

An evaluation of physical activity at Forest School

Rebecca Lovell

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Declaration of Authorship

The work submitted in this thesis is the candidates own; the thesis has been composed by the candidate and has not been submitted for any other degree or professional qualification.

Signed by Rebecca Lovell

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Abstract

While the health benefits of physical activity are commonly recognised, increasing evidence indicates that significant percentages of children, particularly girls, are not sufficiently physically active. Children spend a large proportion of their waking day at school; however their opportunities to be physically active during the school day, beyond the traditional PE lesson and break times, are limited. Increasing children's levels of physical activity during their time at school may be a key approach to increasing children's overall levels of physical activity. The aim of this study was to evaluate the outdoor education programme 'Forest School' as a source of school based physical activity. A review of existing research showed that there had been no rigorous evaluation of physical activity during Forest School sessions.

A two phase mixed method design was used. The first phase used a repeated measures controlled design to objectively measure the amount, intensity, duration and frequency of the participants' (n26 age 9-10) physical activity during Forest School. The second phase used semi-structured paired interviews (n24 age 10-11) to understand the subjective experience of the Forest School physical activity. The study was conducted in the central belt of Scotland.

The results showed that during Forest School sessions the participants engaged in a significantly greater total amount of physical activity, at a higher intensity, and with a greater frequency of longer bouts, in comparison to the typical school days. The children were also shown to reach the recommended hour of MVPA during the Forest School sessions. The children reported enjoying and appreciating the opportunity to be physically active in an environment they had little previous experience of using. Existing barriers to physical activity in other contexts, in particular bad weather and low motivation, did not appear to be relevant at Forest School. The inequality in levels of physical activity and motivation to be physically active, between males and females, was shown to typically be lower on the Forest School days.

The findings suggest participation in Forest School resulted in greater quantities of inclusive and enjoyable physical activity at higher intensities than otherwise experienced at school.

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1 Introduction

This thesis details the planning, execution and results of an evaluation of the physical activity opportunities offered at Forest School.

1.1 *Forest school*

Forest School is essentially education in the outdoors. The emphasis of the programme, however, is not solely on educational gains. One of the largest providers of Forest School describes it as ‘an inspirational process that offers children, young people and adults regular opportunities to achieve, and develop confidence and self-esteem through hands-on learning experiences in a woodland environment’ (Forest Education Initiative Accessed November 2007). Several factors define Forest School (Bridgewater College Accessed June 2006; Forest Education Initiative Accessed November 2007; O'Brien and Murray 2007; The Forest School Training Co. Accessed March 2009); first, the programme takes place in the specific context of a forest or woodland. Second, the Forest School site will typically be close to the participants’ school or youth centre. Third, while attending Forest School the participants take part in a wide range of activities; these typically include small and achievable tasks such as creating a sculpture or building a fire, playing active games and exploring the natural environment. Finally, one of the most important aspects of Forest School practice is that it is a sustained experience. Where many outdoor education programmes take place on a single day or perhaps over a week, participants generally attend Forest School once a week or fortnight for at least twelve weeks and in some instances participants attend over a whole school year.

1.2 *The research*

A significant percentage of children in Scotland, and in much of the western developed world, are not sufficiently physically active. This is an important public health issue, as inadequate levels of physical activity during childhood have negative health impacts in both the short and long term; low levels of physical activity are linked to cardiovascular disease, type 2 diabetes and certain cancers (WHO 2004). Identifying ways of increasing children's levels of physical activity is now one of the key approaches to improving public health (van Sluijs, et al. 2007).

Children spend significant amounts of their time at school yet it is a place where they have little real opportunity to be physically active; this is likely to have a considerable impact on their overall levels of physical activity. It is, therefore, important to focus effort and attention on increasing children's opportunities to be physically active during their school day. Forest School, like other forms of education in the outdoors, may be one approach to increasing children's levels of physical activity during school time. The author's informal observation of Forest School indicated that participation is an inherently physically active experience. Furthermore, unlike many other forms of education in the outdoors, which participants experience rarely and often for discrete periods of time, participants attend Forest School regularly for extended periods of time. Forest School has the potential to increase children's levels of school based physical activity. The types of physical activity the participants experienced while at Forest School appeared to be considerably different to those in the typical school context; with far less focus on the traditional sports and activities. Forest School therefore has the potential to give children the opportunity to experience alternative types of physical activity in a novel environment.

