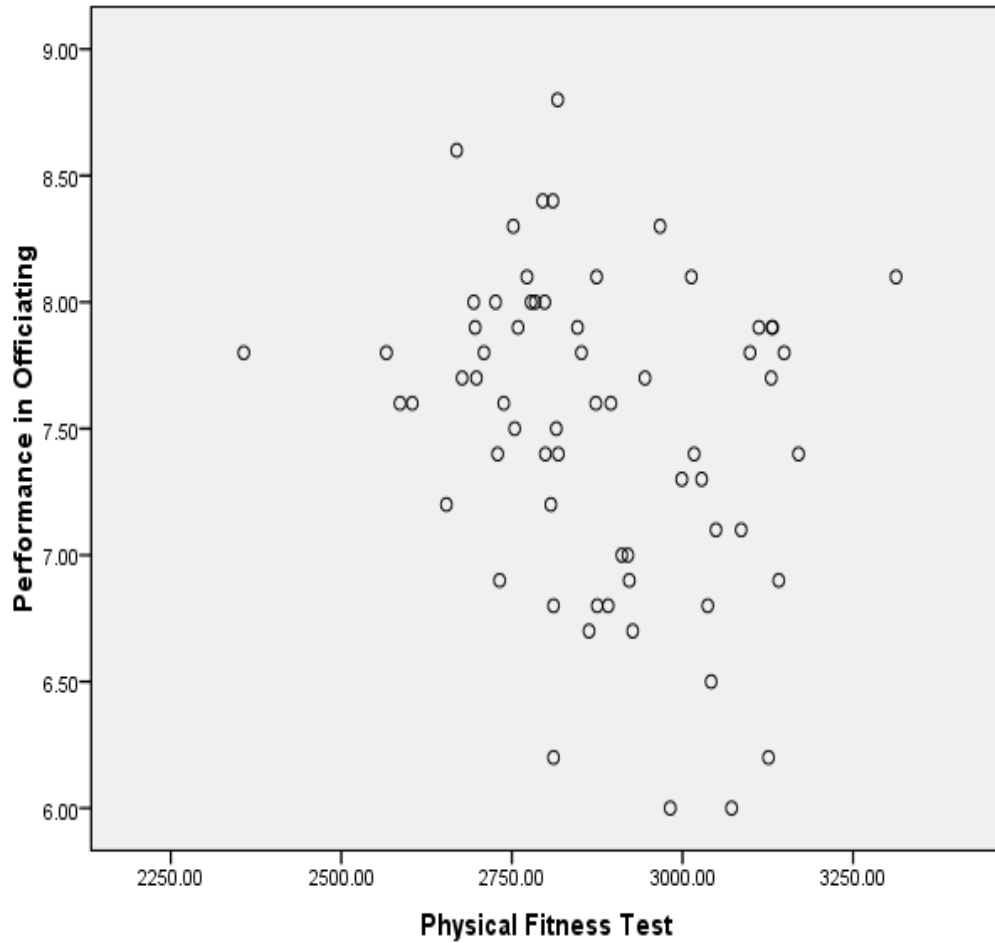


Figure 1. Scatter Plot representation of PFT and OP

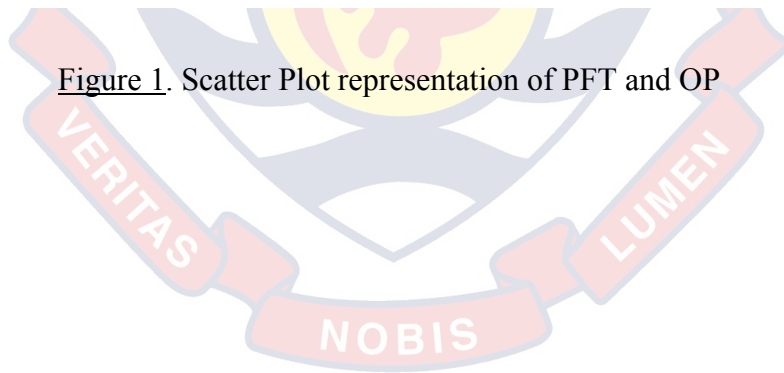


Table 1

Analysis of Variance of Linear Regression on PFT as a Predictor of OP

Linear R (adjusted) = -0.253

Linear R² (adjusted) = 0.064

Standard Error of Estimate = 6.0366

Analysis of Variance					
Model	Sum of Squares	Df	Mean Square	F-ratio	Sig
Regression	1.572	1	1.572	4.314	0.042
Residual	22.958	63	0.364		
Total	24.530	64			

Note: Predictors (constant): PFT Dependent Variable: OP

The Linear Regression Analysis model was used to test the major hypothesis which formulated that physical fitness test (Cooper Test) achievement would not be able to predict level of performance during officiating. The decision criterion was set at .05 alpha level of significance.

Table 1 shows the analysis of variance of the extent to which PFT predicted OP. The result revealed a linear regression coefficient of -0.253 which yielded an R square (R²) value of 0.064. This value of 0.064 gives an indication of the percentage of variation in the items. This means 0.064 percent of the variance in PFT is associated with variance in OP scores and

Table 2

Regression analysis of PFT as a Predictor of OP

Model	N	Mean	SD	df	t	Sig(1-tailed)
PFT	65	2875.4462	178.80471	64	8.243	0.021(s)
OP	65	7.5015	0.61910			

p < .05 s = significant

is to be considered for analysis (Coefficient is calculated thus, $10.022 - 0.001 \times$ PFT). The results also indicated a variance F-ratio of 4.314. The SD value of 0.6 (see Table 2) informed us that it is better to use the regression model than the equation.

The test results in Table 2 indicated a PFT mean of 2875.4462 and an OP mean of 7.5015. The PFT standard deviation was set at 178.8047 with 64 degrees of freedom. A regression value of 8.243 and a p value of 0.021 were also obtained. Summarily ($r [65] = 8.243, p < .05$) is an indicator of a statistically significant result. This result does not support the null hypothesis. This means that the variability of scores could not have occurred by chance. It can, therefore, be concluded that there is a marginal relationship between the PFT levels of soccer referees and the performances they exhibit during officiating. In effect PFT marginally predicts OP. The revelation that referees' PFT results marginally predicts OP indicates that, passing the PFT could be considered amongst the criteria for the selection of referees to officiate matches in Ghana, although not wholly since not all referees with high PFT would necessarily exhibit good OP. Other forms of assessment such as theoretical exam, visual acuity test, practical

officiating, and audio-visual match analysis could be added to enable the RAG turn out quality referees. As shown in Table 3, the variability of scores in the study stipulated that 44.6% (n = 29) of the subjects returned moderate PFT scores.

The result of this study is in agreement with the results of a study by Castagna et al (2002) which focused on the relation between fitness tests and match performance in elite Italian soccer referees. They observed 22 such referees on eleven match activity categories during a maximum of three Serie A matches as against the PFT (independent variable). The result demonstrated that the PFT is a moderate predictor of OP in elite referees and that aerobic fitness should have priority in the physical conditioning programmes of the referees. Ndovi (2009) also asserted that the physical fitness test is actually designed to enhance referees' performance on the pitch.

Soccer referees are required to keep up with play at all times despite occupying an age bracket of an average of 10-15 years older than their playing counterparts. By so doing they would be able to visualise all infringements and interpret the laws appropriately. It is in consonance with this belief that Weston et al (2008) in a study on endurance and physical match performance in the English Premier League soccer referees, found out that the referees were able to maintain an average distance from fouls and a corresponding average distance from the ball. They also found a significant average effect for total distance covered. They claimed this could be as a result of the performances exhibited, in agreement with the current study.

A case study to Weston et al (2008) contention has been postulated by Roth (2008). Roth, who is the head of refereeing of the German Football Association,

said of a female referee Bibiana Steinhaus, after she had been offered great or more challenging assignments by the German Football Association, “She has earned great respect”. This was buttressed by statements from footballers, “her refereeing was very good, there was absolutely nothing to object to”, “I have no doubt that she could also referee in the first division; up to now she has received positive reactions from all quarters. I would have nothing against more women refereeing if their performance is up to standard”. “She has a pleasant manner; she is not so dogged and is always up for a little fun. As players we try to behave better than we would towards a man, at least, to be more polite, not so brash”. Remarks by Patrick Helmes (Bayern Leverkusen), Thorsten Jutd, and the captain of Kickers Offenbach F/C (p. 33).

