"An investigation into whether there is a link between a child's level of physical activity and their academic performance"

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Abstract

This study was undertaken with the intention of finding out whether there is an existing relationship between a child's academic performance and their level of physical activity.

The results collected were gathered from pupils in primary six and primary seven pupils from one large rural school in Derry. Data was collected on ninety subjects leaving the study scale relatively small. As all subjects came from the one school, results and information was gathered with relative ease.

In order to obtain the levels of physical activity amongst the subjects, each participant was required to fill out a questionnaire. They were asked; how many different activities do you participate in? How many times a week do you partake in physical activity? State whether this activity is inside or outside of school. In receiving the academic performance levels of pupils, InCAS scores for both English and Mathematics were provided by the class teachers, outlining exactly where the pupil was at in terms of years and months in comparison to their actual age.

After comparing the results of all subjects, it can be seen that a small correlation may exist between a child's level of physical activity and their academic performance. Results indicated that the most active 25% of participants performed extremely well academically, however the same correlation could be seen for the least active 25% of participants who scored only slightly less academically. What could be seen from the results however was that, those children who were neither in the most active 25% or least active 25% actually performed considerably less academically than those who were either very active or very inactive. However, independent statistical analysis using the Spearman Rank Test suggested that no correlation existed between a child's level of physical activity and their academic performance.

Key Words: Academic Performance, physical activity levels, physical fitness`

Chapter One: Introduction

1.1 Background to Study

A commonly used phrase by the general public is that "a healthy body leads to a healthy mind" and yet young children today are becoming more and more inactive, with physical activity regularly being displaced by television viewing, internet surfing, and video gaming (Palmer, 2006). This has led to considerable concern arising as a result of this lifestyle change as levels of obesity amongst children and adults have grown quite considerably in the last decade (World Health Organisation, 2003).

Within the school context, the position and importance of physical activity through Physical Education has often been undervalued compared to other curriculum areas which have the perception of being more academic. Tremblay et al (2000) provide evidence to this statement, declaring that some parents and teachers often question the need of Physical Education within schools and believe that the children would benefit more with being in the classroom learning more 'academically' based subjects. However with the growing certainty and reality that physical activity is essential and could actually have a positive effect on academic performance, this view is ever changing.

The recommended amount of daily physical activity required for children is one hour at a moderate intensity (Atter and Drew, 2008) however worrying figures presented by the NHS Information Centre (2009) suggest that such requirements are not being met. They found that 68% of boys aged 4-15 were classified as not meeting the government's recommendations for physical activity and that an even more distressing 76% of girls of the same age were not meeting the recommended amount of physical activity. Furthermore, with regards to physical activity offered in the school setting, Sport NI (2009) reported that a worrying 44% of boys and 34% of girls think that they do not get enough Physical Education time at primary school which is definitely worrying as a prospective physical educator.

According to the World Health Organization (2003), physical activity, including taking part in sports, is vital to a person's health and well-being. It is clear to be seen that over the last couple of decades, the world has experienced a sharp increase in non-communicable diseases, such as heart disease, diabetes, cancer, and respiratory illnesses. Research conducted by Rahl (2010) highlights that one of the biggest risk factors of developing these non-communicable diseases is not getting enough physical activity.

The health benefits of a physically active lifestyle are well documented and there is also a large amount of evidence to suggest that regular activity is connected in reducing the occurrence of many chronic conditions (NHS Information Centre, 2009). Within the school context, incorporating physical activity or fitness training not only contributes to a wide range of health benefits but also is a likely means to improve the cognitive performance (Sibley & Etnier, 2003) and enhance the social skills and self-perception of children which can be a factor in reducing levels of absenteeism in school and therefore playing a positive role academically.

1.2 Need for Study

As it has been noted during this first chapter, physical education serves many purposes for children and not only in relation to their physical health which is often the perception of others. Participating in physical activity within school has often been seen as a waste of good 'educating time' that could be spent in the classroom and this opinion needs to be changed.

Several researchers have conducted investigations regarding the correlation between the two variables of academic performance and physical activity; however results to date have been inconclusive. As a prospective teacher specialising in the area of Physical Education and one who cares greatly about the need for children to be physically active and also that they achieve well academically I felt that this area had the potential to be looked into further.

As mentioned previously, it is well documented that taking part in sports and physical activity can foster a positive self-image, teach children how to work as part of a team, and develop healthy exercise habits, and therefore schools should encourage children to be more active and allocate more time for physical activity to take place. School sport leads to social competence, which is the ability to get along with others, including peers, family members, and teachers. School sport can also make children feel more worthy and successful (Ewing, 1997) and motivate them to go on and pursue successful careers that interest them.

In her handbook for 'Sport Specific Performance Enhancement' Dosil (2006) highlighted that physical inactivity is estimated to cause a shocking number of 1.9 million deaths worldwide. The primary school setting is a great place to get children involved in sport as usually those who are active as children are more likely to grow up to become active adults, further emphasising the importance of physical activity at a young age.

1.3 Aims and objectives

The aims and objectives of this paper are to investigate the relationship between children's level of physical activity and their academic performance and then establish whether there is a direct correlation between these two variables. The relationship of these two has been the subject of extensive discussion between advocates of Physical Education and school sports programmes. It is important to note that both elements of this discussion (academic performance and physical activity) are independent determinants of a child's health.

Information will be gathered from ninety subjects at one school where results will be collected and recorded. The subjects will range from the ages of nine to eleven and will either be in primary six or primary seven. The participants will be evenly balanced between male and female with forty-five from each gender participating in this investigation. The subjects all originate from one large rural school in Derry.

To obtain the level of physical activity amongst all subjects, each subject will have to fill out and record the amount of physical activity they do weekly, where it is they participate in this activity e.g. during school or outside of school, the type of activity it is e.g. whether it is a team sport (football) or a more general method of exercising (jogging or walking) and finally how many hours and minutes a week this activity accumulates to. With regards to obtaining information on the subjects academic performance the school has generously agreed to provide each pupil's InCAS score for Maths and English which will be kept with the utmost confidentiality and for the purpose of this study only.

In order to determine whether there is a link between physical activity levels and children's academic performance, the information will be entered into an Excel document whereby tables of results will be created. Results and statistical analysis will then be analysed and a conclusion reached regarding the correlation between the two variables.

Chapter Two: Review of Literature

'An investigation into whether there is a link between a child's level of physical activity and their academic performance'

2:1 – Benefits of Physical Activity

In addition to physical health, the benefits of daily physical activity on the brain and cognitive functioning have been extensively researched and support the view that there is a need to incorporate more physical activity into the school day. An article written by Rauner *et al*, (2013) uses the view of Must and Tybor (2005) to define physical activity. They identify *physical activity* as 'any movement caused by muscle activity resulting in increased energy expenditure' and categorise it in a variety of ways. An approach adapted by many is to separate physical activity on the basis of the identifiable portions of daily life during which the activity occurs. The World Health Organisation (2002) divides physical activity into categories of sports, conditioning exercises, household tasks and other activities further suggesting that physical activity is any movement that requires increased energy expenditure.