The wider aims of this research were to understand: firstly, whether children had the opportunity to be active at Forest School, secondly, how the children experienced the physical activity and, thirdly, how the opportunity related to the children's physical activity in other contexts. The final aim of this research was to use the findings to assess whether Forest School is of significance as a source of school time physical activity which could be used to increase children's overall quantity, intensity and frequency of enjoyable physical activity.

1.3 *Outline of the thesis*

The following details the structure of the thesis and, briefly, the contents of each chapter.

Chapter 2: Background

The benefits, to human health and well being, of both physical activity and the natural world are reviewed in the second chapter. The first section of the chapter details the evidence which suggests that despite the beneficial impacts of participation, levels of physical activity amongst children in Scotland are low. Children's perceptions of physical activity and how they may act as barriers or facilitators to participation are discussed. The second section of the chapter asks whether there is a demonstrable relationship between green space and human health and wellbeing, and in particular whether access to green space encourages greater amounts of physical activity.

Chapter 3: Forest School

The third chapter discusses the theory and practice of Forest School, the subject of this evaluation. The current knowledge regarding the benefits of participation in Forest School is reviewed.

Chapter 4: The research design

The fourth chapter details the specific aims and objectives of the research. The research design is described and justified. Particular relevant topics are discussed, including a brief overview of the practice of evaluation and the legitimacy of the use of mixed methods in social research.

The structure of the main body of the thesis reflects the research design. A multi-stage, mixed method design was used, with the research carried out during two distinct phases;

each phase was conducted and analysed separately. The methods, analysis and results of each phase of research are, therefore, presented separately; chapters five and six relate to the first phase of this research, chapters seven, eight and nine relate to the second phase of the research.

Chapter 5: Phase one methods, data collection and analysis approach

Chapter five details the methods used during the first phase of the research. The various approaches to the objective measurement of physical activity are reviewed in this section; this is followed by a description of the first phase of data collection. The chapter concludes with an explanation of the data reduction and statistical approach for the analysis of the data collected during the first phase of work.

Chapter 6: Results of phase one data collection

Chapter six details the results of the analysis of the data collected during the first phase of data collection. The chapter is structured into four key sections:

1. the differences in the quantity, intensity and frequency of activity on Forest School days in comparison to the two control day types;
2. differences in the physical activity between the genders at Forest School and on the typical school days;
3. comparing the physical activity of specific activities and lessons; and
4. the participants' subjective experiences of the activity.

Chapter 7: Phase two methods, data collection and analysis approach

In chapter seven the qualitative interview as a means of scientific data collection, in its many forms, is discussed. Particular attention is paid to issues associated with interviewing children. The chapter also includes a description of the second phase of data collection and the analytical approach.

The reporting of the results of the second phase of research is split into two chapters:

Chapter 8: Children's perceptions of Forest School and the physical activity they engaged in during sessions

The first chapter, which details the results of the second phase of the evaluation, is primarily descriptive; focusing on the children's perceptions of Forest School and the physical activity they engaged in during the sessions.

Chapter 9: Exploring aspects of the wider value of Forest School and the associated physical activity

A more analytical approach is taken in this second chapter of results from the second phase of the evaluation. The children's discussion of Forest School was analysed with the aim of understanding the wider value of Forest School and the physical activity which results from participation.

Chapter 10: Discussion and conclusions

The results from both phases of this evaluation are brought together in the final chapter. A number of factors which may help explain the key findings are then explored:

- opportunities to be active;
- motivation to be active;
- the impact of place, space and context; and
- the relationship between gender and physical activity at Forest School.

This is followed by a discussion of the research design and methods used, including an examination of the strengths and weaknesses of the study. The thesis concludes by considering the implications of this research and suggestions for future research into physical activity at Forest School.

2 Background

The purpose of this chapter is to discuss the wider literature which is relevant to the present study. It will be argued that rates of physical activity in Scotland are low despite the evidence that physical activity is beneficial for health and wellbeing. This is followed by an examination of the evidence which suggests that green spaces are positively associated with greater participation in physical activity.