Contrary to the above studies there have been numerous reports and incidents of poor OP from certain referees, despite having good PFT scores. Mention can be made of referees in the current study who made 3072, 3126 and 2982 PFT marks, but performed woefully in OPs with marks 6, 6.2 and 6 respectively (see appendix J). Surprisingly these referees, because they passed the PFT, had a lot of slots of officiating at the expense of those who could not make the grade, but returned high OPs. It is a thing of common knowledge that referees suffer a number of negative psychological conditions during officiating which affect their performances invariably. This involves high disturbances in mental and emotional processes which in turn inhibit musculo-skeletal functions. These negative conditions consequently lead to the making of wrong calls to the chagrin of players, spectators, and all stakeholders.

This practice of awarding more matches to those who necessarily pass the PFT at the expense of those who exhibit adequate OP has been seriously condemned in some quarters and upheld in others. In condemning the practice, Mba (2009), in a report on “Rating our League Referees” postulated that referees who exhibit serious technical deficiencies should be de-listed to officiate in the lower division where they are expected to be guided to brush up on their experience. This according to him would prepare them for higher refereeing assignments. Tresaco (2005), a former assistant referee also noted; “physical fitness is no longer an issue; referees are meticulous in their preparation these days. A good knowledge of the laws can also be taken as read, so what it boils down to is how these laws are applied” (p. 35). He made this observation at an instructors course which examined the ways in which referees’ concentration levels and reflexes can change over the course of a game.

Also, the Daily Graphic gave an account of a remark by a leading French referee and president of the French National Union of Referees (UNAF) who blamed the FIFA president for selecting some referees to officiate “catastrophically” at the World Cup in 2006. Captioned “officiating at the World Cup”, the paper reiterated the fact that FIFA selected the best teams from each continent, but not the best referees, and that it was alright to use referees of average standard for minor international competitions, but not the World Cup (Daily Graphic, 2006). The paper attributed their errors to the fact that the referees were now required to be too close to the action, meaning officials were chosen more for their physical condition than their judgment.

The referees are in perfect physical condition, but the closer they are to the ball, the less they can see. The referees (for the World Cup) are made to train as if they were in the army every day. They are running too much. This is not the best (p. 48).

In defense, the FIFA president; Sepp Blatter, criticised the referee who handled the Portugal 1-0 win over the Netherlands in which the Russian showed a World Cup record 4 red cards and 16 yellow. He lamented that the referee's actions harmed what could have been an excellent football match. He, however, insisted that the selection of referees would continue to be based on passing the PFT.

In upholding the study result that PFT is a marginal predictor of OP, the FIFA president relates that the PFT shall continue to be used to select referees for assignments. FIFA, he said, would however, continue to give tuition on the interpretation of the laws of the game, psychology of refereeing, refereeing techniques and hot issues of the sport to the referees. He, however, as a measure to curtail the mistakes made by referees and reduce controversy, suggested introducing a second referee into the game. He disclosed that "... tests had been conducted in Malaysia and Sao Paulo, Brazil, with encouraging results, but an unsatisfactory reaction in Norway and Italy" (Blatter, 2006, p. 30). He likened this to ice hockey where two referees and two assistants officiate in a much smaller arena without any clashes with the players.

Reilly (1997) also corroborates the study result. He is of the view that major physiological demands on referees are imposed on the oxygen transport system. Superimposed on these are short-term high intensity runs. The work-rate profiles

exhibited by referees can be interpreted to mean that aerobic fitness is an important requirement of soccer referees, but they also need to be quick “off-the-mark”. Strict fitness standards are, therefore, imposed on referees with the view that a pass in PFT will lead to good OP. The need to pass this fitness is an ongoing concern for referees since some loss of fitness occurs due to the ageing process.

From the foregone it suffices to state that the quality of a match can depend on the performance of the referee. With or without technical assistance, a referee, like a player, will also be open to error. Careful preparation can, however, reduce the margin of error. Erroneous decisions by the referee are as much a part of football as misplaced passes by outfield players and gearing mistakes by goalkeepers. But, there has to be coherency from one match to another and refereeing has to be as uniform as possible throughout the country, so that the GFA, RAG, Managers, Players and Spectators know what to expect at all times.

The GFA in a related bid to make sure that Ghanaian referees perform creditably during officiating has instituted measures to curtail poor performances during matches. On the caption “GFA bans two referees”, as reported on the web,

The GFA has banned two referees for the remainder of the 2009 league

second round for their abysmal performances in league matches, suspended

one for five matches for performing below average in a match, and

cautioned three for exhibiting low work-rate and not applying psychology of

refereeing (<http://www.ghanaweb.com/Ghanahomepage/sportsarchive>).

The statement said the latest action by the GFA forms part of efforts aimed at phasing out under-performing match officials, whose actions often drag the image of the association into disrepute. Also the GFA in conjunction with the RAG suspended three referees indefinitely after the 18th week of the 2009/2010 Glo Premier League for failing to apply the correct decisions, thus harming the beauty of the game, and also exhibiting low work rate.

Summary of Results in Response to Research Question 2: Is there any Link between the PFT of Referees and their FM?

This question sought to find out if there possibly is a link between the PFT performances exhibited by referees and the fitness portrayed when officiating.

H₀: PFT is independent of FM

H₁: PFT is not independent of FM

For the purposes of the analysis, the PFT scores were categorised into three thus, < 2750, < 2950, and < 3350 (range 2357-3313) and coded low, moderate and high, respectively. The fitness scores in a match was also categorised into low; 1.3-1.5 (n = 35), and high; 1.6-1.8 (n = 30).

Table 3 which show the Crosstabulation table on FM indicated that 10 referees with low FM marks of 1.3-1.5 performed low in the PFT whilst only 7 performed high. Contrary to this, a minimal 5 in the high FM category performed low as compared to a high-high of 14. An overall low count of 15 (23.1%), a moderate of 29 (44.6%) and a high of 21 (32.3%) were realised. The highest PFT count of 29 was chalked by the moderate category, an indication of a moderate link between PFT and FM.

Table 3

Crosstabulated Counts of PFT and FM Categories

		PHYSICAL FITNESS CAT					
		Low	Moderate	High	Total		
FITNESS	Low	Count	10	18	7	35	
CAT		Expected Count	8.1	15.6	11.3	35.0	
		% within PHYSICAL					
		FITNESS CAT	66.7%	62.1%	33.3%	53.9%	
		% of Total	15.4%	27.7%	10.8%	53.9%	
		High	Count	5	11	14	30
		Expected Count	6.9	13.4	9.7	30.0	
Total		% within PHYSICAL					
		FITNESS CAT	33.3%	37.9%	66.7%	46.1%	
		% of Total	7.7%	16.9%	21.5%	46.1%	
		Count	15	29	21	65	
		Expected Count	15.0	29.0	21.0	65.0	
		% within PHYSICAL					
	FITNESS CAT	100.0%	100.0%	100.0%	100.0%		
	% of Total	23.1%	44.6%	32.3%	100.0%		

The Non-parametric statistic of Chi-square test of significance (Independence test) was used to analyse this data. This was in line with the exposition by

Breakwell et al (2006) and Vernoy & Kyle (2002). Test values obtained by referees in the PFT and FM categories are illustrated in Table 4.

Table 4

Chi-square analysis of PFT and FM

	Mean	SD	N	df	X ²	p
PFT	2875.4462	178.80471	65	2	5.337	0.069
FM	1.5431	0.13106	65			

p > .05 ns = not significant

According to Table 4, the PFT recorded a standard deviation (SD) of 178.80471, whilst FM recorded 0.13106. The Pearson X² value obtained was 5.337 whilst the p value was 0.069. Summarily (X² [65] = 5.337, p > .05) is an indicator of a statistically not significant result. Hence, statistically, the result supports the null hypothesis. In this wise the variability of scores could have occurred by chance. It can, therefore, be concluded that PFT performances have no influence on FM performances. This means that a referee's performance in the PFT is not reminiscent of his fitness level during officiating. This has implications for the referee's adequate distribution of energy stores over entire periods of matches so as not to be fatigued, or for the slow tempo or minimal activity nature of some matches. This does not support the contention that periods of endurance training and conditioning go a long way to increase ones fitness level or VO₂max.

