



“An investigation into gender differences in physical activity in primary seven children”

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Abstract

This investigation was undertaken with the objective of determining the existing correlation between physical fitness and gender with primary seven children. Two hundred and ninety five subjects took part in the investigation ranging in age from 10 years and 5 months to 11 years and 4 months. This particular study was a relatively small scale. Participants attended rural and urban schools across Northern Ireland.

Five different fitness tests were conducted to analyse an overall level and participant rank in term of physical fitness. Suitable testing methods for the children of that particular age included:

- Flexibility = Sit and Reach
- Agility = T-Test
- Speed = 20 Dash
- Strength = Hand Grip Dynamometer
- Cardiovascular Endurance = Bleep Test

The average fitness rank for females is 160.7 (± 82.1) and the average fitness rank for males is 136.9 (± 86.7). This produces a difference in average fitness rank as 23.8 and in terms of each individual fitness component as 4.76 on average. Males on average ranked less in each element therefore males are generally fitter than females.

Key words: Physical fitness, Gender

Acknowledgements

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Chapter One: Introduction

1.1 Background to the study

There has been much discussion about apparent differences amongst the population regarding gender participation in sport and physical activity. Physical education is the most appropriate time for children of a young age to enhance and develop their physical activity levels but not all children are participating. Stigman (2012) found that over the course of childhood, children spend more time watching TV than they spend in school. Gillman (2007) says that an inactive childhood will impact the child's health at a later stage of life, and for the child itself the physiological and psychological benefits to be gained are essential. Researchers such as Seel et al (2012) have highlighted that regular participation in physical activity is imperative for health and well-being on a physical, social, mental and emotional scale. This is further supported by Jansen and Le Blanc (2010) who found a direct link between physical activity and health benefits for children. A report published by the British Heart Foundation (2012) found that only one in eight young people are getting the recommended 60 minutes of physical activity a day.

Brown and O'Rourke (2003) state that females partake in more feminine sports such as figure skating and gymnastics as it is perceived as being more socially acceptable. Parents and other influential people assume that males are to play basketball while females are expected to participate in dance and other feminine-type activities. Research carried out by Brown and O'Rourke discovered that males had a tendency to participate in team sports that required speed, strength, power and physical contact. If students stepped outside the realm of social acceptability, they viewed themselves at risk for some sort of social penalty. Baar and Wubbels (2011) state that males are expected to participate in team sports with aggressiveness and competitiveness. Fitness testing is a valuable way of gauging physical activity but with females lacking competitiveness and motivation during testing, results may be affected.

1.2 Need for study

There are many studies conducted on gender and fitness in Northern Ireland but there are numerous studies from other countries around the world which have results of this type of study. The impact that physiological gender differences have on physical fitness has been well documented in the past and will continue to be well documented in the future. Different countries around the world are continually trying to research and discuss findings on children's fitness levels and compare them to other countries. It is imperative that children should experience an encouraging attitude towards fitness as the benefits greatly overshadow the negatives, allowing children to become more aware of how to maintain and improve their physical fitness. As a female teacher specialising in Physical Education this area of study is of interest and relevance to my future teaching. It is hoped that the findings produced in the study will be useful and form the foundation for future research in this area.

1.3 Aims and Objectives

The fundamental aim of this investigation is to establish if there is correlation between gender and the physical fitness of primary school children aged 10-11 years. The subjects for this study hail from various schools across Northern Ireland. Primary seven children have generously agreed and been approved permission by their parents, teachers and principal to take part in the testing procedures. The tests to be used include sit and reach, which will test the children's flexibility, T-Test which will test children's agility, 20 dash which will test children's speed, hand grip dynamometer which will test children's strength and finally the bleep Test which will test children's cardiovascular endurance. Once the testing has been complete, all results will be collated into excel to produce tables and graphs to be analysed for the results section and therefore provide a conclusion.

1.4 Summary

This chapter states a general outline to the independent study, including background to the study, the need for the study and the aims and objectives. In the chapters ahead, chapter two provides a review of literature supporting the study. Chapter three describes the methodology and chapter four presents the results through the use of charts and graphs and assesses the findings from the research through discussion and analysis. Finally chapter five presents a conclusion that determines whether or not there is a positive correlation between gender and physical fitness.

Chapter Two: Literature Review

2.1 Physical Activity and fitness

“Health”, “physical activity” and “physical fitness” all represent a different concept but they are also strongly interlinked (Livingston et al, 2003). Werner and Hoeger (2012) proposed that physical activity is bodily movements produced by skeletal muscles that requires the expenditure of energy and produces progressive health benefits. Furthermore research indicates, that exercise and an active lifestyle increase health, quality of life and longevity. Trembaly et al (2010) recently produced a paper showing Canadian children’s fitness results aged 6-19 years. The rationale for doing this report was because Canadian children had not been measured in more than two decades.

Children in today’s world are vastly different to their predecessors; they seem to be glued to their TV screens because of the new technology developments over the years. With all the latest gadgets on show many researchers are very interested in the effects it may have on a child’s wellbeing. Stigman (2012) recently produced an article ‘Time for a view on screen time.’ He found that over the course of childhood, children spend more time watching TV than they spend in school. When including computer games and DVDs in his research, he found that by the age of seven, a child born today will have spent one full year watching TV media. Hancox et al (2004) reported that watching television in childhood and adolescence has been linked to adverse health indicators including obesity, poor fitness, smoking and raised cholesterol. Gillman (2007) also goes on to say that an inactive childhood will impact the child’s health at a later stage of life, and for the child itself the physiological and psychological benefits to be gained are essential. He also says in his report that several chronic diseases in adult life including cardiovascular diseases, osteoporosis, obesity and some cancers stem from an inactive childhood. Therefore it is vital that a child must participate in physical activity. This is further supported by Jansen and Le Blanc (2010) who found a direct link between physical activity and the health benefits for children. According to Pryke (2006) and Aumann and Hart (2009) British children are not getting enough exercise. A report published by the British Heart Foundation (2009) found that only one in eight young people are getting the recommended 60 minutes of physical activity a day. Over 1000 school children were questioned about the amount of daily exercise they took. More

than 55% of the children revealed that they spend at least an hour a day texting, talking on the phone or using social networking sites. Almost a third of boys and nearly half of girls were not meeting the daily requirements of 60 minutes physical activity.

Evidence indicates that childhood aerobic fitness levels are declining worldwide and that aerobic fitness is related to health in children in a dose response fashion, and that these relationships are independent of physical activity. Overwhelming evidence demonstrates that higher or improved fitness, including measures of body composition, cardiorespiratory function and musculoskeletal fitness, is associated with improved health in children and youth.

(Tremblay et al, 2010)

Physical fitness promotes both physiological and psychological health benefits and is fundamental to a healthy lifestyle (Ostermann 2012). The Department of Health guidance highlights that the key benefits of exercise for children are the avoidance of weight gain, achieving a peak bone mass, improved mental wellbeing and reducing the risk factors for disease (NHS 2009).

Physical Education is a compulsory part of the revised curriculum for all pupils from the age of 4-16 (DENI, 2012). The Department of Education has encouraged schools to give the children at least two hours PE per week. Children's experiences in primary school physical education are thought to be heavily influenced by the confidence, knowledge and disposition of their respective teachers (Morgan and Bourke, 2005) who are likely to have received little training in the subject (Caldecott et al, 2006). Some of these teachers claim that private sessions taken by outside coaches are considered to be their PE lesson for the week and when that is considered children are not receiving any curricular PE.

Determining a child's activity level in primary school is challenging. Fitness tests are devised to calculate an individual's physical fitness level. Extreme consideration and care should be employed when selecting a testing method for children. It is imperative that all aspects are carefully considered and every child's individual needs catered for to avoid exclusion from certain activities (Harris, 2007). To ensure accurate testing, during the fitness testing every child should be entitled to demonstrations, supervision, safety precautions and explanations. Boreham and Riddoch (2001) and Fahey et al (2005) reported to find that if fitness testing

was managed successfully the benefits should outweigh the negatives and encourage the physical activity of the participants throughout their lives.