2.1 *Physical activity rates amongst children and young people*

There is increasing evidence to suggest that significant percentages of children and young people in the west, including those in Scotland, are not sufficiently physically active to meet the recommendation of one hours moderate to vigorous physical activity each day (the level at which the physical activity is of benefit to health and wellbeing (Scottish Executive 2003)). Whilst there is confusion and disagreement as to the actual levels of physical activity amongst children and young people, the majority of the studies appear to indicate that rates of physical activity are low. Before this evidence is examined the term 'physical activity' is defined and the levels necessary for good health and wellbeing are briefly discussed.

Physical activity

'Physical activity' is defined as 'any force exerted by skeletal muscle that results in energy expenditure above resting level' (Casperson, et al. 1985 p129). Physical activity 'therefore includes the full range of human movement, from competitive sport and exercise to active hobbies, walking, cycling or activities of daily living'(Chief Medical Officer 2004 p88) .

2.1.1 What levels of physical activity are necessary for good health and well being?

It is suggested by the World Health Organisation (WHO) that 'individuals should engage in adequate levels' of physical activity throughout their lives (2004 p4). While there are no official recommended levels of physical activity (for the European region), the WHO (Accessed 2008) does promote the following recommendation for children regarding the amount of physical activity needed to 'improve and maintain good health' (Cavill, et al. 2006); children and young people (5-18 years) should achieve, '60 minutes of moderate- to vigorous-intensity physical activity each day that is developmentally appropriate and involves a variety of activities'. These recommendations are similar to those promoted by the English and Scottish governments (Chief Medical Officer 2004; Scottish Executive 2003). The WHO does, however, suggest that different types and amounts of physical activity are required for different health outcomes (2004). If there is a specific health risk, then greater amounts of physical activity might be required. For the prevention of obesity in adulthood, for example, around 45 to 60 minutes of moderate physical activity, each day, may be necessary (Chief Medical Officer 2004piii). Though even for the average person, as the authors of the updated American guidelines state, the more physical activity engaged in beyond the recommended minutes, the greater the benefit to health, thereby further reducing the risks of inactivity-related disease detailed later in this chapter (Haskell, et al. 2007a). Overall there is a clear relationship between the amount of physical activity and health; the recommended amount of physical activity is positively associated with better health related quality of life and perceived health status (Brown, et al. 2003b).

The recommended 60 minutes of at least moderate-intensity physical activity can be *accumulated* over the day. This recommendation is based on evidence which shows that shorter bouts of physical activity (though greater than 10 minutes) also have a beneficial impact on health and wellbeing (Fulton, et al. 2004). The Chief Medical Officer for England (2004 p24) states that, 'the recommended levels of physical activity can be achieved either by doing all the daily activity in one session, or through several shorter bouts of activity of 10 minutes or more' (it is not clear whether children are included in this recommendation).

It is also suggested that the physical activity needs to be of sufficient *intensity* to be of benefit to health and wellbeing; at least moderate intensity activity is recommended. Cavill

et al. (2006), described moderate intensity physical activity as activity that 'raises the heart beat and leaves the person feeling warm and slightly out of breath' (p3); moderate intensity physical activity raises the metabolism of the body by three to six times from its resting level. Or, as it is explained in 'Let's Make Scotland More Active' (Scottish Executive 2003), moderate activity is 'using five to seven calories per minute' (p13). For inactive people brisk walking tends to constitute moderate physical activity, for active people fast walking or jogging is likely to be necessary (Cavill, et al. 2006). For the maintenance or improvement of health and wellbeing, physical activity of at least moderate intensity is recommended as there is a clear relationship between the intensity of physical activity and potential health benefits; the higher the intensity the greater the benefits. The Harvard Alumni Study (Lee and Paffenbarger Jr 2000) demonstrated this relationship, showing that while light intensity physical activity had no association with lowered mortality rates, moderate intensity physical activity had some beneficial effect, and vigorous intensity was a clear predictor of lowered mortality rates.

2.1.2 Evidence of low rates of activity in Scotland

The evidence relating to levels of physical activity amongst Scottish children and young people appears to be somewhat limited; both in quantity and in reliability. Just two large scale surveys (Bromley, et al. 2005; Currie, et al. 2004) were found which had attempted to assess the rates of physical activity in Scotland, furthermore both these studies used methods (self-and proxy report measures) which are considered to be less than ideal for accurately assessing physical activity (see chapter 5), especially amongst children and youth. However the results of these two studies are discussed with the understanding that they are likely to be *indicative* of the rates of activity if not entirely accurate.