To determine the strength or direction of the link or relationship, if any, the Somers'd scale was referred to;

H_0 : Somers' $d = 0$

H_1 : Somers' $d \neq 0$

Somers' d value = 0.286 and $p = 0.026$. Summarily $p < .05$. This is statistically significant. There is evidence to reject the H_0 . The strength of the link is, therefore, significantly different from zero, an indication of an infinitesimal relation between the variables.

The test result is at variance with the SAID principles of conditioning. The principle states that when the body is subjected to stress and overloads of varying intensities, it will gradually adapt over time to overcome whatever demands that are placed on it. The increased endurance therefore helps to boost one's fitness in the performance of the PFT. Those people who are more active, or perhaps those who continue to strength-train, considerably reduce this tendency toward declining muscle strength. In addition, exercise may also have an effect in slowing the decrease in cardiorespiratory endurance, and flexibility as well as showing increases in body fat that tends to occur with ageing. It was rather expected that referees' continuous handling of matches would increase their endurance level and subsequently help to increase FM.

The paralleled nature of the SAID principle of conditioning and overload to the PFT could emanate from the distances referees cover in a match, the frequency and duration of the activities they portray in a match, and possibly the energy expenditure imposed on them during match-play. Studies in Brazil by Da Silva et al (2008) relating to the above suggests that, during match-play, referees cover an average of 9155.4 ($\pm 70.3m$, range 8411-9765), a value similar to that observed in other studies (Golant et al., 2008; Krstrup & Bangsbo, 2001), but

lower than that observed by Castagna et al (2004) in Italian referees. Malo et al (2010) also recorded an average total distance of 10km for female referees with the highest mobility being achieved in the initial 15 minutes of the match. The differences observed in match coverage between these studies could be partially related to different competitive levels of the official matches analysed. Also, the frequency and duration of activities of standing still, walking, jogging backwards, running, and sprinting, and the mean energy expenditure of 734.7 (\pm 65kcal) as intoned by Da Silva et al, contribute immensely to referees exhaustion, reduced work rate, and unfit stature.

Castagna et al (2007) have cited that referees observe actions of players in an area of 8.250m² on average, contrary to the 19.5m reported on female referees by Malo et al (2010). Based on this, recent studies opined that, approximately every 4-6 seconds the referee changes motion activity (D'Ottavio & Castagna, 2001; Krstrup et al., 2001), equating to 1268 different activities during 90 minutes of an official match. Of these, 588 are a consequence of low intensity activities (walking, standing, jogging) and 161 of high intensity (running and sprinting).

Although exercise has been widely reported as a sure route to physical fitness and a significant contributor to good health, and the major source to better able cover high intensity activities, and as presented in reports Doyle (2005), Nutristrategy (2004) and CDC (1999), PFT results were independent of FM in this study. The insignificant link of the PFT and FM results could be referred to in studies by Bouley, Simoneau, Lortie & Bouchard (1998) performed on 15 male athletes in a progressive maximal exercise test on an electrically braked ergocycle. They contended that although VO₂max has often been used as a

predictor to endurance exercise because of its significant relationship with running performance, such as that achieved during a marathon run, a triathlon or a cycling road race, it is an endeavour in which an athlete tries to minimise the duration of the activity by adjusting the work rate to get the maximal benefit without getting into a power output level that cannot be maintained for the predicted duration.

Bouley et al (1998) further contended that the performer is thus in a difficult position of having to calculate a solution to a complex problem that involves many individual (e.g. $VO_2\text{max}$), circumstantial (e.g. opponents, profile of the race course), and environmental (e.g. weather, altitude) constraint. There is the need, therefore, to search for indicators to help the athlete establish the optimal work intensity during races and prolonged workouts. The authors concluded from the results that prolonged high intensity endurance exercise test can be performed in a steady state “at a heart rate slightly lower than that determined at the ventilatory threshold” (p. 131).

From the above submission, it is prudent to imply that the referees’ FM could not significantly match their PFT performances because of varied amounts of constraints including;

- I. Application and interpretation of the knowledge of the laws of the game within an instant
- II. Overcoming stressful conditions as a result of spectator uproar, threats and managers’ outbursts
- III. Overcoming physiological inadequacies (sick, painful joints, reaching $VO_2\text{max}$ thresholds)

- IV. Distributing fitness over a period of 90 minutes and even more in cases where the playing of extra time is desired
- V. Dealing with and settling players' disputes and misbehaviour
- VI. Managing slippery, stony, weedy, sandy and inconvenient playing surfaces
- VII. Contending with unfavourable weather conditions (chilly, hot, hazy, misty, smoky, altitude).

The above notwithstanding, it is right to state that an increase in fitness leads to an increase in self esteem, and that as a referee feels better about him or herself, he or she is more likely to have a greater sense of control over the factors that influence his or her fitness during match-play. This will facilitate his or her decision making efficiency as a whole. It is stressed that there should be an attempt to conform and elucidate mechanisms behind the intuitive belief that exercise has a positive effect on an individual's psychological and physiological state. It has become imperative for referees in Ghana to select a physical conditioning regimen and choose appropriate exercise modes in developing their endurance and fitness, and also stick to appropriate and adequate nutritional plans to meet the energetic demands for match-play.

This is advised because the pattern of movement confirms that soccer refereeing is considered a highly intermittent exercise mode. The high to low intensity ratio may be considered as 1:7 (Da Silva et al., 2008). This according to them meant that, on average a high intensity bout occurs every seven low intensity bouts, with an average duration of approximately 3.2 seconds. A lot is, therefore, expected from Ghanaian soccer referees to be able to exhibit and

maintain a high level of fitness in matches to enable them make good and important calls.

Summary of Results in Response to Research Question 3: Are Exhibited PFT Performances Influenced by the Ages of the Referees?

This question sought to ascertain if the performances exhibited by referees were as a consequence of their ages.

H_0 : PFT is independent of Age

H_1 : PFT is not independent of Age

The scores in appendix J reveal that the oldest referee at age 52 years (middle belt) did a PFT of 2729 (low). The second most aged of 50 years (Southern belt) performed a PFT of 2669 (low). This incidentally was the lowest PFT in the Southern zone and the sixth lowest overall. The last five are all found in the middle belt. On the other hand the youngest referee at age 18 years (middle belt) did a low PFT of 2357. This was the lowest in the middle belt and also the overall lowest, as compared to the Northern and Southern belt's youngest referees of 19 years (3017; high) and 24 years (3149; high), respectively.

In line with the exposition by Breakwell et al (2006) and Vernoy & Kyle (2002), the same X^2 test of significance was used to test the data. Again, the PFT scores were categorised into < 2750, < 2950, and < 3350 and coded low, moderate, and high respectively, whilst the ages were categorised into 18-35 (young) and 36-53 (old). Tables 5 and 6 show the analysis.

Table 5

Crosstabulated Counts of PFT and Age Categories

		PHYSICAL FITNESS CAT				
		Low	Moderate	High	Total	
AGE	18-35	Count	5	6	13	24
CAT		Expected Count	5.5	10.7	7.8	24.0
		% within PHYSICAL FITNESS CAT	33.3%	20.7%	61.9%	36.9%
		% of Total	7.7%	9.2%	20.0%	36.9%
	36-53	Count	10	23	8	41
		Expected Count	9.5	18.3	13.2	41
		% within PHYSICAL FITNESS CAT	66.7%	79.3%	38.1%	63.1%
		% of Total	15.4%	35.4%	12.3%	63.1%
Total		Count	15	29	21	65
		Expected Count	15.0	29.0	21.0	65.0
		% within PHYSICAL FITNESS CAT	100.0%	100.0%	100.0%	100.0%
		% of Total	23.1%	44.6%	32.3%	100.0%

Table 6
Chi-square analysis of PFT and Age

	Mean	SD	N	df	X ²	P
PFT	2875.4462	178.80471	65	2	8.992	0.011
Age	31.8462	6.64556	65			

p < .05 s = significant

From the age category of the crosstabulated table (Table 5), it came out that only five referees aged between 18-35 years (young) performed low and as many as 13 had high PFTs. In the same way ten of those between 36-53 years (old) performed low and 8 performed high. The chunk of 23 performed moderately. This gave a total of 41 (63.1%). The total accumulated counts were 15 (23.1%), 29 (44.6%) and 21 (32.3%) for low, moderate and high, respectively. Again, moderate PFT performance had the highest count of 29 and the lowest was the low with a total count of 15.