2.2 Gender

From the moment of birth a child is physically active. Pica and Pica (2006) suggested that from birth children will start to interact with their environment through subconscious motor controlled movements. Children will therefore continue to grow and develop their physical activity levels through play.

Children's parents will have the most influence over their attitude to physical activity and sport. Early influences of parental behaviour on children's physical activity patterns are well documented. Loprinzi et al (2012) demonstrated that parents support was positively associated with child physical activity at home. Kimiecik and Horn (2012) suggest that children's physical activity beliefs differed according to parenting style. He states that children in high support/high challenge families had the most positive constellation of beliefs.

In a study by Lee et al, (1999), students explained the main reason for sex-stereotyped views was the need to feel socially accepted. Parents and other influential people expect boys to play basketball while girls are expected to participate in dance and other feminine-typed activities. If students stepped outside the realm of social acceptability, they viewed themselves at risk for some sort of social penalty. Research carried out by Zipp (2011) investigated the sports which are stereotypically associated with gender. It was discovered that males had a tendency to participate in team sports that required speed, strength, power and physical contact. In contrast females participated in less aggressive sports that were labelled as feminine such as gymnastics or dance. Klein (2007) assessed children's activity levels during break time and results showed that boys have the tendency to be more active, participating in activities that were team orientated and of an aggressive nature. Further research by Wright et al (2003) reported that parents are more eager to involve their sons in physical activity compared to their daughters, who are introduced to physical activity later in life. This might suggest that girl's motivation levels are lower than that of boys which may account for the findings that male participation levels are higher than their female counterparts.

Research in later years has argued that the barriers to girls participation in physical education and sport have now been removed, and that whether and how to participate is now a matter of individual choice. A number of school based programmes for physical education have somewhat limited success because they were geared towards an outcome of enhancing physical fitness rather than promoting physical activity (King and Coles, 1992). Physical education has developed rapidly over the years, ensuring that the needs of every individual are catered for. This was the primary objective of the Northern Ireland Curriculum (NIC, 2007) which stated that “all children” will experience a wide variety of activities and sports. It was proposed that these should be taught in both an enjoyable yet controlled learning environment.

As children enter school the responsibility will become shared between the parents and the school. Teachers have a massive impact on a child’s life and therefore are in a pivotal position to promote physical activity and positive experiences associated with it. Schools should assess the resource they devote to physical education and evaluate their success in building school community links which are likely to promote post-school physical activities among their pupils. Teachers should examine their curriculum and extra-curricular provision to provide opportunities for all children.

It is clear to see that there are obvious differences between genders. Males tend to experience puberty at a later age than females and often experience the growth spurt later than their female counterparts. As both genders develop, differences between the two sexes become obvious. Men usually have an advantage in strength, speed and power over women and this may be down to men having larger muscle fibres which (Miller et al 1992) state is an innate gender difference. The greater gender difference in upper body strength can probably be attributed to the fact that woman tend to have a lower proportion of their lean tissue distributed in the upper body. Due to these physical differences it is unrealistic to expect females to compete with males at an equal level.

2.3 Physical Activity and Gender

Canada's first set of physical activity guidelines for children and youth were introduced in 2002. The basic recommendation within these guidelines were that children and youth, independent of their current physical activity level, should increase the time they spend on

moderate-to-vigorous intensity physical activity by 30 minutes per day and over a 5 month period progress to adding an additional 90 minutes of daily physical activity. In addition to this Janssen and LeBlanc (2010) also reported that children and youth 5-17 years of age should accumulate an average of at least 60 minutes per day and up to several hours of at least moderate intensity physical activity. According to the U.S. Department of Health and Human Services (USDHHS 2000), young people must be taught the skills, knowledge, attitudes and behaviours that lead to regular participation in physical activity. Research recently conducted by the British Heart Foundation (2012) has found that an immense number of children are not meeting the suggested benchmark for physical activity. As a result schools have set up fitness testing methods to battle the inactivity and unhealthy lifestyles being presented in this current era. For both males and females the fitness testing can be seen to be beneficial. Thomas et al (2008) advocate the accuracy of the methods, by suggesting that there are direct links between activity levels and fitness testing. This implies that those who excel in such tests express greater levels of physical activity. Boys are expected to perform better in fitness testing because they come from a competitive background so they are more motivated to do well. Fuchs et al (1998) longitudinally examined physical activity in German children in grades 6 and 7. Boys reported significantly greater participation in total physical activity, despite the fact that participation in moderate physical activity was similar for boys and girls. The consistent observation that boys participate in substantially greater amounts of vigorous physical activity than girls underlines the need for physical activity intervention programmes for girls of all ages.

Rowland (2005) states that as children mature, gender differences in fitness levels become greater. The author highlights that puberty has a huge bearing on the gap. As the child grows and matures, so does their physical appearance. These body changes enable boys to become faster, stronger and more powerful than girls, because of the great muscle mass and cardio respiratory capacity. Therefore because of these differences it is unfair and unrealistic to believe girls can score higher than boys.

To conclude, it is clear that there are other factors to take into consideration when conducting fitness testing. Stages of puberty, weight, attendance, well-being and opportunity are all areas that need to be looked at as each one may have a negative effect on the testing results. It is so important that the physical educator along with the NIC (2007) make sure the needs of every individual are met. It can thus be argued that males and females should have an encouraging attitude towards fitness as the benefits will greatly overshadow the negatives, allowing the

children to become more aware of how to keep healthy and improve their overall fitness level.

Chapter Three: Methodology

Following on from the literature review, which has informed the background for this study, this following chapter will describe the methodology employed in this investigation of the difference in gender and physical fitness.

3.1 Research Design

The aim of this particular study was to investigate the effects of gender difference in children in several aspects of physical fitness. The primary focus of this study will involve a range of physical fitness tests to take place, in order to gain accurate results for different elements of physical fitness. It is essential to use accurate experimental design when conducting fitness tests to gain dependable results. According to Rikli and Jones (2012) a reliable test is one that results in consistent, dependable and repeatable test scores, free of measurement errors. The testing will include the following elements of physical fitness:

- Flexibility
- Agility
- Speed
- Strength
- Cardiovascular Endurance

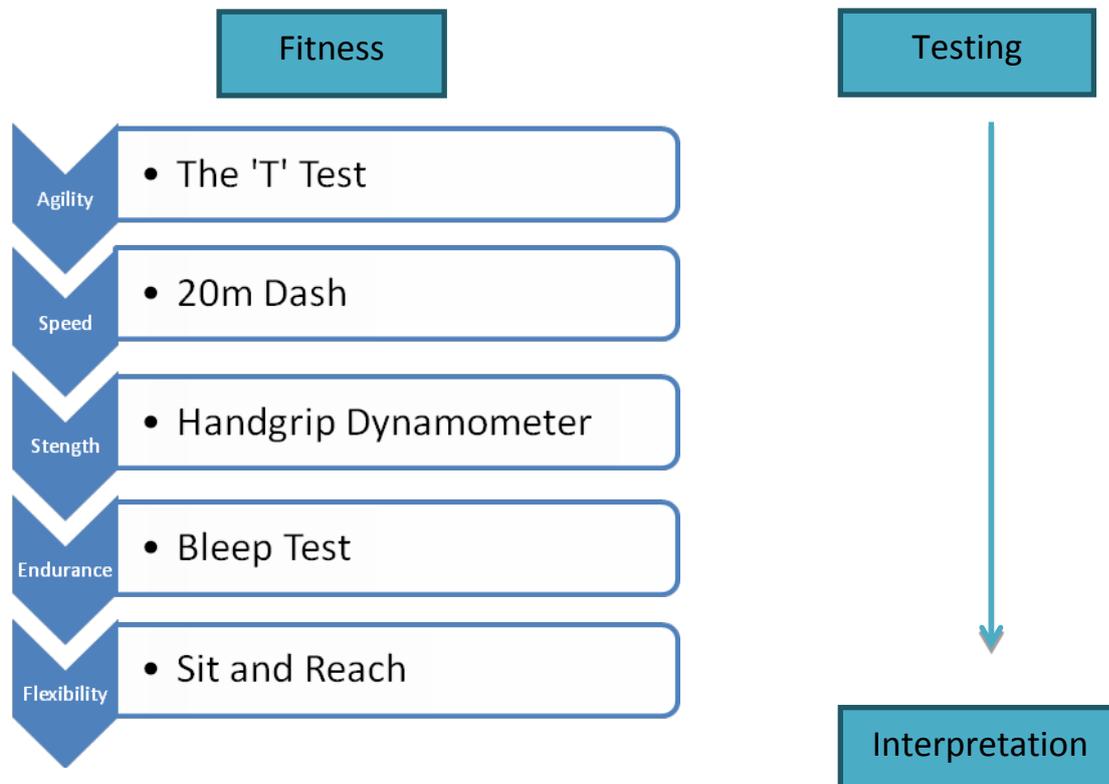


Figure 3.1- Model of Research Design for Investigation

The above tests were chosen as they will produce accurate results in each element of the physical fitness. Utilising elements from both the skill-related (agility, speed) and health-related (strength, flexibility and cardiovascular) components will provide an accurate and widespread reflection of the children's overall fitness level.

3.2 Subjects

This study focussed on participants (subject n= 295) in year seven classes who attended a range of primary schools in Northern Ireland.

All the pupils were in year seven most of whom were aged 10 and above. The participants comprised of 135 females and 158 males from a range of urban and rural areas.

3.3 Procedures

Before the testing could take place it is essential that formal consent procedures were followed.

3.3.1 Consent

As the children of the schools are the most important part of this study it was necessary to get permission, not only from the principal of the school but also from the parents of the children. According to Buck et al (2008) informed consent for fitness testing is a necessary requirement as well as there being a legally safe process for those involved in the testing. A letter (Appendix 1) was sent to the principal to secure consent along with information on the aims and purpose of the study, and to promise confidentiality and professionalism throughout. A second letter (Appendix 2) was sent to the parents/guardians of the children involved in the study outlining in detail the purpose of the study, who would be conducting the study and the requirements of the tests which the children would undertake. At the bottom of the letter there was a reply slip that the parents had to sign and return stating whether or not their children could participate in the study. Once all these forms were returned and authority was granted by the school the testing could begin.

Before any tests took place the children were informed and a demonstration shown of what exactly would be required of them in each aspect of the test. Children were not informed of the exact purpose of the study, simply because it is an investigation and not a competition.

3.4 Tests

There are a total of five tests that were carried out to provide data for this study. The ‘Sit and Reach Test’ was used to test flexibility, whilst the 20m Shuttle run was used to test endurance, the ‘T-Test’ was used to test agility, the ‘Handgrip Test’ was used to test strength and the ‘20m Dash’ was used to test speed. Appendix 3 provides a breakdown of each physical fitness test and the procedures involved.

3.4.1 Agility

Turner (2011) describes agility as the ability to change direction in response to a sport-specific stimulus, incorporating physical, technical, perceptual and decision-making skills. Agility is also influenced by body balance, coordination, the position of the centre of gravity, as well as running speed and skill. In this study the 20m T Test will provide accurate results of children’s agility.

3.4.2 Endurance

Malina et al (2004) highlight that cardiovascular endurance is one of the main components used to measure health-related fitness. The bleep test is a simple and effective test that is used to assess cardiovascular endurance in athletes.

3.4.3 Speed

In measuring fitness, speed is an essential element which is described by Scott (2002) as the differential rate at which an individual is able to perform a movement or cover a distance in a period of time. For the purpose of this study, speed was tested using a simple but effective straight line sprint over a distance of 20metres (m).

3.4.4 Strength

Coulson and Archer (2009) illustrates that muscular strength is the tension that muscles can apply in a single maximum contraction. A handgrip dynamometer is used to measure muscular strength accurately. The handgrip strength test is an extensively used test in experimental and epidemiological studies (Ruiz et al 2006). The hand grip strength test gives information on muscle strength that is straightforward and economical to use.

3.4.5 Flexibility

Flexibility is the range of motion around joints in the body and this allows individuals to carry out daily activities as long as possible throughout their lives (Coulson and Archer, 2009). There are many benefits associated with good flexibility, including range of motion and function, reduced risk to injury and improved performance (Pope et al, 2000) Flexibility can be tested using the 'Sit and Reach Test' which assesses flexibility by means of reaching forward as far as possible from a seated position.

3.5 Statistical Analysis

All data collected from the subjects were produced on a spread sheet from Microsoft Excel. The data were thoroughly checked and all the information gathered was produced in a number of graphs and tables. The child's overall physical fitness was determined by their cardiovascular endurance.

Chapter Four: Results and Discussion

4.1 Introduction

Applying the research methods outlined in the previous chapter, this chapter presents the results of research which has been conducted. The information which has been gathered will be used to formulate graphs and charts. The results of the investigation will determine if such a correlation exists between gender differences and their effects on physical fitness.

4.2 Subjects

There were 295 subjects from various primary seven classes. The children were aged between 10 years and 5 months and 11 years and 4 months at the time of data collection. The subjects come from a mixture of rural and urban schools across Northern Ireland. There were 135 females and 158 males.

4.3 Physical Fitness

The subjects were tested in a range of fitness tests to ascertain their level of speed, agility, strength, flexibility and endurance.