The Scottish Health Survey (Bromley, et al. 2005) investigated the levels of physical activity amongst Scottish children of the ages 2- 15. The authors found that the majority of the children surveyed reported taking part in some physical activity on at least 5 days in the previous week; between 92% and 99% of all the children of all ages reported activity on five days or more. The proportion of the children who were meeting the guideline of at least 60

minutes of moderate physical activity each day was also estimated; the findings are displayed in Table 2-1.

Table 2-1. Levels of physical activity amongst Scottish children (Scottish Health Survey)

Levels of activity in Scotland						Total
	2-4 years	5-7 years	8-10 years	11-12 years	13-15 years	
BOYS						
Low (%)	12	11	11	12	19	13
Medium (%)	11	14	12	10	13	12
High (%)	77	75	77	78	68	74
GIRLS						
Low (%)	15	12	12	17	36	19
Medium (%)	15	13	13	26	23	18
High (%)	70	75	75	57	41	63

High is 60 minutes or more physical activity on all 7 days i.e. meeting the WHO recommended amount of activity; *Medium* is 30-59 minutes on all 7 days; *Low* is a lower level of activity; All activity was assumed to be of a moderate intensity (Bromley, et al. 2005 p91+104)

According to this study, on average, 74% of boys and 63% of girls in Scotland between the ages of 2 and 15 reported having met the recommended level of physical activity, meaning that some 26% of boys and 37% of girls appeared to be insufficiently active.

A second study of children and young people’s physical activity also suggested that considerable percentages of Scottish children are not reaching the recommended amount of physical activity. The authors of the Young People’s Health in Context study (Currie, et al. 2004), concluded that just 46% of the Scottish boys surveyed and 30% of the girls were sufficiently physically active, the rates are detailed in Table 2-2.

Table 2-2. Levels of physical activity amongst Scottish Children (Young People’s Health in Context study)

Rates of activity in Scotland				Total
	11 years	13 years	15 years	
BOYS				
% meeting guidelines	54.6	46.3	38.4	46.4
GIRLS				
% meeting guidelines	41.1	28.2	22.8	30.7

% meeting guidelines is percentage of the children who reported doing one hour or more of MVPA on five or more days a week (Currie, et al. 2004 p93-94).

While both studies indicate that it is likely that significant percentages of Scottish children are not sufficiently physically active to meet the recommended daily hour of moderate to vigorous physical activity (MVPA), comparison of the results reveals that there is considerable disagreement in the reported rates of physical activity. For instance the Young People’s Health in Context (Currie, et al. 2004) study reported far lower percentages of 11-15 year old Scottish children meeting the recommended hour of MVPA than the Scottish Health Survey (Bromley, et al. 2005). On average 46.6% of Scottish boys aged between 11 and 15 reported having met the recommendation according to European wide study (Currie, et al. 2004), while the Scottish Health Survey (Bromley, et al. 2005) reported that 73% of boys of these ages met the recommendation. There are similar differences in the percentages of girls meeting the recommendation between the studies; the European study (Currie, et al. 2004) found that 30.7% of girls aged 11-15 met the recommendation while the Scottish Health Survey (Bromley, et al. 2005) found that 49% were sufficiently active.

2.1.3 What might account for the variation in rates of activity?

The disagreement between the results of the two studies may be due to the differences in the research design and methods. For instance the Scottish Health Survey (Bromley, et al. 2005) did not question the children about the *intensity* of the activity they reported taking

part in. Instead it was 'assumed that all occurrences of these activity types were of at least moderate intensity' (Stamatakis 2005 p90). Whereas the authors of the Young People's Health in Context survey (Currie, et al. 2004) did appear to have questioned the participants about the intensity of the activity. Research decisions such as this may have contributed to the higher proportion of children having apparently met the recommendation by the Scottish Health Survey than were found by the Young People's Health in Context survey (Currie, et al. 2004). It appears that the particular methods used to assess the rates of physical activity may have an impact on the findings.