Table 6 illustrates the test values obtained by referees in the PFT and Age groupings. The test results set the means of PFT and Age at 2875.4462 and 31.8462, respectively. Standard deviations were 178.80471 (PFT) and 6.64556 (Age) with 2 degrees of freedom. An X² value of 8.992 and a p value of 0.011 were also recorded. Summarily (X² [65] = 8.992, p < .05), indicates a statistically significant result. There is enough statistical evidence to reject the null hypothesis and disclose that the variability of scores could not have occurred by chance. The test result signifies that there is a marginal association between PFT and Age, that is, exhibited PFT level is dependent on the Age of the referee.

To determine the strength of the relationship the Somers'd value was utilised from the directional measures table.

H_0 : Somers'd = 0

H_1 : Somers'd \neq 0

Somers'd value = -0.291, $p = 0.043$. Summarily $p < .05$ is a significant result. The Somers'd value of -0.291 indicates an inverse relationship which implies that as a referee ages his or her PFT rate diminishes.

The implication is that the younger a referee the better PFT results that could be obtained. This was the notion held by Kenneth H. Cooper when he devised and reported on the Cooper Test ([en.wikipedia.org/wiki/coopertest](https://en.wikipedia.org/wiki/Cooper_test)), as a test to measure physical strength, agility and endurance, and stipulated the various distances for the different age groups. By this, referees in different age categories are required to cover certain distances during the performance of the PFT. This is contrary to FIFA's version of the adopted PFT where all referees undertake the same test irrespective of age. Young people are thus admonished to enroll into refereeing early so that by 18 years they had become accredited referees. Their courage and experience would be built to enable them climb to the highest refereeing level with ease.

To confirm the above, Casajus & Castagna (2006), in a study to examine the physical fitness of elite Spanish referees in relation to their age, observed age-related performance decrements for the 50m sprint performance, although no age related effects were observed for VO_{2max} , 12 min run and the 200m sprint performance. The authors indicated that older referees may be able to limit the expected age-related performance decrements in both aerobic and anaerobic

performance usually reported for sedentary people. They further cited that despite the shortfalls, older referees are able to reach physical fitness levels that have been suggested to be appropriate for coping with match demands. In another development, Weston et al (2008) examined 22 professional elite level English Premier League soccer referees on 11 count format over a 4-season period to determine the effect of age upon the physical match performance and match physiological load, and similarly included that the physical match performances associated with increasing referee age did not appear to impact upon the ability of the older referees to keep up with play. As a consequence the authors recommended to refereeing governing bodies to review their age-based retirement guidelines. Recent studies have suggested that referees reach the peak of their careers at a considerably greater average age than competitive soccer players. Thus, referees perform best physically at a time when their cardiovascular performances start to decline (Golant et al., 2008).

The current study result that younger referees perform better on the PFT than ageing ones is understandable considering a reflective statement by Asagba (2005), from a study that “there is a decline in physiological function with increasing age” (no page). Although, this, according to him, is a natural phenomenon, long-term athletic training can lead to major gains in aerobic capacity. Golant et al’s (2008) submission that long-term training is associated with morphological cardiac changes, including increased left ventricular cavity dimension, wall thickness and calculated mass, is a testimony to the gains derived from training. So even if referees are older than soccer players, Golant et al further stated that, the echocardiographic study shows how the referee’s heart

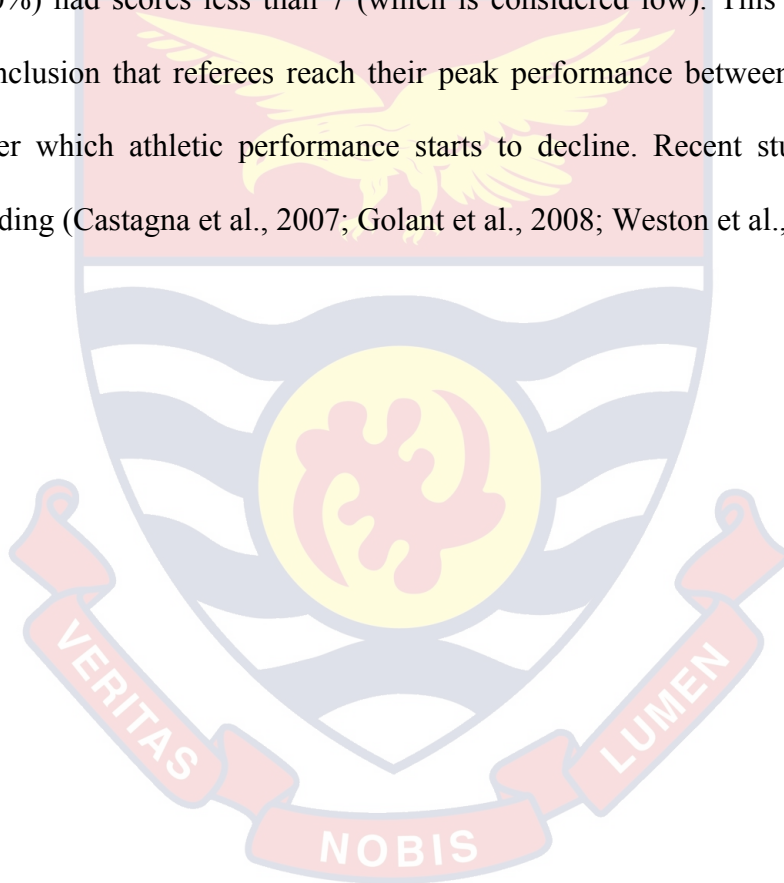
presents morphological adaptations and an increase in left ventricular mass (both due to training and overload).

The above notwithstanding, and in consonance with Asagba's (2005) assertion, too much PFT cannot be expected from ageing referees as age is detrimental to physical activity. At ages 45 and 50, referees could manage low PFTs of 2604 and 2669, respectively (see appendix J). These figures would have passed the affected referees if the original table proposed by Cooper had been followed by FIFA. In another development, Mba (2009) is of the view that with better PFTs the mobility of the young referees will match up with that of the players who are equally very young, and propelled by the new velocity of the FIFA approved footballs in use for competitions these days.

Most national associations have pegged the retiring age of referees at 50 years, an age after which they believe referees are prone to make a lot of bad calls as a result of their inability to keep up with play, cannot visualise offences clearly, become highly temperamental, and lose concentration easily. This is the group that usually finds it difficult to return good times in the PFT. In order to avoid being sidelined most referees go to the extent of reducing their ages, some to as much as 15 years so that by the age of 50 years they are 35 in the refereeing records. They thus, are rejecting God's plan for them when they reach a certain age bracket. The most glaring of the negative impact of age cheating is that it frustrates development planning; some of them fail to respond to programmes that have been designed for referees who have attained a certain age range. They also hijack majority of the matches which hitherto would have been given to the young ones to propel them into the limelight. Mba (2009) laments that when this

happens young capable referees are bottled up, “not getting the opportunities to express themselves because of the limited opportunities to offer match slots to them” (<http://www.vanguardngr.com/2009/09/02>). He wants aged referees to be withered out.

It was observed from the study that as many as 80% (n = 32) of the referees between 30 and 45 years (n = 40) recorded OP scores greater than 7 and only 8 (20%) had scores less than 7 (which is considered low). This lends itself to the conclusion that referees reach their peak performance between 30 and 45 years after which athletic performance starts to decline. Recent studies support this finding (Castagna et al., 2007; Golant et al., 2008; Weston et al., 2008).



CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to find out the relation between the physical fitness levels of soccer referees and the performances they exhibited during officiating. Also the fitness of the referee in a match, as well as the age of the referee all in consonance with the PFT was accessed. Major findings came out of the study to which this chapter has been devoted. The findings have been summarised and the conclusions and recommendations drawn based on the findings. Areas for further research have also been suggested.

Summary

Refereeing a game of soccer is an arduous task which must be given all the seriousness it deserves. With the popularity of soccer soaring to greater heights considering the number of people involved in it, the game has correlated positively with refereeing. The population of referees keeps on increasing each year despite the dangers inherent in it. Dangers such as assault, death threats, unfavourable weather conditions, injury prone fields, uncomfortable travelling mechanisms, stress, and psychological imbalances are reminiscent of refereeing soccer matches today.

Soccer referees officiate the most watched sporting event and are increasingly scrutinised when their calls are at variance with the expectations of players, managers and spectators. The referee has according to Law 5 of the Laws of the

Game, full authority to enforce the Laws of the Game in connection with the match to which he or she has been appointed, and his or her decision on all matters is final. Usually three referees handle a match directly; one central referee and two assistant referees and, in high profile games, a fourth official by the sideline. From the moment one joins a district to express interest in refereeing, the fellow is taken through an extensive training programme in the interpretation of the Laws of the Game, flagging technique, psychology of refereeing, stress management, player management techniques, and a host of other related topics in refereeing, including the writing of a qualifying and subsequently a promotion examination.