It is a widely conceived opinion that regular physical activity is imperative for a healthy life, not just physically, but socially and mentally. Mental illness, suicide, depression, and anxiety are some of the conditions that affect young people and there is a growing belief that suggests regular physical activity can reduce the levels of these (Viner and Booy, 2005). Furthermore, there is a genuine belief that physical activity is healthy for young people with regards to various psychosocial outcomes, such as self-esteem and confidence. Blair *et al* (2001) are of the same opinion and believes physical activity has consistently been associated with improved physiological functioning and minimises the risk of disease and depression.

There is prevailing evidence to demonstrate that childhood and adolescence patterns of physical activity moderately track into adulthood (Telama *et al* 2005) which suggests that active children and adolescents are more likely to become active adults. Regular physical activity, whether it is within a sport, work, walking or manual labour provides numerous significant benefits found to be positively associated with a person's overall health. As a result of this physical activity the risk of cardiovascular diseases, obesity, osteoporosis and some cancers will significantly be reduced (Warburton *et al* 2006) and therefore lead to a greater standard of life. In addition to reducing risks for chronic diseases such as obesity, diabetes and cardiovascular disease, participating in regular physical activity is

correspondingly linked with improved mental health and well-being (Jago *et al.* 2008). These cognitive attributes include physical self-perceptions and intention towards future activity.

More specifically studies have shown that the self-perceptions of those people who take part in physical activity significantly improve. Research from Eime *et al* (2013) about the psychological and social benefits of participation in sport for children and adolescents highlight the most common benefits associated with physical activity; higher self-esteem (Pedersen *et al*, 2004), improved social skills (Howie *et al*, 2010), fewer depressive symptoms (Boone *et al*, 2006) and feeling more confident as stated by Holt *et al* (2011).

In addition to this, through physical activity and especially through physical education children can become healthier, develop their motor skills and physical fitness, as well as having the opportunity to participate in play based activities with peers such as ball games and gymnastics which ultimately have a positive impact on the child's social skills (Howie *et al*, 2010) through interaction and team work activities.

The world today is ever changing with the technological advances in computer games, social networking sites and internet access with children now spending hours upon hours every day playing computer games and watching television. Palmer (2006) suggests that in less than two decades, technology has transformed our homes: PC's, laptops, the internet, cable, satellite and digital TV, computer games, I-pods and smartphones are now deemed necessities within our homes which have had a negative correlation in the amount of physical activity children partake in. To back this up, Roberts and Foehr (2004) state that the average child spends 4-5 hours daily watching television, playing video games or playing on their computer and in addition to this, with the advances in our transport systems people in today's culture do not walk as much in comparison to 10-15 years ago. With this in mind, along with the perception that children and adults in our current society are less active, corresponds with the constant increase in the levels of obesity in our country and throughout the UK. The Health and Social Care Information Centre (2012) compiled the latest statistics on obesity for the NHS and they found that over an eight year period from 1993 to 2011 there was a marked increase in obesity rates throughout the UK. In 1993 13% of men and 16% of women in England were obese and in 2011 this rose to 24% for men and 26% for women. Additionally, there is a very worrying statistic which suggests that during 2011-12, 9.5% of children attending reception class (aged 4-5) were obese.

The World Health Organisation (2011) states that in order to improve cardiovascular, respiratory, muscular fitness and bone health children between the ages of 5-17 should partake in at least 60 minutes of moderate to vigorous-intensity physical activity daily. Corresponding with this, the Revised Northern Ireland Curriculum (2007) now has Physical Education (PE) as one of its core subject areas with schools being encouraged to give pupils at least two hours of quality PE weekly (DENI, 2012). Within the Revised Northern Ireland Curriculum (CCCA, 2007) it is stated that the purpose of PE as a separate area within the Primary Curriculum is to provide the opportunity for specific attention to be given to the physical development, health and well-being of children. This physical activity can be through the form of Athletics, Games, Dance, Gymnastics and Swimming, however, there are still a large percentage of school children not receiving the minimum of two hours weekly engaging in these activities. Prime Minister David Cameron believes schools should not be set with a minimum amount of hours to take physical education classes as he believes that as soon as they have met that minimum target, teachers can tick a box and give up. Speaking in August 2012 he urged more teachers to give up their free time to teach sport as well as their main teaching subject. Cameron believes “The problem has been too many schools not willing to have competitive sport and some teachers not willing to join in and play their part."

According to the Revised Northern Ireland Curriculum (2007) the schools extra-curricular programme should provide opportunities for all children to extend and develop skills and interests acquired during the PE programme. Participation in after-school activities can help children develop social skills, improve academic performance, and help them form relationships with adults other than their parents. Barber *et al* (2001) believe that explanations for these educational gains include the association of participation in organised activities with heightened school engagement and attendance, better academic performance and higher aspirations for the future. Research produced by Healthy City and Advancement Project (2012) relating to the benefits of afterschool activities has shown that participation in these programmes is associated with decreased behavioural problems, improved social and communication skills, better relationships with peers and teachers, increased self-confidence and self-efficiency, lower levels of depression and anxiety, development of initiative, and improved feelings and attitudes toward self and school.

2.2 - Academic Performance

Environmental educator David Orr believes that the goal of education should not be mastery of a subject matter, but of one's person. In conjunction with this a quote from Carl Rogers and Jerome Frieberg helps sums up in general terms what the whole point of education is:

> *Here, then, is my theoretical model of the person who emerges from … the best of education, the individual who has experienced optimal psychological growth: a person functioning freely in all the fullness of the organismic potentialities; a person who is dependable in being realistic, self-enhancing, socialised, and appropriate in behaviour; a creative person whose specific formings of behaviour are not easily predictable; a person who is ever-changing, ever developing, always discovering the newness in each succeeding moment of time. We see persons moving in this direction from the best experiences in education*. (*Freedom to Learn*, 1994)

In order for a pupil to achieve well academically there are a number of variables which will affect whether this takes place or not. In the current education system academic achievement is at the core of all teaching, and as a result of this pupils are constantly being monitored through class tests and general classwork with their scores being recorded, interpreted and correlated with standardised scores and descriptors. At present pupils are assessed annually at the end of each academic year with attainment targets specifically documented for each subject at the end of Key Stage 1 and Key Stage 2. These tests are known as InCAS (Interactive Computerised Assessment System) examinations which are a diagnostic, computer-adaptive assessment tool for schools that can be administered at any time to inform personalised learning. InCAS assesses maths, literacy, and attitudes through a computer-delivered assessment which requires minimal teacher intervention during administration. Through using InCAS, teachers can benefit from a wealth of information that identifies what pupils know and can do, which can prove invaluable for teacher planning for the rest of the year. This form of assessment is very useful especially when moving into a new class the new teacher can gauge where each pupil is at so that they can plan accordingly for the forthcoming year.

There are a countless amount of factors that can influence a child’s learning and lead to educational disadvantages for that child. According to The Education Act 1998, educational disadvantage is “the impediments to education arising from social or economic disadvantage which prevent students from deriving appropriate benefit from education in schools”. There

are various different factors which result in educational disadvantage. Factors that can result in educational disadvantage include; material factors such as income, poverty and housing, cultural factors such as general interest and attitude towards education, emotional factors like a child's relationship with their parents and the family model, educational factors such as literacy and numeracy skills and materials for education and finally environmental factors such as location and political factors. Parsons (1999) firmly believes that childhood poverty and educational experiences are very powerful influences on an individual's life course and that poverty is in itself a barrier to equal educational opportunity. Furthermore Bramley and Karley (2007) write that a hungry or malnourished child is unlikely to be good at concentrating on work at school or at home and therefore affecting their academic performance.