However, it is possible that *both* these studies may have overestimated the children's physical activity. As will be discussed in chapter 5 the use of self- and proxy-report methods (as used by the two surveys discussed above) to investigate the frequency, duration, and intensity of children's physical activity is problematic. Self-report and proxy report measures are limited in their reliability and objectivity (Argiropoulou, et al. 2004; Kohl, et al. 2000; Melanson and Freedson 1996; Pate 1993; Puyau, et al. 2002). The desire to conform or please can bias reports of physical activity, and the terms used are often ambiguous and hard to interpret. This is especially the case with children, who may also find it difficult to accurately recall the intensity, frequency and duration of activities (Sallis and Saelens 2000). Further compounding these problems is the fact that children's activity is often sporadic making it difficult to categorize and quantify (Ott, et al. 2000; Sirard and Pate 2001; Welk, et al. 2000).

The main alternative to using self- and proxy-report measures in larger scale surveys are objective tools such as pedometers and accelerometers. Despite issues associated with the interpretation of the data produced (again these will be discussed in chapter 5), these tools give a more accurate impression of the amount, intensity and frequency of physical activity than self- or proxy-report (Sirard and Pate 2001). However these tools are expensive and time consuming and have only recently been used in large scale studies of children's physical activity. The study most relevant to this present research to have used objective measures is the Avon Longitudinal Study of Parents and Children (Riddoch, et al. 2007). Riddoch et al. measured the physical activity, using accelerometers, of a large sample (n5595) of 11 year old children living in the south west of England. They found that only 5.1% of the boys and 0.4% of the girls met the recommended amount of physical activity. Although it must be noted that a somewhat conservative method of interpreting the data

was used to estimate the amount of children who reached the recommendation, Riddoch et al.'s results are considerably lower than the findings of the two surveys previously discussed (Bromley, et al. 2005; Currie, et al. 2004). However, despite the differences in method and reported findings, these studies still draw the same basic conclusions, that there are considerable percentages of children in the UK that are not sufficiently physically active.

2.2 *Do levels of physical activity vary according to age or gender?*

Despite the uncertainty, the findings reported in the preceding sections indicate that levels of physical activity are not static throughout childhood and into adolescence, further more there is variation in the levels of activity of boys and girls.

2.2.1 Age

The findings presented in the tables in section 2.1.2 indicate that there is a general trend towards decreasing levels of physical activity with greater age. The trend is most obvious when examining the percentages of children who meet the recommended level of physical activity. The Scottish Health Survey (Bromley, et al. 2005) found that until the age of 11-12, the percentage of boys who reported meeting the recommendation remained fairly stable at around 75-78%. After this age, the rate falls sharply and only 68% of boys in the 13-15 year age group met the recommendation. This finding was supported by the Children's Health in Context survey (Currie, et al. 2004), where the percentage of Scottish boys meeting the recommendation at 11 years of age was reported to be 54.6%, falling to 46.3% of the 13 year olds and then to 38.4% of the 15 year olds. Amongst the girls the percentages begin to fall at an earlier age; the Scottish Health Survey (Bromley, et al. 2005) found that at the age of 11-12 the percentage had fallen to 57% from the 70-75% of the 2-10 year olds. Amongst the 13-15 year old girls the percentage who reported meeting the recommended one hour of moderate activity most days of the week, had fallen sharply to just 41%. Again this finding was supported by the Children's Health in Context survey (Currie, et al. 2004), though with

much lower percentages. While 41.1% of the 11 year old Scottish girls reported meeting the recommendation, only 22.8% of the 15 years olds reported sufficient amounts of physical activity.

The relationship between age and levels of physical activity for both males and females has long been recognised. As Biddle et al. (2004 p684) commented, surveys consistently find, despite the differences in methods used between studies, that there is a 'steep decline' in levels of physical activity as children of either sex reach adolescence.