Several studies have revealed that referees cover a distance of between 9 km-12 km at an average heart rate of 150-160bpm and an average oxygen uptake of approximately 80%-85% of the maximum aerobic power. Refereeing is thus considered a high intensity exercise mode. It is observed that during matches soccer referees perform physical aerobic activities of low and moderate intensity. In this wise, referees undergo a lot of endurance training to tune their bodies up for refereeing assignments. To test their physical fitness level, FIFA introduced the Cooper Test into their training sessions. To make this test more scientific, it was changed in 2005 to the YYIRT which has episodes of intermittent running and walking severally reminiscent of activities associated with refereeing.

Referees undertake this test annually at the regional and national levels for selection to officiate tournaments, leagues and others, and also for promotion from one level to the other. Only a few Ghanaian referees, relatively 1.2 %, manage to get to FIFA level before they retire from active refereeing. Majority

retire at class one, where they mostly officiate in the League (Premier and DOL), and thereafter become Match Commissioners and Assessors.

The trigger to the study was the contention of what good refereeing is; whether it behoved on merely passing the PFT, the referee's ability to run and keep up with the players, or the ability to interpret the laws of the game effectively and take firm decisions. Most referees who pass the PFT are enlisted to officiate, and those who fail but exhibit high levels of officiating performances are sidelined. Several literatures relating to the referee's, physical fitness level, performance during officiating in the face of psychological, physiological and stressful demands have been reviewed on the problem. Also reviewed was the impact of age on the referee's physical fitness test performance.

Three research questions and three hypotheses regarding PFT in relation to OP, FM, and Age of referees were posited to guide the cross-sectional survey design study. The refereeing population in Ghana was zoned into three (Northern, Middle and Southern belts) to draw a sample of 65 referees for the study using the stratified and proportionate multistage sampling procedures. Documentations from the referees and match commissioners associations of the sampled regions based on Cooper Test distances ran by the referees, and the officiating performance results, respectively covering 2003-2005 were sought. These documents were analysed using SPSS Windows 13.0 of Linear Regression and Chi-square, with explanations based on means, percentages and standard deviations at the .05 alpha level of significance. The study found out that PFT marginally predicted OP leading to the conclusion that performances in the PFT marginally predicted the sort of performances expected of referees when

officiating. This has implications for prioritizing aerobic fitness for the physical conditioning programmes of referees. Physiological function also correlated inversely with ageing leading to the admonishing of younger people to enroll into refereeing at a younger age. No link could be established between the PFT and FM. This calls for the efficient and adequate distribution of energy stores over match duration.

It is in the light of these concerns that it is taught that PFT performances do not operate in a vacuum from energy expenditure. Therefore, nutritional habits must be adapted to the daily physical activities of the referees, short training periods, moderate energy intense physical activity, and match refereeing.

Main Findings

1. The study revealed that the exhibited PFT levels of Ghanaian soccer referees had a marginal predictive influence on the performances they exhibited during officiating.
2. PFT levels of Ghanaian soccer referees had no influence on their fitness levels during match-play.
3. The study found out that exhibited levels of PFT were dependent on the ages of the referees.

Conclusions

The findings of the study corroborated most of the related literature cited while others were refuted. Based on the findings of the research it is concluded that Ghanaian referees who exhibit significant PFT performances perform better when officiating, irrespective of their fitness level, and age. In effect, how a referee

officiates in Ghana can be predicted from the PFT scores he or she returns. In a similar vein, the study revealed that the younger a referee the better the PFT performance. These revelations have refuted the hypotheses posited and are found to have diverse concerns. Referees believe that PFT results have no consequential effect on officiating performance, but accept the fact that PFT results decline with increasing age although extreme cases could exist. This has relegated to the background the concerns of whether passing the PFT was enough determinant of performance in officiating which necessitated the conduct of the research and has led to the belief that PFT results have a marginal predictive index to exhibited refereeing performance.

Recommendations

Based on the findings of the study the following recommendations have been made:

1. Given that PFT only marginally predicted OP, measures need to be put in place to ensure an improvement in the rate of prediction. The RAG should as a measure mandate all district and regional associations to organise the PFT on district and regional basis quarterly and bi-annually, respectively for their members. However, the final PFT should be organised centrally (not on regional or northern and southern basis) under the watchful eyes of the national refereeing experts over a number of days. The results reflective of every referee should be declared on the spot and officially documented.
2. To keep referees in training and in preparation for the annual PFT and to ensure that aerobic fitness and endurance becomes the priority in the

physical conditioning of referees, it has become imperative for referees in Ghana to select a physical conditioning regimen and choose appropriate modes in developing their endurance and fitness. As a measure, the RAG should from time to time (at most each quarter), organise refresher courses in conditioning, overload and high intensity training modes for the district and regional Instructors to go back and retrain their referees.

3. Age is a natural phenomenon and has been found to be detrimental to physical activity, although long-term athletic training can lead to major gains in aerobic capacity. Literature reveals that referees reach their peak performance between 30-45 years after which athletic performance starts to decline. The RAG is therefore admonished to review their age limit in line with FIFA's so as to cut down on the incidence of poor officiating performance exhibited mostly by the aged referees.

Areas for Further Research

As a measure to increase the body of knowledge in refereeing in Ghana, the following areas of research have been identified to help improve upon the scanty or nonexistent literature in this area.

1. A study of performance analysis between Premier and DOL referees in Ghana from the 2005 to 2010 soccer seasons.
2. The intensity of different modes of motion in Ghanaian soccer referees during match-play and between halves of the same match.
3. An assessment of the decision-making ability of referees when officiating under different conditions (weather [hot, humid and chilly], field [natural-

4. Anthropometry and work-rate profiles of elite Ghanaian referees
5. Dietary demands and performance assessment of elite soccer referees during a period of match officiating.



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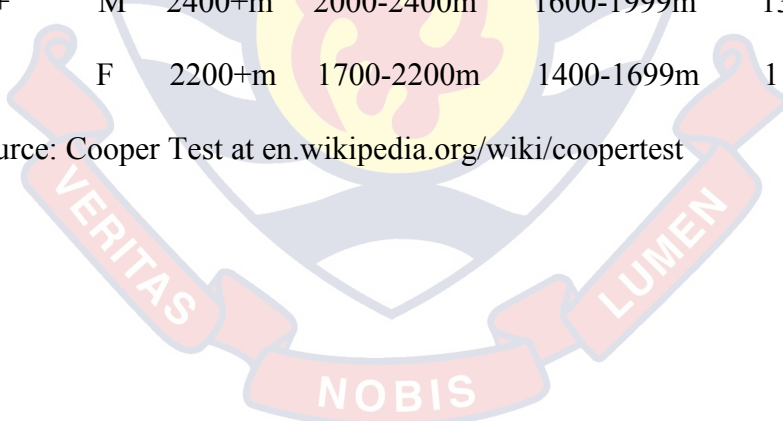
APPENDICES

APPENDIX A

Cooper Test Distances for Age Groups and Gender.

Age	Sex	Very Good	Good	Average	Bad
17-20	M	3000+m	2700-3000m	2500-2699m	2300-2499m
	F	2300+m	2100-2300m	1800-2099m	1700-1799m
20-29	M	2800+m	2400-2800m	2200-2399m	1600-2199m
	F	2700+m	2200-2700m	1800-2199m	1500-1799m
30-39	M	2700+m	2300-2700m	1900-2299m	1500-1899m
	F	2500+m	2000-2500m	1700-1999m	1400-1699m
40-49	M	2500+m	2100-2500m	1700-2099m	1400-1699m
	F	2300+m	1900-2300m	1500-1899m	1200-1499m
50+	M	2400+m	2000-2400m	1600-1999m	1300-1599m
	F	2200+m	1700-2200m	1400-1699m	1100-1399m

Source: Cooper Test at en.wikipedia.org/wiki/coopertest



APPENDIX B

Format for the Assessment of Officiating Performance

A 1 PERSONALITY

Whether or not the referee is decided, anxious, influenced by the general public in case of difficulties, influenced by players, impartiality, and quick thinking

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

A 2 FITNESS

Whether the referee is slow or fast to follow the game (speed). Good or weak stamina

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

X 2

B 1 INTERPRETATION AND APPLICATION OF THE LAWS OF THE GAME

Application. The spirit of the laws of the game. Distinction between intentional and unintentional play. Advantage rule

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

X 3

B 2 PERFORMANCE OF HIS DUTIES

Whether the referee is attentive to details, diagonal system, co-operation, decisions, use of the whistle, clear signals, and timing

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

X 2

B 3 DISCIPLINE AND CONTROL

This assesses incorrect decisions, conduct or violence, cautions and expulsions

1	2	3	4	5	6	7	8	9	10	X 2	<input type="text"/>
---	---	---	---	---	---	---	---	---	----	-----	----------------------

TOTAL OF MARKS

A1 + A2 + B1 + B2 + B3 divided by ten.