4.3.1 Strength

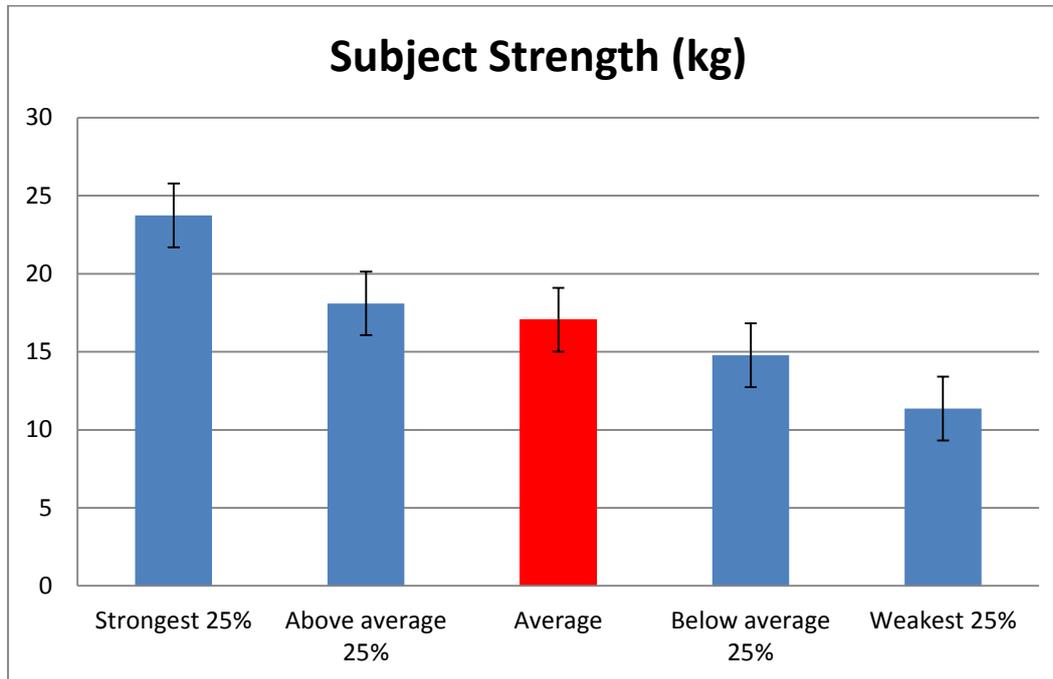


Figure 4.1 Strength- Results of the Strength Test

Figure 4.1 illustrates the results of the strongest 25%, above average 25%, below average 25% and the weakest 25% in the 'Hand Grip Dynamometer' strength test. It is very evident from the graph that there is a broad range in the strongest and weakest 25%. The highest score achieved was 31kg by a female and there were three subjects that achieved the lowest score of 8kg, two of whom were male subjects. The average score in the strength test was 17.04kg (± 4.92). Tremblay et al's (2010) study on children's fitness found that the average male aged between 7-10 should score 27 in strength where the average female aged between 7-10 should score 24. In comparing these results with the above graph only 3% of males achieved this score and only 4% of the females achieved their score. Rowland (2005) states that as children mature, gender differences in fitness levels become greater. The author highlights that puberty has a huge bearing on the gap. Rathus (2011) claims that females reach the pubertal stage earlier than the male gender, which in turn could support such a high score from the female subject as physical growth maybe occurring. As the child grows and matures, so does their physical appearance. In this particular test it is possible that the female who achieved the highest score had matured and grown more so than her counterparts. This would concur with Aerenhouts (2012) in suggesting that the males that took part in this test are late-adolescent boys that are still developing their muscularity. Boys and girls differ in

biochemical, physiological and endocrinological characteristics which certainly influence physical fitness. Paizkova and Hills (1998) reinforces this by stating that as a result of the increasing amounts of testosterone during puberty, boys have more lean body mass than girls and thus in strength tests, adolescent boys have a biological advantage.

4.3.2 Speed

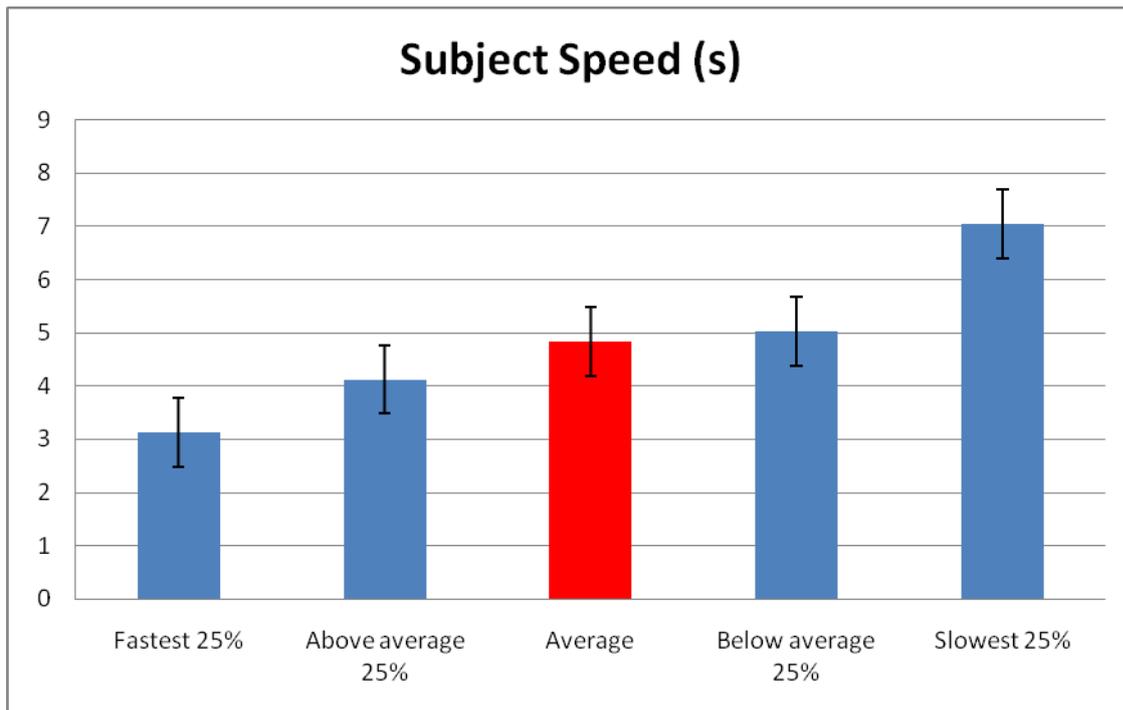


Figure 4.2: Speed- Results of the 20m Sprint

Figure 4.2 shows the results obtained from the 295 subjects in the 20m Dash speed test . With there being a large number of subjects the graph above shows the fastest 25%, above average 25%, below average 25% and the slowest 25%. From the graph it is apparent that there is not much difference from the fastest 25% and the above average 25% with only 1 second separating the subjects. The fastest subject was a female and she completed the test in 2.03s with the slowest subject also being a female and taking 8.6s. The average speed for all participants was 4.84s (± 1.52). When studying the fastest 25%, 49% of these subjects were in fact females. In addition to this, when we analysed the top 10 subjects there was only 0.59s of a difference which again shows that they is not much of a between the top male and females in the sprint. Armstrong (1996) says that between the age of 5-8 there is little difference between the sexes in terms of speed but by the age of 9 the differences in speed becomes apparent and males generally become faster. These particular results though do not agree with

Armstrong but agree with Feltz et al (2008) where they state that males are not always better than females.

4.3.2 Agility

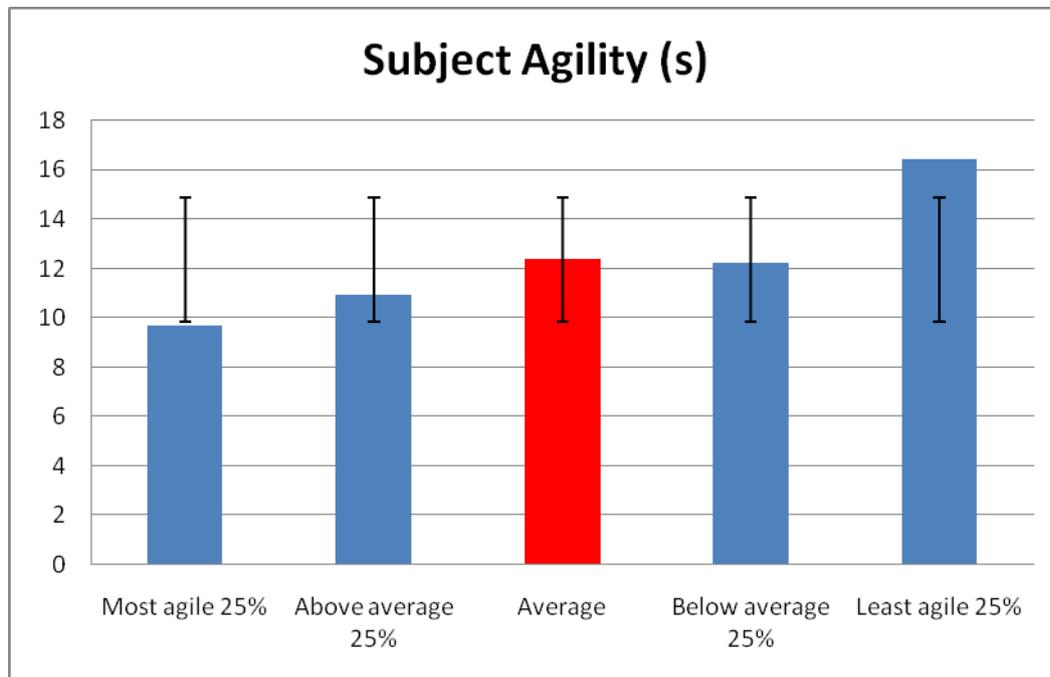


Figure 4.3 Agility- Results of the Agility Test

Figure 4.3 shows the results of the most agile 25%, above average 25%, below average 25% and least agile 25% obtained in the 20m T-Test. From analysing the graph there is a difference of 8 seconds between the most and least agile 25%. The fastest subject was a male and he completed the test in 7.58s whereas the slowest subject was a female who completed the test in 21.92s, nearly three times as long as the quickest male. The overall average for the group was 12.38s (± 2.77). When looking at average results and comparing them with the average results for children in the test, 50% of the children reached or bettered the average score. These results are supported by the research of Paipaiakovou et al (2009) who state that from the age of 7 years of age, males generally run faster than females and the gap increases with age as children enter the teenage years. These results also back the claims by Gordon and Williams-Browne (2010) who propose that males tend to score better on agility testing than females. This is backed by Capel, and Piotrowski (2002); boys are taller, faster and physically stronger, on average, than girls.