2.2.2 Gender

A further consistent finding across surveys of children's physical activity is that, on average, boys engage in significantly more physical activity than girls (Sallis, et al. 2000). The difference is most obvious as the children reach adolescence. As can be seen in Table 2-1, the Scottish Health Survey (Bromley, et al. 2005) found that there was parity in the reported levels of physical activity between males and females at the age of five to seven, but prior to and after these ages the boys appear to engage in more physical activity than girls. The difference becomes most apparent from the age of 11; while 78% of boys aged 11-12 reported at least one hour of physical activity each day of the week, only 57% of the girls did. Each of the surveys and studies discussed in this chapter found that there were significant differences in the levels of physical activity between males and females, despite the vast differences in reported levels of physical activity between the studies. For example the European Young People's Health in Context survey (Currie, et al. 2004) reported that between the ages of 11-15 46.6% of Scottish boys met the recommendation in comparison to 30.7% of girls. Even when a survey found that the percentages of children who were sufficiently physically active were very small, as Riddoch et al. (2007) did, there was still an evident difference in the levels of activity between the males and females (5.1% of the boys and 0.4% of the girls were sufficiently active). This gender inequality in has been shown to be consistent though time and is unaffected by relative levels of physical activity (Inchley, et al. 2005).

2.3 *Levels of physical activity in the school setting*

As this present research focuses on the opportunity for physical activity in schools it is pertinent to ask how active children and young people are in this particular setting. Again the evidence suggests that the levels of physical activity in this setting are low. One particular study found that even on a day with a physical education lesson, the primary-aged children were physically active at a moderate level (the minimum level recommended for health gain) for only 15 minutes (Waring, et al. 2007). In the school setting children have two main opportunities to be physically active; the physical education lesson and during their break times. These two opportunities are examined in the following sections.

Physical education is now an explicit duty of Scottish education authorities: 'where school education is provided to a child or young person... it shall be the duty of the authority to secure that the education is directed to the development of... physical abilities of the child or young person to their fullest potential' (Scottish Executive 2004 p9). Therefore, as detailed in the document Sport 21 (Sport Scotland 2004), the Scottish government aims to provide Scottish school children with at least two hours of quality physical education (PE) each week. However it appears that few Scottish school children receive this amount of PE. A further report by the Scottish Government (2006) shows that in the years 2004-2005 only 5% of primary school children and 7% of secondary school children received two hours of PE each week.

Despite the provision of, on average, one hour and ten minutes of PE for primary school children and one hour forty minutes for secondary school children in Scotland per week, there are questions as to the quantity and intensity of the physical activity which takes place during the lesson. While it is acknowledged that it is not the sole aim of the PE lesson to provide children with an opportunity to be physically active, it is an important aspect. It was found by Waring et al. (2007) that children (5 -11 years) in British primary schools were physically active at a moderate or vigorous intensity for just 18% of their PE lesson. The results of their formal observation study (argued to be the most accurate method of physical activity measurement (Sirard and Pate 2001)) showed that during the average PE lesson (with a length of 36.9 minutes) the children were moderately active for only 5.29 minutes and active at an intensive level for just 1.53 minutes. A second study (Fairclough and Stratton 2005) found greater levels of physical activity during PE lessons amongst British

secondary school children (11-15 years). Fairclough and Stratton, using objective measures, showed that the children were, on average, active at a moderate and vigorous level for 34.3% of the lesson. This equated to 17.5 minutes of moderate and vigorous intensity physical activity during an average lesson length of 50.6 minutes.

The second period during which children have the opportunity to be physically active in the school setting are the break and lunchtimes; children theoretically have the chance to play, take part in active games such as football or hopscotch or to just run around. There are no recommendations as to how physically active children should be encouraged to be during these break times (Ridgers, et al. 2005). This is despite, as Ridgers et al. commented, that unlike PE lessons break times offer children an opportunity to be physically active *each* day. Furthermore a recent study indicated that the levels of physical activity during break time may be consistent throughout the year, with no seasonal variation (Ridgers, et al. 2006).

Ridgers et al. (2005), using an objective measure, evaluated physical activity levels during the break times of British primary school children (5-10 years). They found that, on average, the boys were physically active at a moderate or vigorous level for 32.9% of the break and the girls 25.3%. This equates to the boys taking part in 28 minutes of activity and the girls, 21.5 minutes of activity during their break time (the mean accumulated length of break was 85 minutes). An American study (Sallis, et al. 2001) found that levels of physical activity during break times were much lower for older school children. An average of just 2% of the girls and 6% of the boys surveyed were physically active during their break times. Though the relevance of these findings are questionable due to the American context; there may be significant differences in a number of factors, such as the space in which the children had to be active, weather or cultural norms relating to physical activity, in comparison to the UK.