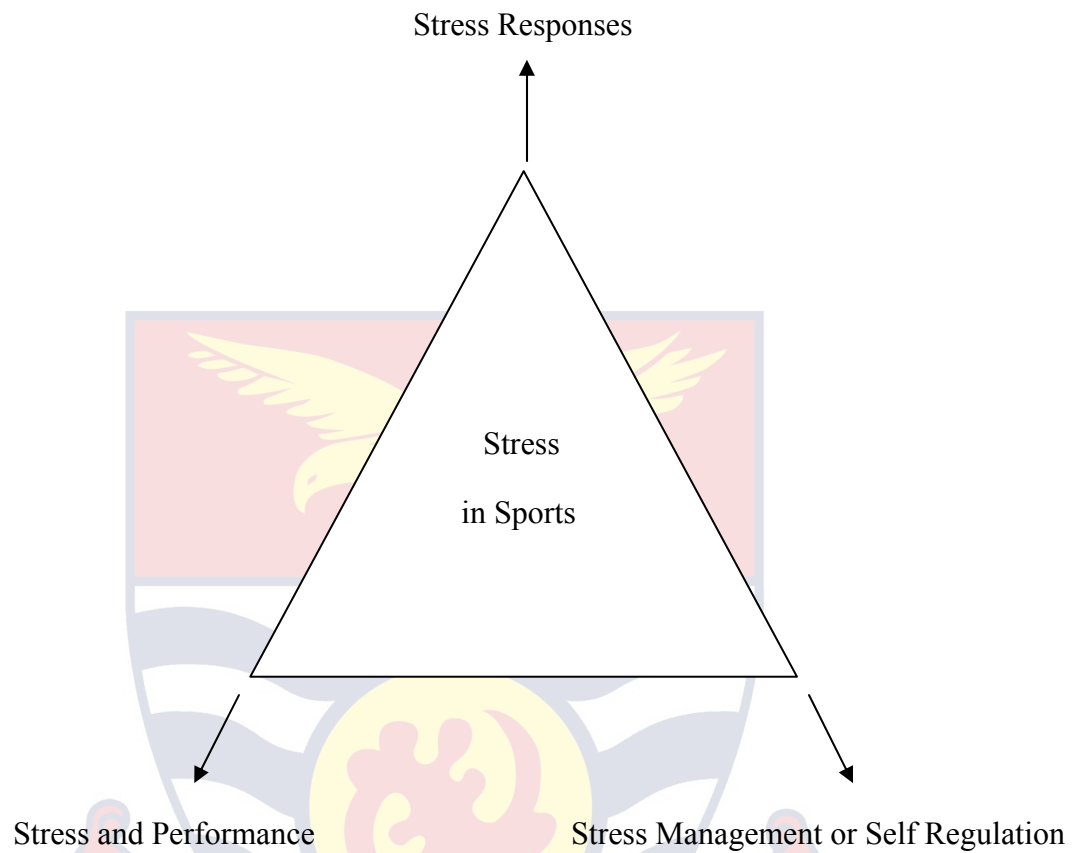
This gives the referees final mark or performance in the match which is usually between one and ten.





APPENDIX D

Components of Stress in Sports

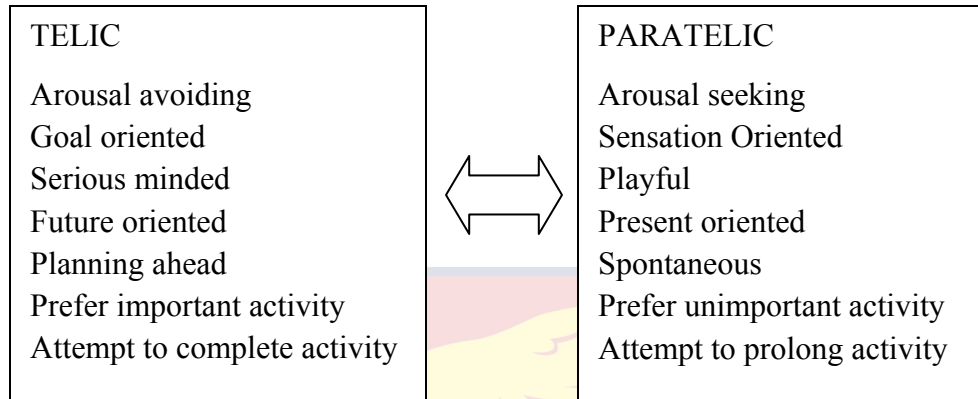


Source: Graham, J. J. & Hardy, L. (1990). *Stress and Performance in Sport*.