The home can play a big part in a child's life and indeed their academic performance. Low income can often result in conditions at home being poorer and this can have a big effect on the child. An unemployed parent or parents will limit the resources available to the child as a result of financial costs. Additionally if a child's parents are not well educated this can cause problem for the child as there may not be as big an emphasis put on them to do well academically. Also as a result of poorly educated parents children may not receive sufficient help at home with homework tasks and additional reading therefore leaving them at a disadvantage in comparison to their peers. Thomas (2000) informs us, higher numbers of disadvantaged students experience academic failure and subsequent sanctions, causing many of these students to disengage and eventually drop out of school.

Despite efforts to improve inferior academic levels among disadvantaged students, a substantial achievement gap exists between the test scores of these students and others (National Centre for Education Statistics, 2000). This reality, coupled with a situation where a growing number of children attend inadequate schools, has focused public attention on the need for school reform and has created enormous pressure to develop programmes that promote achievement success among disadvantaged youth (Pianta & Walsh, 1998). With this in mind initiatives such as the Breakfast Club were set up to ensure pupils receive breakfast on a daily basis which is essential for effective functioning of our brains. In September 2011, the Deputy Prime Minister announced that £50 million would be made available for a summer schools programme. The main purpose of this initiative is mainly to help disadvantaged pupil's social and emotional well-being.

The role of the teacher is critical in the development of a child academically. Research conducted from Murdoch (1999) shows that students who feel their teacher encourages and praises them are more committed to learning and therefore are more likely to be successful academically. Thus, it is crucial to the development of our pupils that teachers build up a rapport with their pupils and develop the use of encouragement, praise and instruction effectively within their classroom.

2.3 Physical Activity and Academic Performance

The question now is: does physical activity have a positive effect on academic performance? The relationship between a child's level of physical activity and academic performance is indisputably a very interesting one, which in recent years has led many researchers to carry out documented reviews of the available literature on the relationship between the two. When addressing health outcomes, naturally the physical benefits are discussed, however according to Fedewa and Ahn (2011), participating in physical activity has also shown significant and positive effects on children's cognitive functioning and academic outcomes with no detrimental effects to learning. In addition to this, research gathered by Trudeau & Shepard (2010) theorise that children receive cognitive benefits from participating in physical activity through a number of mediating processes while Talbot and Verrinder's (2006) views produced clear parallels claiming that physical activity increases the flow of blood to the brain, enhancing mood, increasing mental alertness and enhancing self-esteem, which in turn are factors likely to improve academic performance.

The Qualifications and Curriculum Authority (2001) indicated that schools who had higher levels of PE and school sport had higher achievements across the curriculum. This is also supported by Lindner (2002) who indicates that the higher the activity levels are in schools, the better the academic performances of that school. Participation in physical activity or sport presents a range of physical, mental and social benefits for children today. Through team activities or sports children get the chance to develop and enhance their social skills through constant interaction and teamwork. This often leads to children feeling part of a group leading to increased self-esteem, confidence and self-worth which all assist children in classroom situations, e.g. group tasks, classroom debates and presentations.

Within the school environment this coincides well with the pupil's attitude towards their school work and academic performance developing a sense of positivity. It is a known fact that physical activity improves overall health. Not only does it improve circulation, increase

blood flow to the brain, and raise endorphin levels, but physically active students may also achieve more academically and according to Taras (2005) physically fit students are less likely to miss school, partake in risky behaviours or attempt suicide.

Research conducted by Satcher (2005) with United States Sports Academy suggests that several studies have identified that in providing increased time for physical activity can result in better concentration, reduced disruptive behaviour, and higher test scores in reading, math and writing therefore suggesting that physical activity does have a positive impact on academic performance.

In contrast children who are overweight or obese as a result of a lack of physical activity often experience many symptoms which affect their learning in school. Not only can weight problems heighten the risk of disease but it is believed children who are overweight miss as much as four times as much school as children of normal weight (Satcher, 2005). Coe *et al* (2006) also highlighted that children can spend less time in academic learning and more time being physically active during the school day without having a negative affect on academic success or progress.

In conclusion this chapter has identified that there is certainly a bigger emphasis been put on the level of physical activity experienced among children in schools today. Although many conflicting conclusions have been formed about the relationship between physical activity and academic performance, functionalists believe that an individual's academic success depends completely upon that person's IQ, and that this is biologically determined however there are many on the other hand who believe that academic performance can be positively influenced by physical activity. Thus from the literature outlined in this chapter, there is much evidence to suggest that regular physical activity does lead to better academic achievement, however some researchers have rejected these claims as shown in this chapter. For that reason, due to these conflicting views, this study will examine the relationship between levels of physical activity and academic performance.

Chapter Three: Methodology

3.1 Research Design

The primary objective of this study is to investigate the amount of physical activity children participate in weekly and the influence that this has on their academic performance. In order to achieve reliable results, it is vital that testing methods used are extensively researched and that the process is completed both thoroughly and professionally. To determine a child's overall participation in physical activity, information must be gathered directly from the children themselves outlining how many hours they spend doing physical activity per week, what it is they do, where they do it (in school or out of school) and how often they do it. This should provide all the information needed to complete an accurate and precise reflection of the amount of physical activity participated in which can be then looked at in relation to their academic performance.

In terms of the academic performance of the pupil, the use of InCAS test scores provide up-to-date and accurate results of a child's progress. InCAS assesses the maths and literacy levels of pupils through a computer-delivered assessment which requires minimal teacher intervention during administration. A reading age and mathematical age is generated by this assessment tool allowing for comparison with the actual age of the child. In the case of this particular study, the achievement of the child was considered in the context of the amount of physical activity they partake in. The results collected are imputed to a spread-sheet via Microsoft Excel allowing for clear interpretation.

Other forms of research for this topic were considered but dismissed due to their lack of practicality. Each child was to be expected to keep a log book, detailing all the physical activity they participated in for one week and academic tests were to be conducted independently on a number of occasions. However through evaluation of each option thoroughly the use of InCAS scores proved to be a more accurate way of finding out the academic performance of each child and the log book was deemed to be too time consuming.

3.2 Subjects

This study involved ninety subjects from one large rural school in Derry, within Northern Ireland. The age range of the children in this study ranges from nine years to eleven years, with all of the subjects involved in either primary six or primary seven. The school involved has a strong connection in particular with their local GAA and soccer clubs and are

enthusiastic in creating a positive ethos regarding participation in physical activity both inside and outside of school.