4.3.4 Flexibility

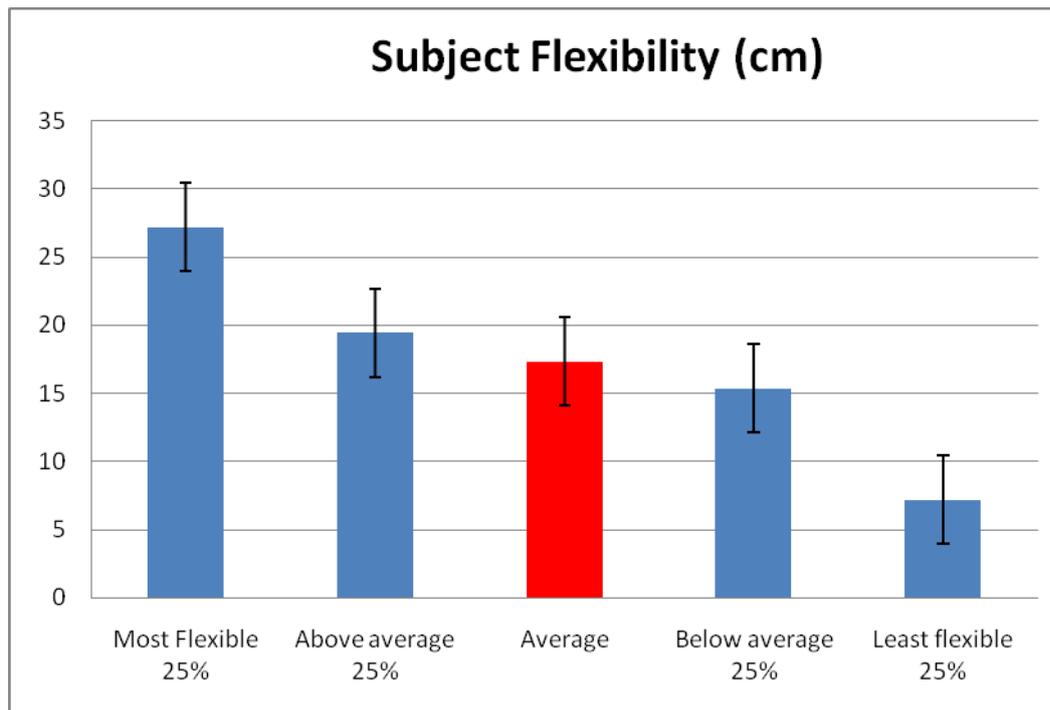


Figure 4.4 Flexibility- Results of Flexibility Test

Figure 4.4 illustrates the most flexible 25%, above average 25%, below average 25% and least flexible 25% results from the Sit and Reach test. These results present a wide range of scores particularly between the most and least flexible 25% where there is a difference of 20cm. The highest score of 42cm was achieved by a female and the lowest score of -9 was achieved by a male subject. The average score in this graph shows 17.34cm (± 8.0). Looking at the most flexible 25%, 77% of these were females, whereas when looking at the least flexible 25%, 100% of these were males, agreeing with John and Lindner's (2006) suggesting that females generally do better in flexibility tests. Tremblay et al (2010) recently produced a document on the fitness of Canadian children. Within this they found that the fitness levels of children and youth have declined significantly and meaningfully since 1981, regardless of age or sex. In their flexibility test the average male scored 24 and the average female scored 29. Out of all our subjects that took part only 6% of the males scored 24 or above and 5% of the females scored 29 or above. It is clear that females outscored males in the flexibility test, therefore supporting the claim of Brown and O'Rourke (2003) that females partake in more feminine sports such as figure skating and gymnastics as it is perceived as being more socially acceptable. Parents and other influential people assume that males are to play basketball while females are expected to participate in dance and other feminine-typed

activities. If students stepped outside the realm of social acceptability, they viewed themselves at risk for some sort of social penalty. Research carried out by Zipp, (2011) discovered that males had a tendency to participate in team sports that required speed, strength, power and physical contact. In contrast females participated in less aggressive sports that were labelled as feminine such as gymnastics or dance.

4.3.5 Endurance

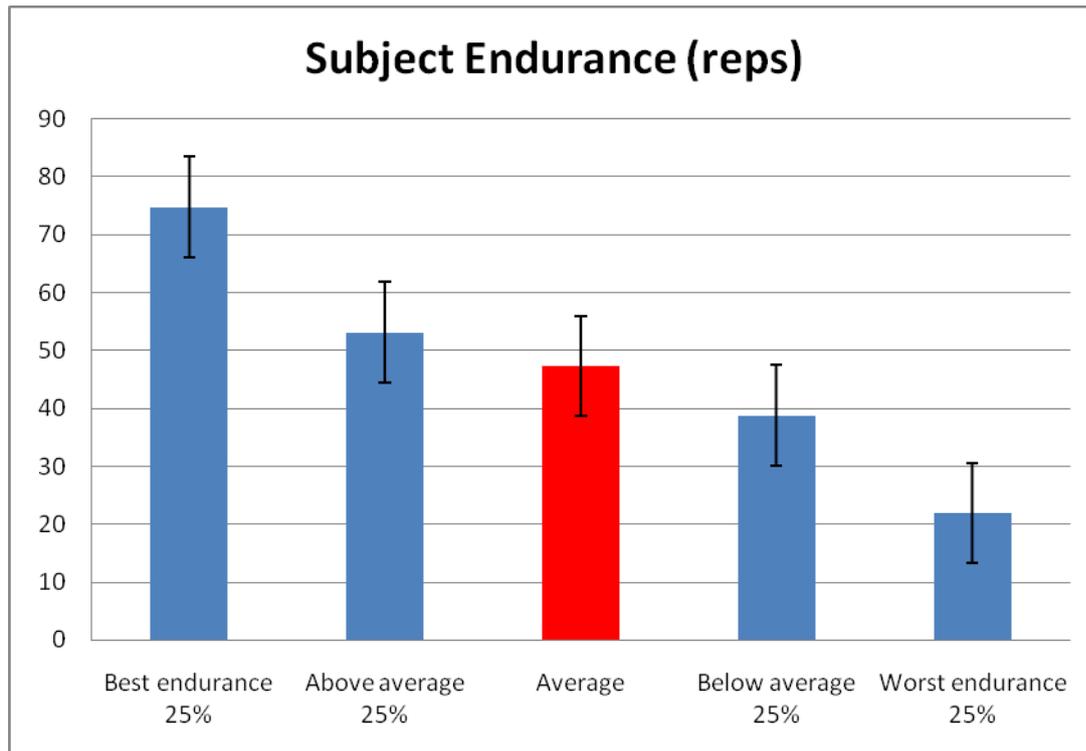


Figure 4.5 Endurance- Results of Endurance Test

The results from figure 4.5 present a wide range of scores obtained by the 295 subjects in the Endurance test. The results range from 108 reps scored by two males to 12 reps obtained by a female. The average number of reps completed was 47.27 (± 20.71). The results would seem to support the research of Garrett and Kirkendall (2000) who stated that due to greater growth rates presented in the pre-pubertal stage, males possess greater cardio-respiratory mass than their female counterparts, thus resulting in greater scores. This would prove correct in the above results with a difference of 98 reps between the top and bottom subject. In saying that the next best score to the two males was 203 and this was scored by a female which suggests that there is not always a dramatic difference in the child's fitness levels at a young age. When observing the results above it is clear that the best endurance 25% scored significantly higher than the average. On the other hand the worst endurance 25% scored 50% less the

average of all subject. When analysing the best endurance 25% males outscored the females by 73%. Endurance test is an indicator of cardiorespiratory endurance and aerobic fitness proving in this particular graph that males are on average overall fitter than females.