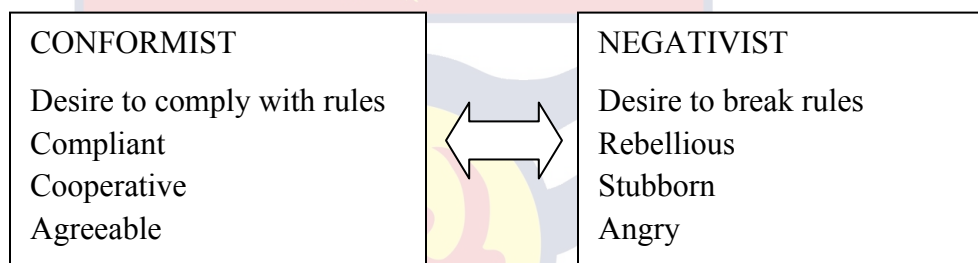
APPENDIX E

Characteristics of the four Pairs of Metamotivational States

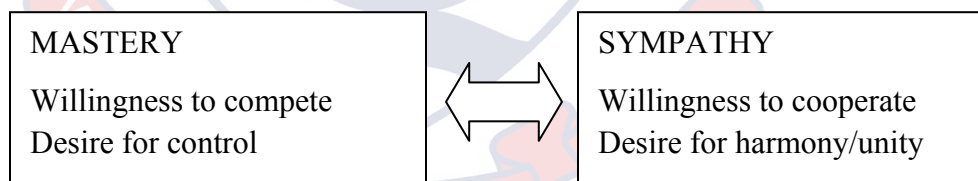
Means-Ends



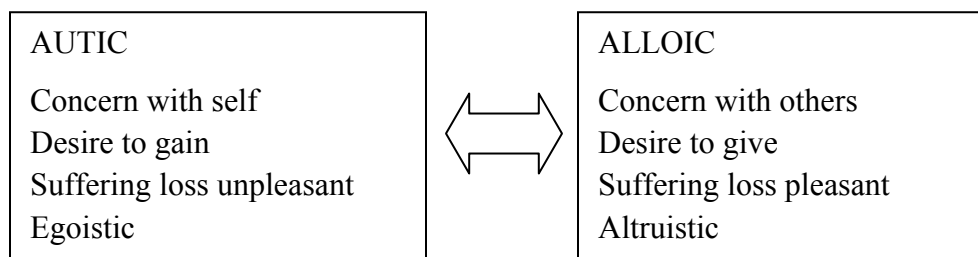
Rules



Transactions

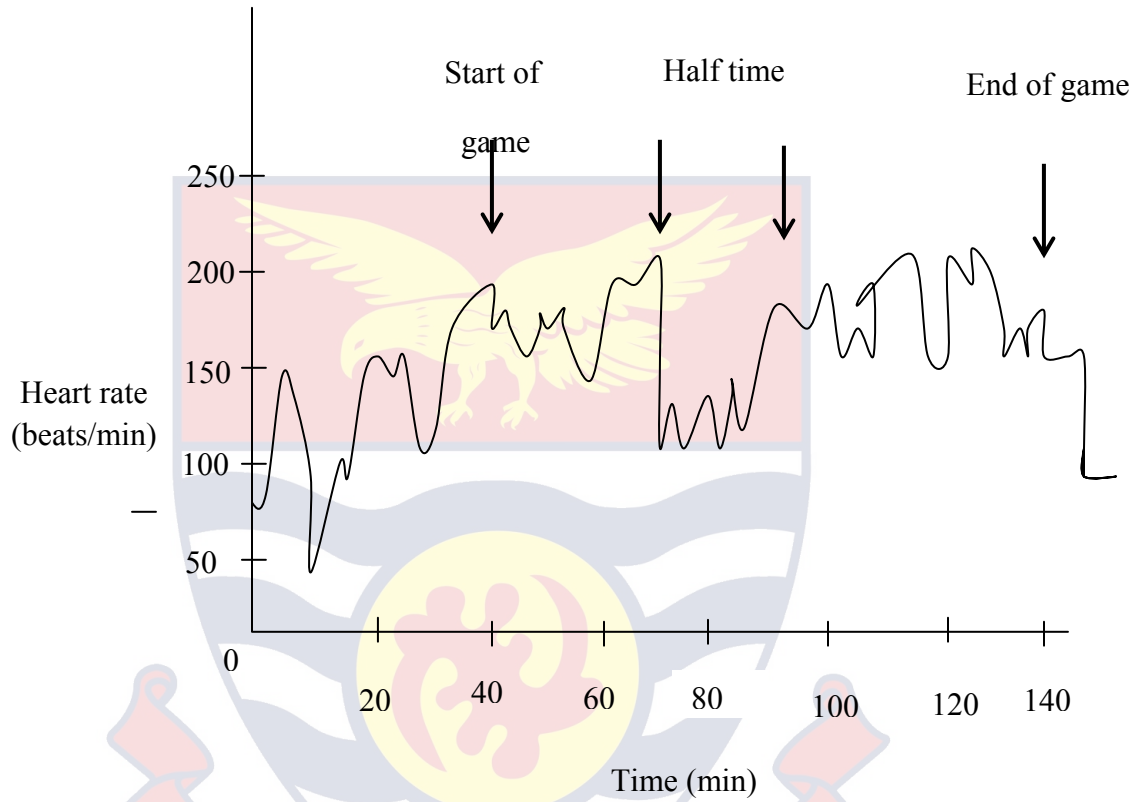


Relationships



APPENDIX F

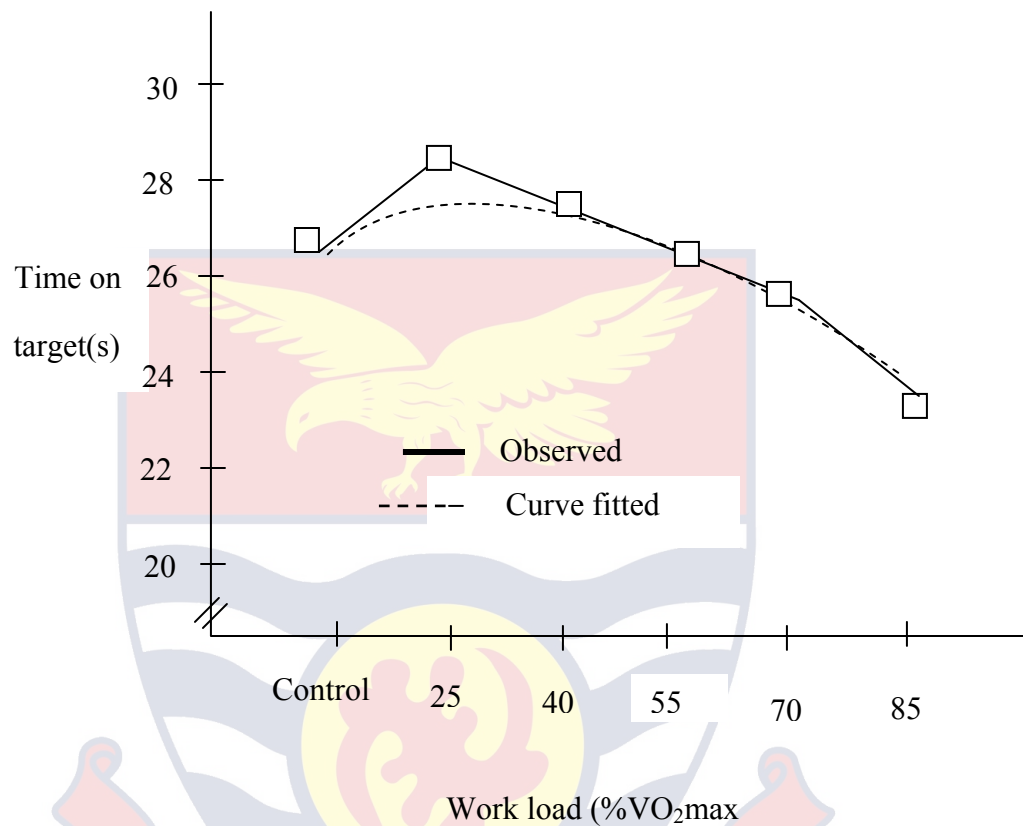
Heart Rate of a Referee throughout a Premier League Match



Adapted from the original work on the physical activity profile of elite Italian referees by Reilly (1997).

APPENDIX G

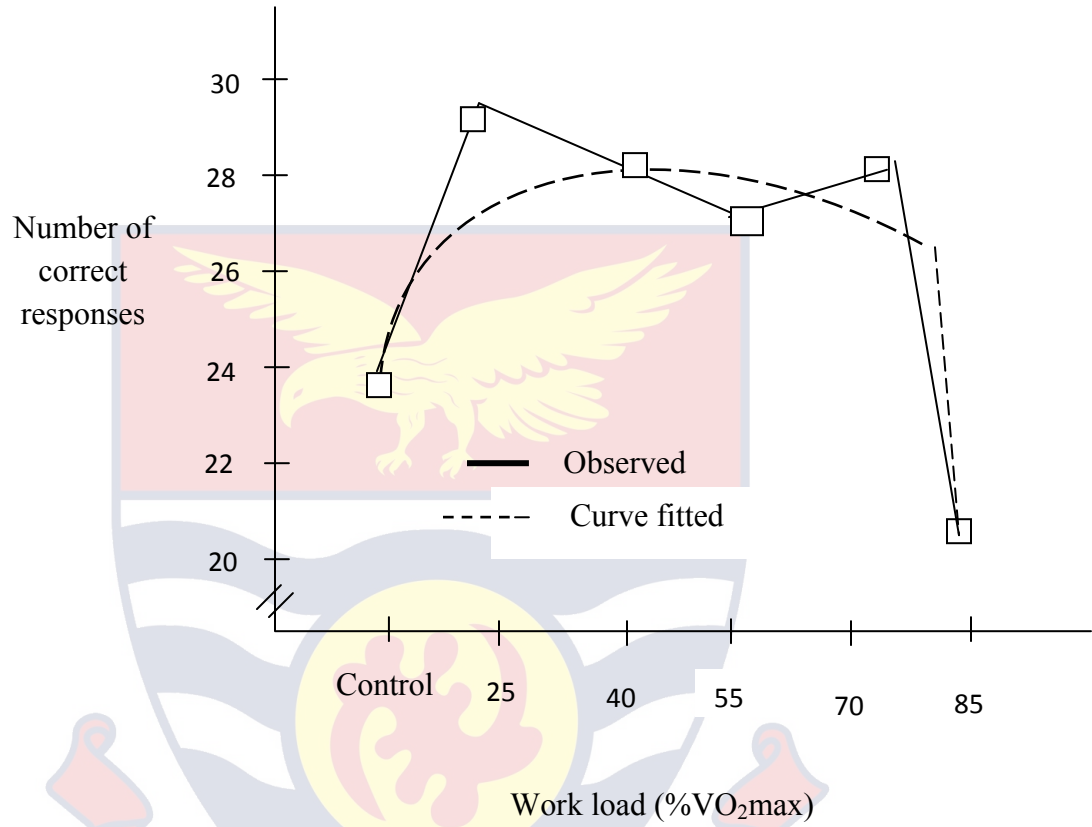
Effect of Exercise Intensity on Psychomotor Tasks during Exercise



Adapted from the original work on the physical activity profile of elite Italian referees by Reilly (1997).