3.3 Procedure

There are a number of steps and procedures to be considered before collecting the results required to assist this investigation. It was essential first and foremost to gain permission from the participating schools via their Principal and class teacher. A letter (Appendix A) was sent to the Principal to ensure that consent was given prior to collecting any results. This letter details the objectives of the study and what is expected from the school and its pupils. This letter also outlines that any information collected would be carried out with the utmost professionalism and confidentiality for schools and participating subjects. Parents of the pupils were also sent a letter (Appendix B) outlining the purpose and aim of the investigation, information on who is leading the investigations and importantly what information is required from their children. Each letter included a consent form which once signed and returned by parents/guardians clarified the involvement of the child. On return of all consent forms from school parties and parents, the collection of data could begin.

3.4 Test

There were in total six sets of information that generated the data throughout this investigation. Two InCAS tests provided the most recent Mathematics and English score for each subject and further information as regards the pupils' physical activity determined each subject's weekly intake of physical activity.

3.4.1 Testing Levels of Physical Activity

Quantitative research was used to find out four pieces of information regarding the physical activity of the ninety subjects involved in this investigation. Each child was provided with a questionnaire (Appendix C) asking for one of four pieces of information. These results were recorded on a spreadsheet document leaving it much more efficient and easier when analysing results.

3.4.2 Testing Academic Attainment

InCAS (Interactive Computerised Assessment System) is a tailored diagnostic assessment which very recently has been implemented by all Primary Schools to monitor and assess where pupils are in terms of their English and Mathematics. Performance in these

assessments provides not only a score but generate a corresponding age of performance in terms of years and months which is useful in terms of considering the child's actual age. These scores are extremely beneficial for both parents and teachers as they identify areas of strength and difficulty so that strategies can be put in place to try to improve areas where the children underachieved. The class teacher in the school provided the InCAS scores of each pupil and this score was matched to the amount of physical activity they partook in.

3.5 Statistical Analysis

In order to determine if there was a direct correlation between the subject's level of physical activity and their academic performance a Spearman Rank Test was conducted.

Chapter 4 Results

4.1Introduction

This chapter details the results of the ninety subjects under investigation to assist in the overall purpose of this study. The aim of this study is to investigate whether there is an existing relationship between a child's level of physical activity and their academic performance through the use of comparative measures. Data was collected and recorded with information on how much physical activity the ninety subjects participated in weekly, whether this activity was inside school or outside school and how many hours per week this accumulated to. The academic performances of the subjects were gathered via access to their InCAS scores for Maths and English. These results when analysed provide an insight as to whether there is a case to suggest that regular physical activity has a positive impact on the academic performance of children. Through research and findings it is hoped that those children who are motivated to participate in physical activities within school, afterschool and in their own free time will perform better academically than those who did not exercise as regularly.

4.2 Subject information

The subjects involved in this investigation were Key Stage 2 pupils from primary six and primary seven classes from a large rural school, situated outside Derry. The age of the subjects ranged from nine years old to eleven years old and the ninety subjects were evenly balanced gender wise with forty-five females and forty-five males.

4.3 Physical Activities

Out of the ninety subjects looked at in this study there was an extremely worrying figure of seven children, nearly 10% of the subjects who did not participate in any form of physical activity weekly. From the findings there were twenty-three different acts of physical activities stated though these forms of physical activity ranged from more strenuous exercise such as Gaelic football, boxing and netball to more recreational perceived activities like walking, trampolining and golf. Gaelic football was the activity participated in the most with over 50% of subjects partaking in this activity whilst only one subject each participated in archery and basketball weekly. Figure 4.1 below highlights the amount of physical activities participated in by the selected number of subjects. Research found that the top five most popular activities were Gaelic football, soccer, netball, swimming and running and within these top five, four of them are school based activities, through either afterschool programmes or general PE.

Although a large number of the subjects did take part in these activities outside of school through their local clubs it does show that schools attitude towards sport and physical exercise is key as it is a great place to get children involved in sport and to enjoy sport. Teachers should be encouraged to act as role models by demonstrating more physical activity during the school day. Furthermore, it is the belief of Dobbins et al (2009) that school based physical activity interventions should be focused on fostering positive attitudes towards physical activity leaving them more likely to participate in physical activity outside of school.

There were sixteen of the twenty four activities where only five subjects or less participated in which further illustrates that excluding the five most common sports highlighted that the range of activities is very broad. Two of the subjects participated in kayaking which is extremely surprising considering the geographical location of the subjects. Within the list of sports, there were a number of which were predominantly participated in by a specific gender, e.g. for males; soccer, martial arts, golf, cricket, rugby, and boxing were mostly male orientated especially the last two of boxing and rugby whereby there were no female participants. There were also sports whereby female participation was most common, e.g. horse riding, netball and dancing. Findings show that, in terms of activities participated in; males have a much broader range in comparison to female subjects and they also participate in activities that involve contact whereas the majority of females participated in individual sports or activities that require little contact.

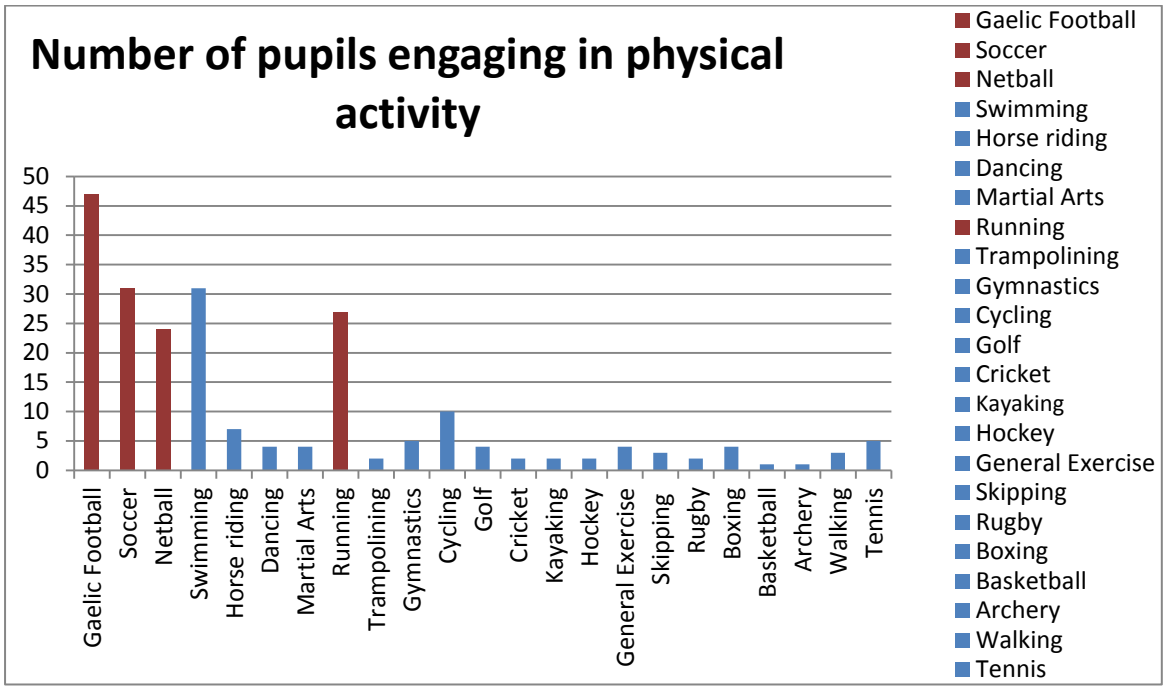

Figure 4.1: Number of pupils engaging in physical activity

Figure 4.2 below highlights the amount of physical activities participated in by the selected number of subjects within school. Results have revealed that a worrying number of thirty pupils did not participate in any form of physical activity in school and yet considering that the school setting is the only opportunity to access all children, more emphasis should be paid to their physical development and health. An online document produced by CCPR (2005) backs this up through stating that physical literacy is as important to a child's education and development as numeracy and literacy. However, when all results were collected and recorded this did not mean that those who did not participate in school sporting activities did not partake in activities outside of school. Excluding the seven subjects who partook in no form of physical activity weekly the remaining twenty-three out of the thirty who did not participate in physical exercise in school did participate in physical activity outside of school and on a number of occasions they were in fact more active than some of the children who were active within school.