Despite the point that it appears that one cannot draw any accurate or definitive conclusions as to the *actual* proportions of children and young people who are sufficiently active, it seems that the overall rates of physical activity, amongst children and young people in the UK, are low, in particular amongst girls, older children and adolescents. This is a finding which is relevant to both overall levels of physical activity but also to levels in the school setting. This conclusion, which has been drawn by organisations such as the Scottish Government (2003) and the World Health Organisation (2004), has led to interest in promoting greater levels of physical activity.

2.4 Why promote greater levels of physical activity?

According to the WHO's Global Strategy on Diet, Physical Activity and Health (2004 p4) there has been a profound shift in the major causes of death worldwide, from communicable to non-communicable diseases such as diabetes and heart disease. In 2001 these non-communicable diseases accounted for nearly 60% of the 56 million deaths and were responsible for 47% of the global burden of disease. WHO concluded that the prevention of non-communicable diseases is 'a major challenge to global health policy' (2004 p2). Low rates of physical activity, along with high blood pressure, high cholesterol levels, inadequate intake of fruit and vegetables, and obesity, are the main risk factors accounting for this increase. Low rates of individual physical activity are, therefore, 'among the leading causes of the major non-communicable disease' (WHO 2004 p2).

There is a growing body of evidence which demonstrates the impact of physical activity on human health and wellbeing (Haskell, et al. 2007b). Achieving an adequate level of physical activity in both childhood and adulthood has now been shown to have positive and far ranging effects on wellbeing and is necessary for good health (Warburton, et al. 2006). These effects are examined after the terms 'health' and 'wellbeing' are briefly defined.

Health

In her book 'Health' Blaxter (2004) argued that there are many definitions of the term, and that these vary widely, though typical according to the context and intention of use. She argued that the most common definition, that health is 'normality', as in an absence of disease, abnormality or damage, is flawed. In particular she questions how one defines 'normality' and pointed out that it does not take into account the psychological and social dimensions of health. Health is, she noted, more than a 'series of distinct bodily systems' (Blaxter 2004 p17). An individual's health is positioned within a broad behavioural and social context; health is determined by basic characteristics (such as age and ethnicity), personal behaviour (diet and rates of physical activity), and by a number of further layers of

influence, including social context and relations, employment and economic status, and by the overarching social, environmental and cultural conditions (DoH 1998).

Therefore the term 'health' should be defined taking this multi-factorial nature of the term into account. For the purposes of this discussion the definition, first used by the World Health Organization in 1948, will be used; health is 'a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity' (1948). While it must be noted that this definition has been criticised, most commonly as being unrealistic to ever achieve, it is used as it encompasses the many facets of health including a recognition of both the bio-medical and social influences (Awofeso 2005).

Wellbeing

'Wellbeing' is a similarly difficult term to define; in common with the term 'health', it describes more than just the absence of illness or abnormality, and can also be used subjectively or objectively. It is a term that is multi-faceted; McCallister (2005 p6) argued that a 'number of domains make up wellbeing', these include physical and emotional wellbeing, material wellbeing, social wellbeing and educational development and activity. Therefore achieving a state of positive wellbeing is a result of numerous factors, from good health to feeling satisfied with employment. Taking this multi-dimensionality into account the term 'wellbeing' will be defined as 'psychological, physical and social states that are distinctly positive' (Huppert et al. 2005: quoted in McAllister 2005 p5).

2.5 *Evidence for the relationship between physical activity in childhood and health and wellbeing*

Although physical activity is commonly accepted to have an impact on health and wellbeing (DoH 1998) there is relatively little empirical research which has conclusively and reliably demonstrated that physical activity in childhood and adolescence does benefit health and wellbeing (Boreham and Riddoch 2001). Certainly there is considerably less evidence than there is for adults. However as Stamatkis (2005 p85) argued, the absence of

evidence does not necessarily indicate evidence of the absence of a relationship between physical activity during childhood and health and wellbeing. There are a variety of reasons for this lack of evidence, including a lack of large studies and problems with accurately measuring health, wellbeing, fitness and activity, and, therefore, confidently attributing cause and affect (Boreham and Riddoch 2001; Whitelaw, et al. 2008).