4.4 Gender

Altogether there were 295 subjects that took part in the testing, from the pie chart below 54% of these were male and 46% were female.

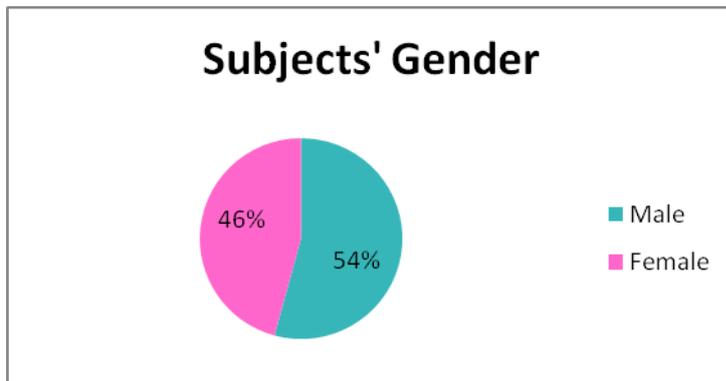


Figure 4.6 Subjects Gender

4.5 Physical Fitness and Gender

The fitness levels of the subjects across the five tests of speed, strength, endurance, flexibility and agility were recorded in Microsoft Excel and a sum of ranks was completed to ascertain the fittest overall subject. Each subject was ranked by their score in the five elements of fitness, with the best result deemed as 1 and the worst result as 295. The sum of ranks added together the 5 elements and the fittest subject had a sum of ranks of 198, indicating an average rank of 39.6. The least fit subject had a sum of ranks of 1247, indicating an average rank of 249.4. Both the fittest and least fit subjects were male. The fittest ranked subject is considerably higher than the next subject who was on average 12 ranks behind him in every element. According to the results below it would appear that male participants ranked higher on average than their female counterparts. This is supported by the research of Johns and Linder (2006), who suggest that males perform better than females in health related components of fitness.

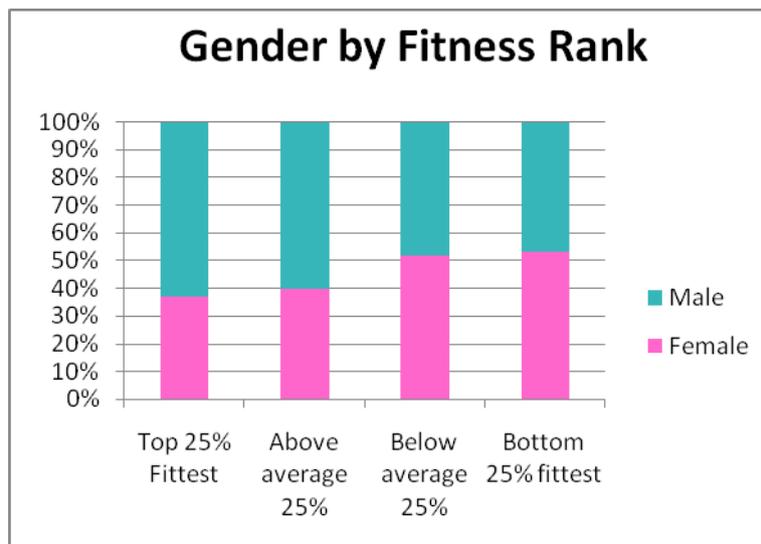


Figure 4.7- Gender by Fitness Rank

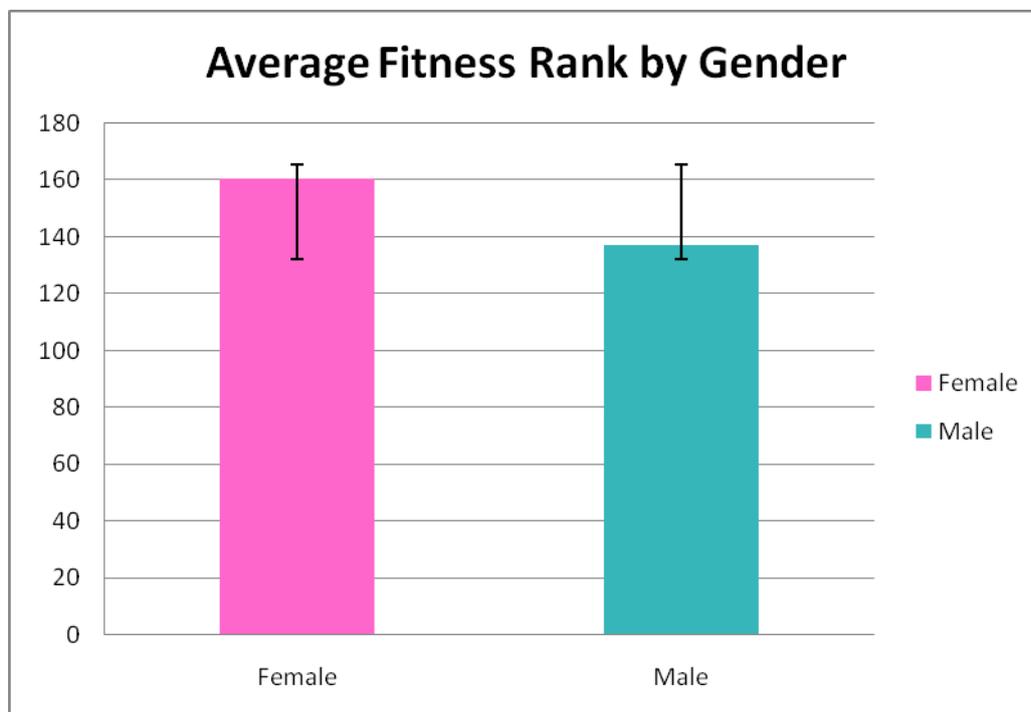


Figure 4.8- Average Fitness by Gender

The average fitness rank for females is 160.7 (± 82.1) and the average fitness rank for males is 136.9 (± 86.7). This produces a difference in average fitness rank as 23.8 and in terms of each individual fitness component as 4.76 on average. From analysing this graph males on average scored less in each element therefore males are generally fitter than females. Boys are expected to perform better in fitness testing because they come from a competitive background so they are more motivated to do well. This is also agrees with Brown and O'Rourke (2003) who say that females take part in more feminine sports such as gymnastics

and dancing as it perceived as being more socially acceptable. Parents have a huge bearing on their child’s sporting background as they assume that males are to play basketball while females are expected to participate in dance and other feminine-typed activities. These results agree with Fuchs et al (1998) who found that boys perform significantly greater in total physical activity. These results correlate to Wright et al’s (2003) proposal that parents are more eager to involve their sons in physical activity compared to their daughters, who are introduced to physical activity later in life. Clark and Paechter (2007) note that girls and woman have long been excluded from sport and physical activity due to perceptions of their inherent weakness and fragility. Boys are expected to outperform females because of the biological differences. When males enter puberty there is an increase in muscular skeletal growth as well as an increase in heart strength and lung capacity, such changes influences the child’s endurance in sporting activities. When analysing the results above it is clear to say that males are overall fitter than females. Seel et al (2012) further argue that while sport significantly shapes the way boys view their masculinity, for girls playing sports presents a significant risk to their femininity. This could be one of the many reasons males have outperformed females in the fitness tests.