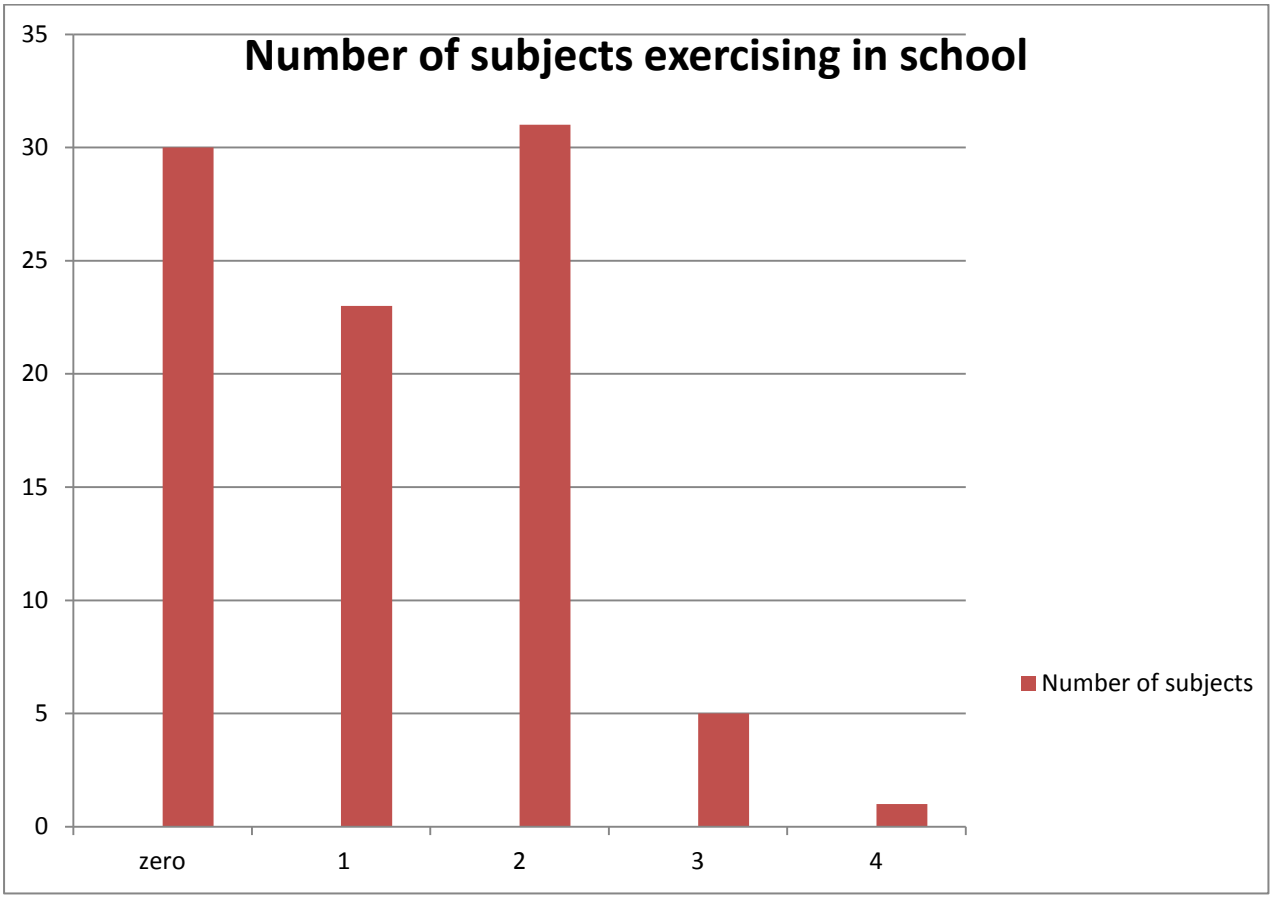

Figure 4.2: Number of subjects exercising in school

There was an even balance of male and female participation in activities taken part in outside of school, however it was the male subjects who seemed to be more motivated as there was a

number of subjects who were very active, e.g. subject numbers 83 and 85 (both male) participated in five forms of physical activity outside of school. Although each subject participated in the same number of activities there was a huge difference in the total amount of minutes spent active. Subject number 83 spent 180 minutes exercising in comparison to subject number 84 who spent 410 minutes engaging in physical activity. At first glance, it is surprising to see that for two considerably active males they only exercise outside of school however when looking at the type of activities they participate in it is clear to see that they like to partake in sports that are individually based instead of team based and ones that have little or zero contact, e.g. running, swimming, horse riding, netball, cycling and cricket.

Twenty-three pupils took part in one form of physical activity within school whilst over a third of the subjects (31) exercise twice weekly within school. In most cases those who did partake in these activities within school went on to participate in the same activities outside of school. A small number of 5.5% of the children exercised three times a week within school and only one child (subject number 41) participated in four different forms of physical activity within school, yet, surprisingly did not participate in any physical activity outside of school. In fact results have shown that when comparing subject number 84, who only participated in activities outside of school and subject 41 who only exercised within school it was actually the child who exercised outside of school who spent more time being physically active. Considering that the school is where children spend a large percentage of their waking hours, it provides the most logical and accessible place for them to take part in physical activity. In addition to this there is evidence to suggest that afterschool programmes can improve and enhance physical activity levels as well as other health related aspects (Beets et al, 2009).

The Table 4.1 highlights how many hours of physical activity children participate in weekly. Through research it was gathered that the average amount of physical activity participated in weekly by children is 193 minutes ($\pm$120), and this ranged from seven pupils participating in zero minutes of physical activity to one pupil who exercises seven hundred and twenty minutes weekly (12 hours). Hoeger and Hoeger (2010) recommend that children should strive for at least 60 minutes daily of physical activity at a moderate intensity whereas Blair and Connelly (1996) suggest an alternate approach that may be equally beneficial which consists of engaging in 10 – 20 minute stints of moderate intensity activity throughout the day, for a total accumulation of at least 60 minutes for children. Walking quickly or biking for pleasure,

swimming, engaging in sports and games, participating in physical education, and doing tasks at home such as gardening may all contribute to the accumulated requirement of physical activity. This is further supported through research gathered at the University of Illinois and Beckman's Institute for Advanced Science (2009) as they found that children need to engage in "at least one hour a day" of moderate to vigorous physical activity in order to remain not only physically healthy but mentally and sociably healthy.