APPENDIX H

Effect of Exercise Intensity on Cognitive Function during Exercise



Adapted from the original work on physical fitness and activity profile of elite Italian referees by Reilly (1997).

APPENDIX I

UNIVERSITY OF CAPE COAST

FACULTY OF EDUCATION

Department of Health, Physical Education and Recreation

20th September, 2007.

The Secretary

Regional Referees/ Match Commissioners Associations

Tamale/ Brong Ahafo/ Koforidua

PERMISSION TO CONDUCT RESEARCH

The bearer of this letter, Mr. Michael Agyei is a postgraduate student of this University conducting his thesis on “Assessment of physical fitness levels of soccer referees in relation to their performances during officiating in Ghana”. We shall be grateful if you could grant him all the assistance required to enable him conduct the research in your outfit.

Please be assured that all the information released to him will remain confidential and shall be used only for the purposes of the research.

Your assistance in this regard is highly appreciated.

.....
Boateng, B. L. (Dr.)

(Major Supervisor).

(0244082503)

.....
Agyei, Michael

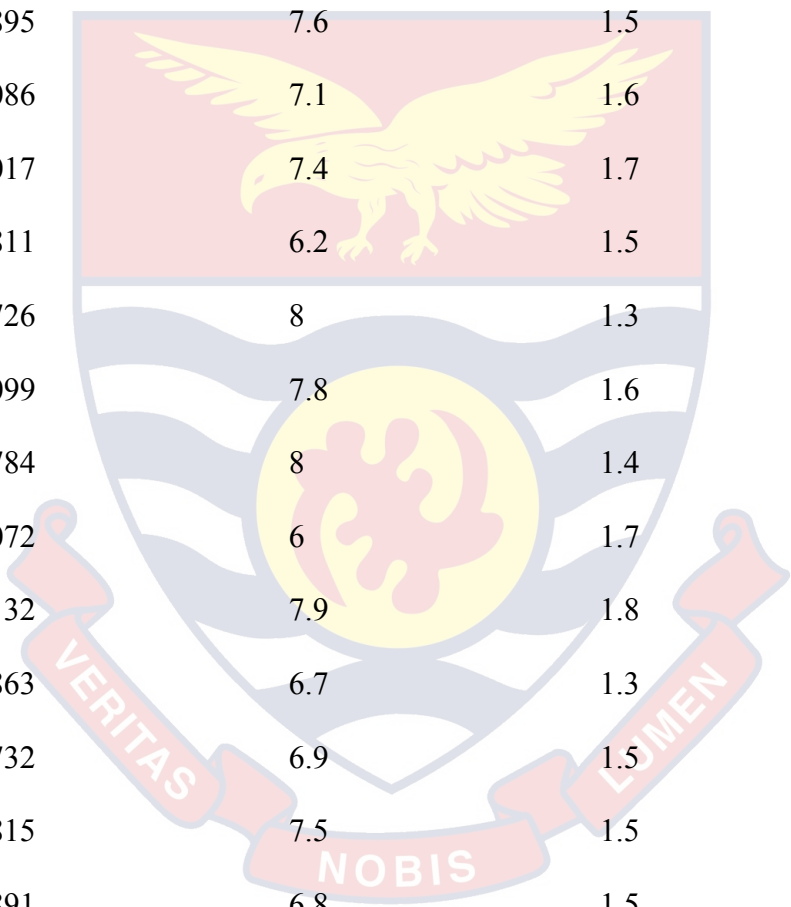
(Researcher).

(0244815886)

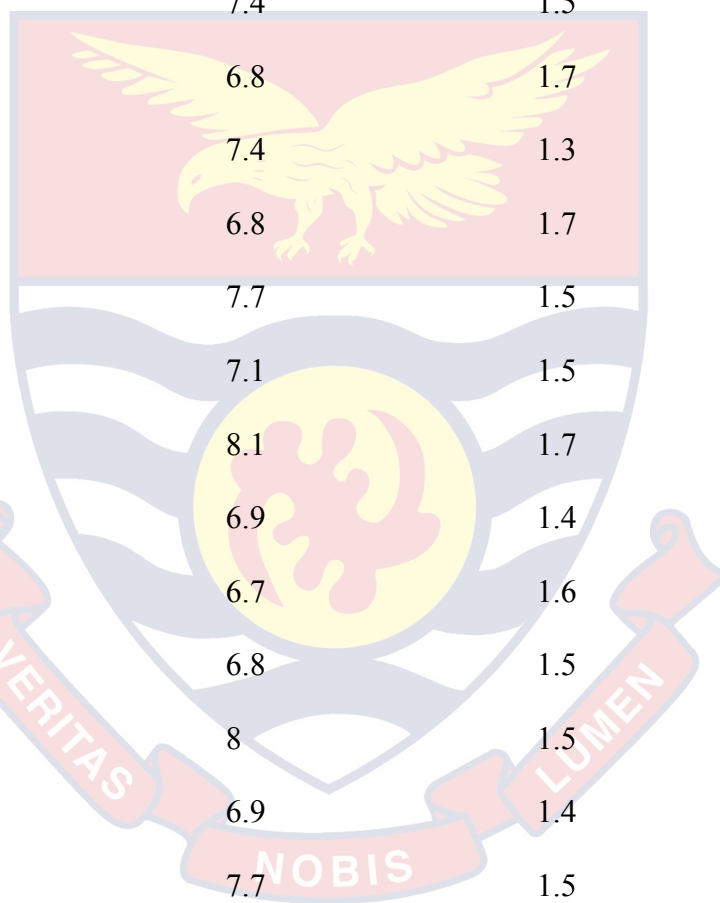
APPENDIX J

Summary of Data Collected for the Analysis and Discussion of the Study

Physical Fitness Test (PFT)	Officiating Performance (OP)	Fitness in Match (FM)	Age
2846	7.9	1.7	33
2738	7.6	1.6	25
2895	7.6	1.5	30
3086	7.1	1.6	32
3017	7.4	1.7	19
2811	6.2	1.5	39
2726	8	1.3	33
3099	7.8	1.6	23
2784	8	1.4	40
3072	6	1.7	25
3132	7.9	1.8	37
2863	6.7	1.3	31
2732	6.9	1.5	35
2815	7.5	1.5	39
2891	6.8	1.5	30
2999	7.3	1.6	26
2982	6	1.3	27
3112	7.9	1.8	25
2654	7.2	1.7	33
2873	7.6	1.6	41



2759	7.9	1.6	25
2357	7.8	1.5	18
2586	7.6	1.6	29
2566	7.8	1.4	42
2604	7.6	1.5	45
2677	7.7	1.4	30
2818	7.4	1.5	37
3037	6.8	1.7	28
2729	7.4	1.3	52
2875	6.8	1.7	34
2698	7.7	1.5	31
3049	7.1	1.5	39
2772	8.1	1.7	26
3141	6.9	1.4	37
2927	6.7	1.6	27
2811	6.8	1.5	30
2694	8	1.5	28
2922	6.9	1.4	43
3130	7.7	1.5	25
2752	8.3	1.6	34
2967	8.3	1.7	32
2754	7.5	1.4	30
2669	8.6	1.7	50
2874	8.1	1.6	27



3028	7.3	1.5	32
2778	8	1.5	32
2795	8.4	1.3	40
3313	8.1	1.7	26
2810	8.4	1.5	35
2696	7.9	1.3	27
2798	8	1.5	25
2852	7.8	1.6	30
2920	7	1.4	34
2807	7.2	1.6	31
3042	6.5	1.5	27
2709	7.8	1.7	39
2911	7	1.5	30
3126	6.2	1.8	25
2945	7.7	1.6	29
2817	8.8	1.5	31
3131	7.9	1.7	28
2799	7.4	1.4	34
3013	8.1	1.6	34
3170	7.4	1.5	35
3149	7.8	1.6	24

Source: Northern, Brong Ahafo and Eastern Regional RAG and MCA Secretariats (2009).

APPENDIX C

Referees' Physical Fitness Test Results Form

REGION..... VENUE..... DATE.....

No	Name	Age or Date of Birth	Country Region or Town	12 min run M-2700m min W-2400m min	50m M-7.0s max W-7.5s max	200m M-32s max W-37s max	50m M-7.0s max W-7.5s max	200m M-32s max W-37s max	Remarks
1.									
2.									
3.									
4.									
5.									

Note: M = Men, W = Women

Signature of Instructor:.....

Signature of Secretary:.....