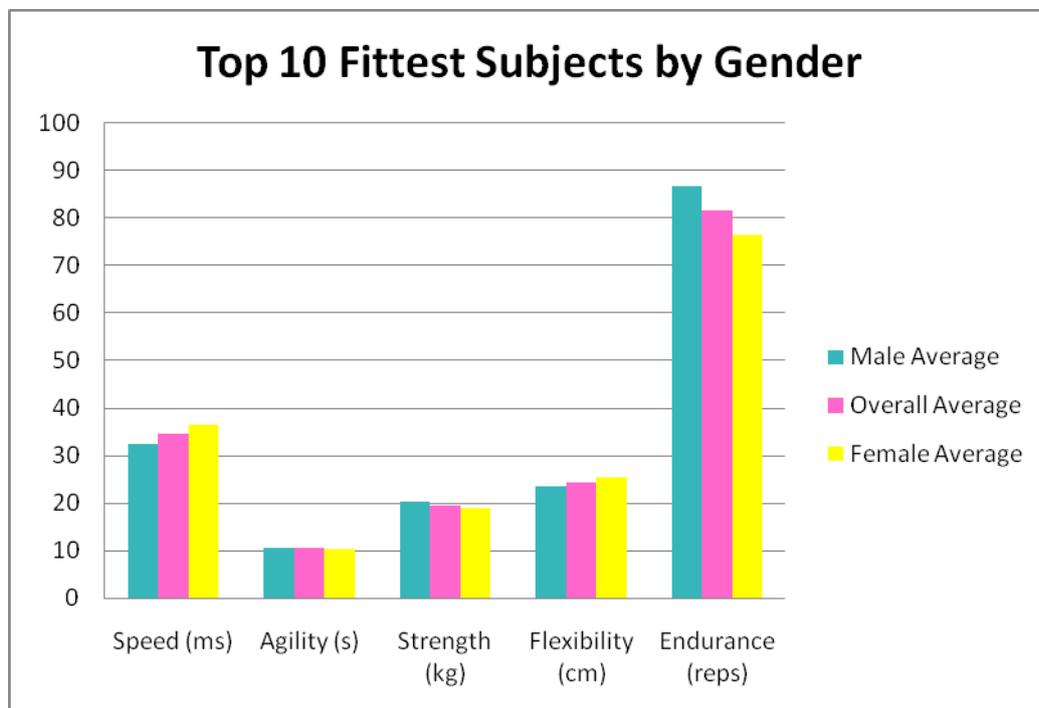


Figure 4.9 shows the top 10 subjects by gender.

When looking at all the overall rank results it was very interesting to note that out of the 295 subjects that took part the top 10 results consisted of 5 males and 5 females. These results

indicate that the females that are fit are very fit or as fit as any of their male counterparts. When studying the fitness tests the graph shows that there is not much separating males and females. When looking at the speed and agility results the males just edged out the overall ranks agreeing with Gordon and Williams- Browne (2010) who propose that males tend to score better on speed testing than females. The endurance test shows from the graph that the males outperformed their females supporting Garrett and Kirkendall (2000) who state that due to greater growth rates presented in the pre-pubertal stage, males possess greater cardio-respiratory mass than their female counterparts, thus resulting in greater scores. The flexibility test expected that females would score better agreeing with John and Lindner's (2006) statement that females generally do better in flexibility tests. Finally when comparing the strength scores, again the males just edged the females with the overall ranks. This agrees with Rathus (2011) who says that males are physically stronger than females. With all these results in mind it is very clear with these particular subjects that the male gender performed better in the fitness tests.

Chapter Five: Conclusion

5.1 Conclusion

Upon examining and discussing the results of the fitness tests it is clear that there is a positive correlation between gender and physical fitness. It is apparent that the findings of Rowland (2005) and Johns and Linder (2006) are true. Johns and Linder (2006) suggest that males perform better than females in health related components of fitness and Rowland (2005) states that as the child matures, gender differences in fitness levels become greater. The author highlights also that puberty has a huge bearing on the gap and as the child grows and matures, so does their physical appearance. These body changes enable boys to become faster, stronger and more powerful than girls, because of the great muscle mass and cardio respiratory capacity. Males on average in each of the fitness tests outscored their female counterpart in strength, agility, cardiovascular and speed tests, while females outscored males in flexibility testing. This was to be expected as Zipp (2011) discovered that males had a tendency to participate in team sports that required speed, strength, power and physical contact. In contrast females participated in less aggressive sports that were labelled as feminine such as gymnastics or dance, which enhance flexibility

While no noteworthy difference between males and females was illustrated in the results it is clear that the fitness testing is valuable to both male and female genders and should be practised in school through a comfortable and fun environment where children can develop their fitness. There are many different factors that need to be carefully looked at when conducting the fitness testing, for example weight, stages of puberty and wellbeing. Assuming these factors are taken into consideration the fitness testing should be carried out on a regular basis to provide accurate results.

5.2 Recommendations

Having completed the study it is vital that the methods used are analysed and discussed. Overall the independent study was a moderately small scale study with 295 subjects. For this study to be enhanced the number of subjects would need to be increased to produce more valid results.

The fitness testing was a totally new experience for all children that took part in the investigation. To certify the eradication of irregularities it would be reasonable for the

children to undergo the testing continuously over a set period of time after the transfer tests. Children would understand more the procedures involved and therefore the results can be more dependable. Furthermore there was an uneven balance in terms of males and females participating in the study. Altogether there was 295 subjects, 135 females (46%) and 158 males(54%) because of this it was challenging to determine results in a true manner and may raise queries on the validity of the testing scores. Having an equal number of males and females participating in the study would eliminate any inconsistencies in the results and produce a more reliable and accurate investigation.

5.3 Limitations

From assessing the results it was clear to see that there were some limitations presented in the study. The first limitation within this study was the sample size of 295. In order to obtain even more valid results it would be imperative that the sample size be increased. When conducting the fitness tests in the schools it was a time when children were concentrating on their transfer tests and therefore some physical education classes were missed due to children sitting practice tests. Due to the children not taking part in these lessons, improvements or developments in their physical fitness were limited, in fact for those that play no sports at all their fitness levels would have continued to decrease. Children were also unfamiliar with the tests and had to be provided with a demonstration beforehand. If children had time to practice the techniques and skills involved in the fitness tests then the results they achieved may have changed. The endurance test requires a lot of knowledge and experience on how to run at a pace suited to the beep. Children seemed to show off at the start of the test by trying to run as fast as they could which certainly reflected their individual score at the end as many children wasted a lot of their energy at the start of the test. With children only being allowed to complete this test once and because of our time limit in schools questions must be raised on the accuracy of results obtained.

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Appendices

Appendix One-Letter to Parent



Mairead Conwell

(Address given)

Dear Parent/Guardian,

I am a 4th year Physical Education student at St. Marys University College, Belfast. As a component of my final year project I am investigating primary 7 children's fitness levels. A requirement of such a study would be to research the current fitness levels of the children and compare both the male and female results from the fitness tests carried out.

The elements of the fitness testing that I will be investigating are speed, endurance, strength, flexibility and agility. These elements will be investigated using a series of accurate, recognised, safe and age appropriate testing methods.

I am writing to request your permission for your son/daughter to participate in my project which will take place on the school grounds. As a physical education specialist I would like to stress that the safety of the pupils will be my primary concern at all times and my results will be regarded with confidentiality and anonymity.