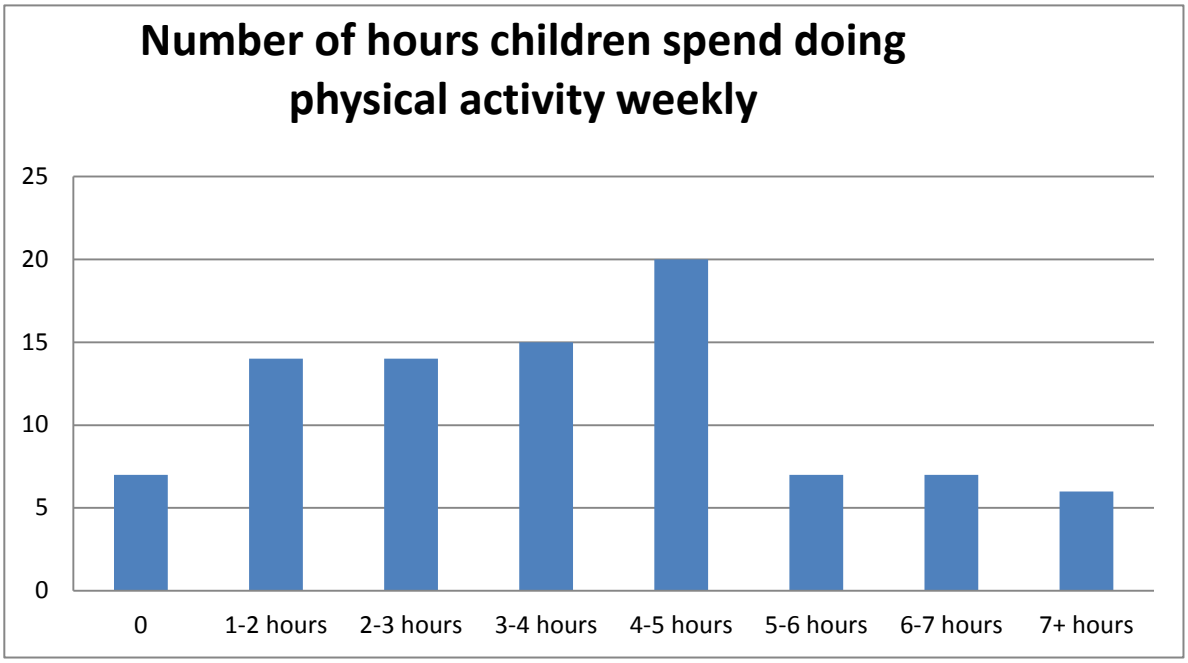

Figure 4.3: The number of hours children spend doing physical activity weekly

Furthermore, a document issued by Sport NI (2009) proposes a target of providing every child in Northern Ireland over the age of eight years with the opportunity to partake in at least two hours per week of extra-curricular sport and physical recreation, and further recommends establishing baseline data on the number of children of compulsory school age receiving the Department of Education's recommended two hours of physical education per week. Initiatives set up by Sporting Councils, e.g. GAA, Rugby, Soccer and Basketball now provide specialist training to coaches who then go out into schools taking children for additional PE in order to get children involved in sports and to increase levels of physical activity.

When comparing these facts and figures stated to the table of results above a few observations can be made. Firstly and most worryingly, out of the ninety subjects involved in this study only thirteen children were said to have taken part in the required amount of exercise per week going by the daily intake of sixty minutes recommended by Hoeger and Hoeger (2010). Fourteen subjects took part in physical activities for a period of one to two

hours and the same number of subjects exercised for a period of two to three hours. Considering that the stated weekly requirement of physical activity to be achieved in schools is two hours this highlights that although the school setting may not be where this exercise took place it is still distressing that 1/3 of the subjects are exercising for a maximum three hours per week. This coincides with the growing obesity among children today. According to Chiodera et al (2008), physical inactivity is related to increased levels of body fat leading to childhood obesity. These researchers argued that preventive measures should be taken at a young age in order to reduce future health risk factors. Furthermore, they found that students who engage in daily physical activity within the school setting will achieve the health benefits they need to be physically fit more so than those students which do not engage in daily physical activity throughout the school day.

From the graph it is clear the most populated time bracket for time spent doing physical activity was between four and five hours with 22% of the subjects within this timescale. Seven children exercised between five and six hours and the same number of subjects exercised between six and seven hours. From the graph it is evident that six of the subjects exercised for at least seven hours weekly and out of these six subjects one subject in particular exercised for twelve hours weekly, through participation in physical activities, through school PE, afterschool activities and outside of school. Referring back to what Beets et al (2009) said about afterschool programmes, there is evidence to suggest that participation in afterschool activities certainly improves health related aspects, but is also found to have no detrimental consequence on their academic performance.

4.4 Academic Results

Figure 4.4 below details the academic results in English and Maths for each of the ninety subjects and with the use Spearman Rank the raw scores in English and Maths were combined to give the subjects an overall score. The results were gathered through InCAS testing displaying the children's results in Maths and English where each pupil was given a score for their RN (Reading Narrative) and RNN (Reading Non-Narrative) for English and an overall score for their maths. The average score across the ninety subjects for English was 25.35 (± 8.08) with the highest score in English been thirty nine and the lowest been six. The average score for maths was 32.82 (± 10.45) with the highest score in Maths being much higher than that in English; in fact it was ten scores higher with forty-nine, although the lowest score in Maths was the same as the lowest in English with six and, it was in fact the

same subject who got the lowest score in both. The overall average difference in the English and Maths scores in any one direction is 7.46 (± 5.43).

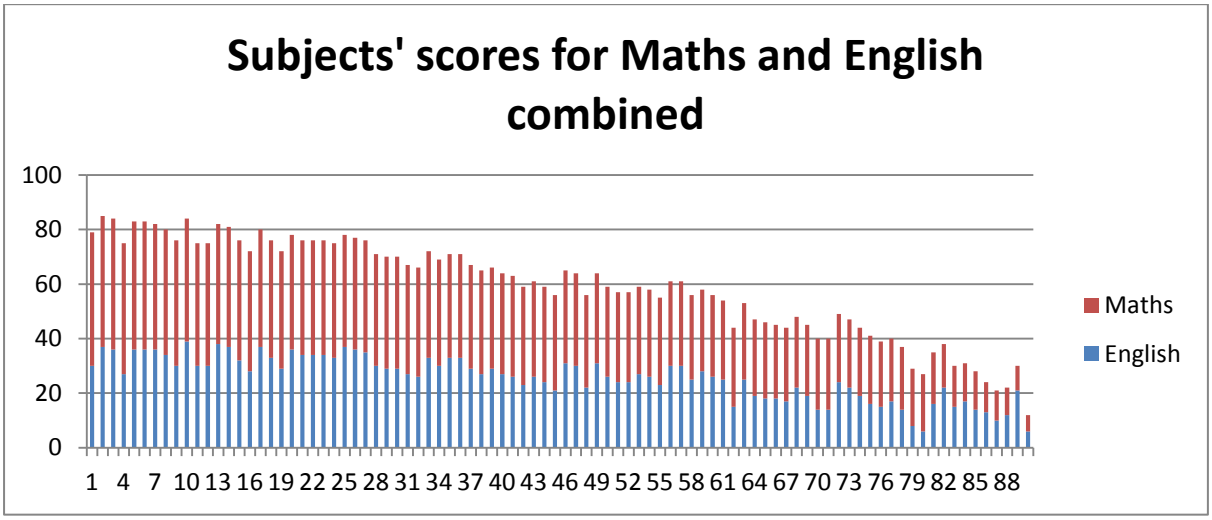

Figure 4.4: Subject scores for Maths and English combined

Through a quick glance at the table it is clear to see that the majority of subjects scored superior mathematically and in actual fact, through detailed analysis it was found that for eighty-two (91%) of the subjects their maths was higher than their English. Along with this evidence and research from Feinstein et al (2008) on teachers ratings, girls and girls' parents feel that they perform better in mathematics than English but that they also spend much more time doing mathematics. Five of the ninety subjects scored better in English and for three of the subjects there was no difference in their academic scores for Maths and English. The age of the ninety subjects ranged from nine years and one month to eleven years and nine months which effectively would have an impact on the academic performance and scores for this study.

4.5 Academic Performance correlated to Physical Activity

The graph below displays both the academic rank and activity rank of each subject. Given the research and literature exploring the relationship between these two variables Talbot and Verrinder (2006) expected a stronger correlation between the two. A spearman rank was used to determine the statistical significance of the data. The average for the academic scores combined was 58.18 (± 18.54). Having combined the Maths and English (figure 4.5 below) scores the subjects were ranked by academic performance and the amount of time spent exercising in one week. The result was r=0.069 (<0.5) indicating that there was no significant difference.

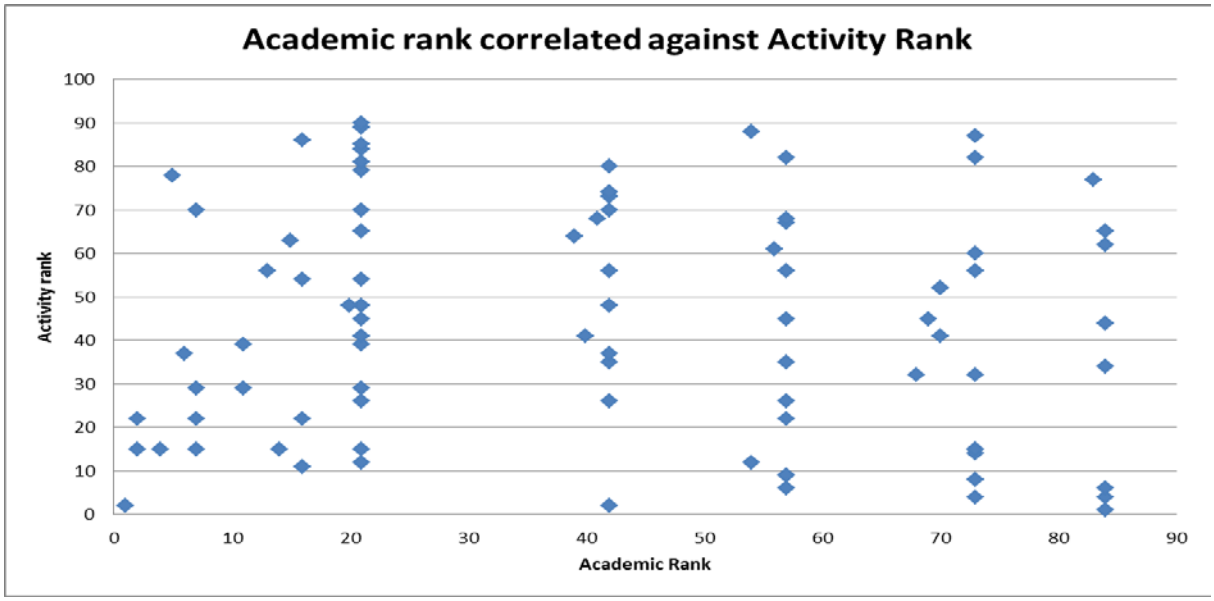

Figure 4.5: Academic scores against activity levels

4.6 Activity levels in relation to academic performance

The figure of results below highlights the average academic performance of the most active 25% to the least active 25% of subjects. It has been hypothesised that physical activity at school could enhance academic performance by increasing cerebral blood flow, enhance arousal level and improve self-esteem although none of these mechanisms have been adequately documented (Shepard, 1997). The results below show that the most active and least active 25% of subjects actually score almost the same in terms of academic attainment with the most active 25% doing slightly better. Subsequently, however there is a clear decrease in terms of academic performance for the 25% of subjects who were above average in terms of activity levels and the 25% who were below average. Those who were above average scored 51 in comparison to the quarter of subjects who were most active who scored 66. In drawing conclusions from these results it is hard to say that physical activity does have a positive influence on academic performance as those who were least active in theory did equally as well as those who were most active. However, a casual connection can still be made between physical activity and academic performance due to the fact that the most active 25% of pupils were also those who scored best academically and therefore there is no evidence to suggest that physical activity has a detrimental effect on the academic performance of a child. According to Dishman et al (2013) physical activity can have a calming effect on pupils, enabling them to sit and concentrate on their academic tasks, increase their self-esteem which can have a positive effect on behaviour and give them a greater desire to learn.

Yet, in concluding this chapter, the spearman rank test that was carried out shows that there is not enough of a significant difference to suggest that physical activity does have a positive impact on academic performance.