I would appreciate if you would accommodate me in my project. Your child's participation is not compulsory but would be greatly appreciated to provide more accurate results. If you have any queries or questions please feel free to contact me. Please complete and return the permission slip below.

Yours Sincerely,

Mairead Conwell

I do/do not give my child _____ permission to partake in this research project. I am also aware that any information gathered during this study will be confidential.

Signed _____ Date _____

Appendix two-Letter to Principal



Mairead Conwell

(Address given)

Dear Principal,

I am a 4th year Physical Education student at St. Marys University College, Belfast. As a component of my final year project I am investigating primary 7 children's fitness levels. A requirement of such a study would be to research the current fitness levels of the children and compare both the male and female results from the fitness tests carried out.

The elements of the fitness testing that I will be investigating are speed, endurance, strength, flexibility and agility. These elements will be investigated using a series of accurate, recognised, safe and age appropriate testing methods which will include the following:

- 20metre Dash for Speed
- 20metre Shuttle Run for Endurance
- Hand Grip Dynamometer for Strength
- Sit and Reach for Flexibility
- T Test for agility.

With your permission I would greatly appreciate the opportunity for your Primary 7 class to participate and assist in my investigation. I would like to stress that the safety of the pupils will be my primary concern at all times and my results will be regarded with confidentiality and anonymity. Your co-operation would mean a great deal and would be greatly appreciated.

Yours Sincerely,

Mairead Conwell

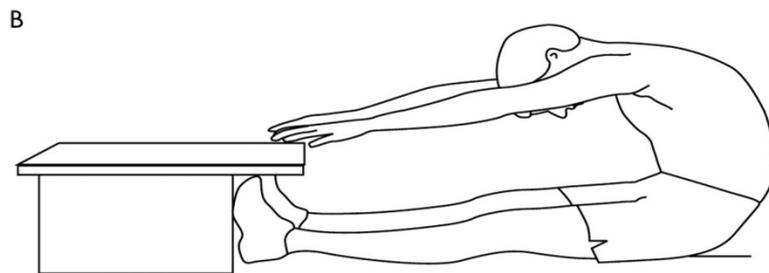
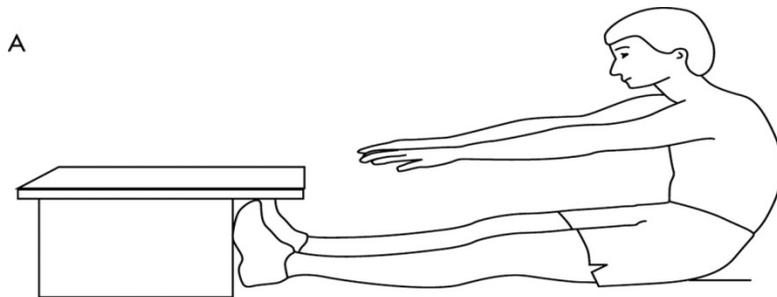
Appendix three- Fitness tests

Altogether a total of 5 elements of fitness will be tested. The following are descriptions and images explaining each test.

The 5 elements of fitness being tested include:

- Agility
- Flexibility
- Muscular Strength
- Endurance
- Speed

Flexibility – Sit and Reach Test



The sit and reach test is a common measure of flexibility, and specifically measures the flexibility of the lower back and hamstring muscles.

Equipment required: sit and reach box (or alternatively a ruler can be used, and a step or box)

Procedure: This test involves sitting on the floor with legs stretched out straight ahead. Shoes should be removed. The soles of the feet are placed flat against the box. Both knees should be locked and pressed flat to the floor - the tester may assist by holding them down. With the palms facing downwards, and the hands on top of each other or side by side, the subject reaches forward along the measuring line as far as possible. Ensure that the hands remain at the same level, not one reaching further forward than the other. After some practice reaches, the subject reaches out and holds that position for at least one-two seconds while the distance is recorded. Make sure there are no jerky movements.

Scoring: The score is recorded to the nearest centimetre as the distance reached by the hand. Some test versions use the level of the feet as the zero mark, while others have the zero mark 9 inches before the feet.

Muscular Strength – The Handgrip Dynamometer



The purpose of this test is to measure the maximum isometric strength of the hand and forearm muscles. Handgrip strength is important for any sport in which the hands are used for catching, throwing or lifting. Also, as a general rule people with strong hands tend to be strong elsewhere, so this test is often used as a general test of strength.

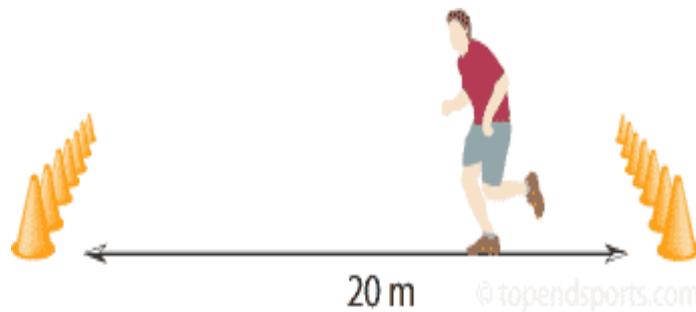
Equipment required: handgrip dynamometer

Procedure: The subject holds the dynamometer in the hand to be tested, with the arm at right angles and the elbow by the side of the body. The handle of the dynamometer is adjusted if required - the base should rest on first metacarpal (heel of palm), while the handle should rest on middle of four fingers. When ready the subject squeezes the dynamometer with maximum isometric effort, which is maintained for about 5 seconds. No other body movement is allowed. The subject should be strongly encouraged to give a maximum effort.

Scoring: The best result from several trials for each hand is recorded, with at least 15 seconds recovery between each effort.

Sourced from Top End Sports: The Sport and Science Resource (2013), available at <http://www.topendsports.com/testing/tests.htm>

Endurance – 20m Multistage Fitness Test (The Bleep Test)



The 20m multistage fitness test or Bleep Test is a commonly used maximal running aerobic fitness test.

Equipment required: Flat, non-slip surface, marking cones, 20m measuring tape, beep test CD, CD player, recording sheets.

Procedure: This test involves continuous running between two lines 20m apart in time to recorded beeps. The test subjects stand behind one of the lines facing the second line, and begin running when instructed by the cd or tape. The speed at the start is quite slow. The subject continues running between the two lines, turning when signalled by the recorded beeps. After about one minute, a sound indicates an increase in speed, and the beeps will be closer together. This continues each minute (level). If the line is not reached in time for each beep, the subject must run to the line turn and try to catch up with the pace within 2 more 'beeps'. Also, if the line is reached before the beep sounds, the subject must wait until the beep sounds. The test is stopped if the subject fails to reach the line (within 2 metres) for two consecutive ends.

Scoring: The athlete's score is the level and number of shuttles (20m) reached before they were unable to keep up with the recording. Record the last level completed (not necessarily the level stopped at).

Speed – The 20m Dash



Purpose: The purpose of this test is to determine acceleration, maximum running speed and speed endurance, depending on the distance run.

Equipment required: measuring tape or marked track, stopwatch or timing gates, cone markers.

Procedure: The test involves running a single maximum sprint over a set distance, with time recorded. After a standardized warm up, the test is conducted over 20m. The starting position should be standardized, starting from a stationary position with a foot behind the starting line, with no rocking movements. If you have the equipment (e.g. timing gates), you can measure the time to run each split distances (e.g. 5, 10, 20m) during the same run, and then acceleration and peak velocity can also be determined. It is usual to give the athletes an adequate warm-up and practice first, and some encouragement to continue running hard past the finish line.

Scoring: The participant will be timed for their 20m run and their score recorded to the nearest 0.01 second. The best time of 2 runs will be recorded and there should be the option of a trial run beforehand also.