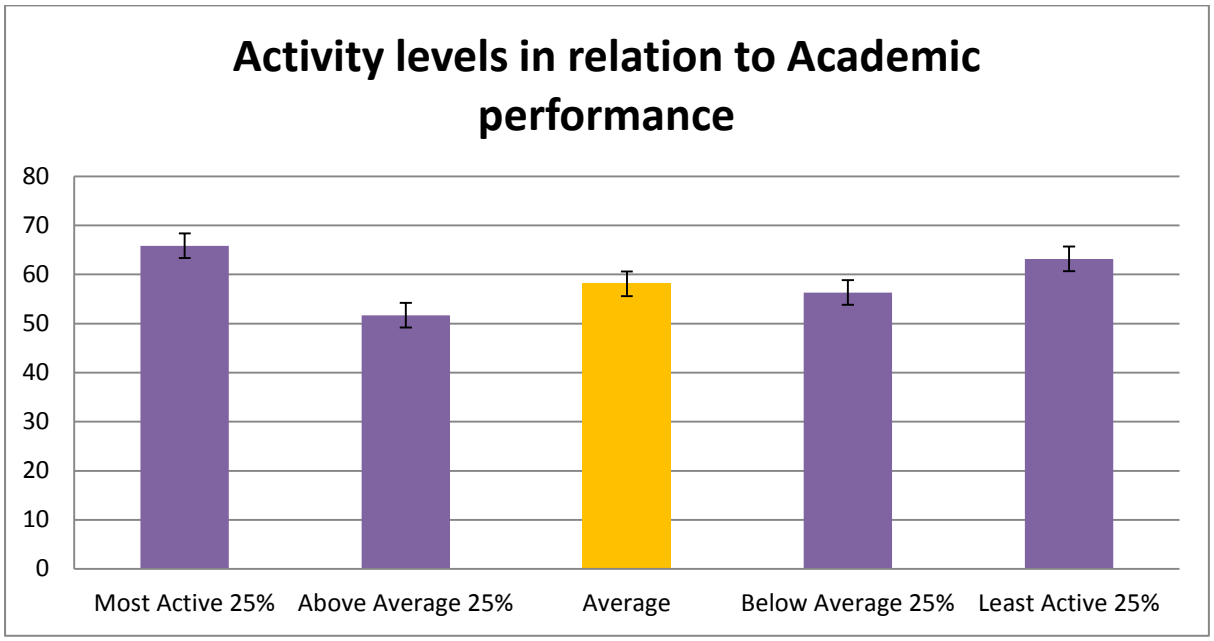

Figure 4.6: Activity levels in relation to academic performance

Chapter 5: Conclusion

5.1 Conclusion

Following numerous hours of research, gathering and collecting results, and then critically analysing these results, a casual connection between physical activity and academic performance is plausible, yet there is still no concrete evidence or support to suggest that physical activity is associated with improved levels in academic performance.

After analysing the results collected, both of pupils' levels of physical activity and their InCAS scores, as well as reading relevant literature regarding this topic, initial weak correlations could be made. However, it appears that the only definite conclusion that can be made regarding academic performance is that physical activity is a constructive way of calming pupils before work takes place, enabling them to concentrate more

Previous research demonstrated that there may be some short-term improvements of physical activity, such as concentration levels but that the long-term improvement of academic performance as a result of more vigorous physical activity is not well sustained and therefore the relationship between the two variables requires further analysis. Shephard (1997) believes the strongest statement one can make regarding the effect of physical activity on academic performance is that at least it does not worsen academic achievement, even when it takes away from classroom time supporting the author's view that physical activity within school time has no detrimental effect to the academic performance of pupils.

Additionally, the Spearman Rank Test that was used to statistically analyse the results collected and recorded, showing that the R value equalled to 0.069 and therefore indicating that there was no significant difference and that physical activity and the academic performance of children was unrelated.

5.2 Recommendations

Upon completion of this study there are a number of recommendations to be made. It is the view of the author that a study of similar design but longer duration is needed before it would be possible to confidently assert that a child's level of physical activity might contribute in an important way to academic performance. The results for this study were gathered over the course of one day which may not be a true reflection of the amount of physical activity some children participate in. Results were collected in the month of November which is a time when for a lot of sports is during their closed season. In order for the study to represent a

complete true reflection of the activity participated in, results should have been collected and recorded over a longer period of time, e.g. collected in June, September and November so that more accurate results could be analysed.

In addition to this, results were only collected from subjects at one school which may not effectively represent the overall levels of participation among young children. As results were only collected from one large rural school, the author should have collected results from a number of other areas around the province of Ulster, and in particular, an urban school to add diversity to the study.

With ninety subjects participating in this study, the author feels that in order to investigate this topic with maximal efficiency and to enhance the collection of date there needed to be a larger sample size.

Although attaining the academic results of the subjects through gaining access to their InCAS scores was a simple and effective method there was some uncertainty from the researcher on basing academic performance solely on the pupils' InCAS scores. It was a thought that many of the children may perform better in another subject and therefore academic results as a whole could not be entirely accurate. However, in defence of this criticism, the researcher was assured by the class teacher that the children were placed in the same groups according to their ability across all subjects.

5.3 Limitations

Through evaluation of this investigation it is evident that there were some limitations which consequently affected the overall outcome of the study. The data gathered was collected in one day and in reflection the study would represent a more accurate set of results if the subjects' levels of physical activity were recorded over an extensive period of time. However, the time restraints of this study meant that this method would not be possible. As alluded to in the previous section, the timing of the year may also have affected the results collected. Results for this study were collected in November which in hindsight may not be the most active time of year for children as it is the closed season for a lot of sports. Ideally, the children's levels of physical activity would be recorded over a six month period showing a more clear scale of the amount of physical activity participated in. In addition to these, a larger sample size would also assist in generating more reliable conclusions.

Lastly, it is worth mentioning that although standardised scores were used, there were no measures for concentration, attention or classroom behaviour, which are factors that can influence learning and academic performance.

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Appendix A

Dear Principal,

I am a 4th year Physical Education student at St. Mary's University College, Belfast. For my final year Capstone module I am investigating the correlation between a child's level of physical activity and their academic performance. As part of this study I am looking to examine a sample of Primary 6 and Primary 7 pupil's current physical activity levels and if possible gain confidential access to their InCAS scores for English and Maths.

This would require the children to complete a short questionnaire and so the entire collection of results should take approximately one hour. Most importantly the safety, confidentiality and anonymity of the children will be my number one concern throughout the investigation.

I would greatly appreciate if I could use your P.6 and P.7 children as my sample for my investigation. Again I would like to reiterate that participation is voluntary and subjects can be assured of confidentiality, privacy and the right to withdraw from the study at any time. Should you have any further queries, please do not hesitate to contact me on 075********.

Yours Sincerely,

Ryan Lynch,

BEd 4 (PE)

Appendix B

Dear Parent/Guardian,

I am a 4th year Physical Education student at St. Mary's University College, Belfast. For my final year Capstone module I am investigating the correlation between a child's level of physical activity and their academic performance. As part of this study I am looking to examine a sample of Primary 6 and Primary 7 pupil's current physical activity levels and also if possible gain confidential access to their InCAS scores for English and Maths. With your permission and consent I would greatly appreciate your child's participation in this study.

If your child were to partake in my study, they would be required to complete a questionnaire stating how much physical activity they participate in weekly, where it is they participate in this activity (in school, afterschool or outside of school) and what the actual activity or sport is that they participate in I would greatly appreciate if you do not discuss this information with your children as this may lead to fictional results.

I can assure you that participation is voluntary and that subjects can be assured of confidentiality, anonymity and the right to withdraw from the study at any time. I would be truly thankful if you could accommodate me in this matter. Please complete and return consent form below.

Yours Faithfully,

Ryan Lynch

BEd 4 (PE)

(Please cut along the dashed line and return the form to the school as soon as possible.)

I give/do not give my child _____ permission to partake in this Physical Education study. I am aware that any information and data gathered during this study will be created confidentially and for one use only.

Signed _____ Date _____

Appendix C

Questionnaire

How many times per week do you participate in physical activity? (E.g. zero, once or twice a week)

_____

If yes, where do you participate in this activity?

During School	
Afterschool	
Outside of School	

How many hours per week would you say you spend doing physical activity?

Zero hrs	
1-2 hrs	
2-3 hrs	
3-4 hrs	
4-5 hrs	
5-6 hrs	
6-7 hrs	
7+ hrs	

Please state what the type of physical activity or sport that you participate in?

Type of physical activity or sport!	**Tick if appropriate**	**How many hours per week**
Walking		
Gym		
Swim		
Soccer		
Gaelic Football		
Netball		
Running		

Cycling		
Basketball		
Rugby		
Golf		
Tennis		
If Other, Please specify in rows below		

Thank you for your time!