This difficulty is demonstrated by the issues surrounding the assessment of the benefits that childhood physical activity has for an individual's health; the primary problem is that the health conditions which physical activity are known to prevent or manage, rarely affect children. These conditions, including cardiovascular disease, type 2 diabetes, and certain cancers, have long development periods and are often the result of lifetimes accumulation of risk (Chief Medical Officer 2004). Therefore, as the Chief Medical Officer's report comments, the usual factors which are used to assess morbidity and mortality, the often lifestyle related diseases which rarely affect children, cannot be used to assess the value of physical activity to health in childhood. However, the risk factors for these diseases *are* relevant during childhood, so instead of focusing directly on the various diseases, researchers have focused on the impact which physical activity during childhood has on these risk factors.

Despite the relatively small evidence base which supports the suggest that physical activity in childhood may have benefits for health and wellbeing, the evidence is, as Boreham and Riddoch (2001) stated, both growing and becoming more convincing. Furthermore, as stated in the Scottish Health Survey report, although the evidence is somewhat weak, 'the conceptual, biological and behavioural plausibility that physical activity is a healthy pursuit for children is high' (Stamatakis 2005 p85).

Evidence from studies which have used rigorous methodologies indicates that physical activity during childhood and adolescence does have certain benefits. Physical activity in childhood may benefit not only the direct health and wellbeing status of the child but also future health and wellbeing status. Furthermore, it is possible that physical activity behaviours 'track' through to adulthood (behaviours learned or adopted in childhood are carried through and sustained in adulthood), thereby increasing the potential positive impact of physical activity during childhood and adolescence.

A variation of the following three pathways is typically used to describe how physical activity during childhood can be of benefit to health and wellbeing;

1. The direct improvement of childhood health and wellbeing
2. The direct improvement of adult health and wellbeing
3. An increased likelihood of maintaining adequate activity into adulthood thus indirectly enhancing adult health and wellbeing

(Boreham and Riddoch 2001 p916)

These three potential pathways are discussed in the following three sections. The evidence quoted is drawn from a number of reliable, rigorous, systematic and critical reviews of the available evidence, all of which have been peer-reviewed (Bailey 2005; Biddle, et al. 2004; Hallal, et al. 2006; Martin, et al. 2004; Strong, et al. 2005; Twisk 2001; Whitelaw, et al. 2008); their findings are detailed below.

The direct improvement of childhood health and wellbeing

In their systematic review of the health and wellbeing benefits of physical activity during childhood, Strong et al. (2005) concluded that children of both sexes, who are highly physically active, have less body fat than children who are less active. However this evidence derives from cross-sectional surveys; there is a lack of evidence which indicates a causal direction between factors such as overweight and obesity and low levels of physical activity (Biddle, et al. 2004 p681). While low levels of physical activity may result in outcomes such as overweight, it may, alternatively be that children who are overweight are reluctant to be physically active. However there is some experimental evidence to suggest that 'systematic physical activity interventions' can reduce 'total body and visceral adiposity in overweight children and adolescents' (Strong, et al. 2005 p733). This is important as obesity and overweight are independently associated with conditions such as type 2 diabetes, high blood pressure and coronary heart disease (Butland, et al. 2007).

There is some evidence to suggest that physical activity in childhood and adolescence may have a positive impact on some cardiovascular disease (disease of the heart and blood

vessels) risk factors (Twisk 2001); for instance, physical activity may have a positive impact on cholesterol levels in the blood (Strong, et al. 2005). However Biddle et al (2004) caution that, overall, the evidence of a relationship between physical activity and cardiovascular disease risk is, to date, 'not convincing',

Research has shown that physical activity during childhood can have a beneficial effect on bone mass (Boreham and Riddoch 2001 p919; Martin, et al. 2004). Weight bearing activities (i.e. activities which stress the bone, for example jumping, dancing, gymnastics or mountain biking) are especially effective (Strong, et al. 2005). Controlled trials have shown that children who take part in these types of physical activities have 5-15% greater bone mass than those who do not (Biddle, et al. 2004). Furthermore during childhood and adolescence regular resistance training has been shown to be related to both improved muscle strength and endurance (Strong, et al. 2005).

Although there is little research which has investigated the effects of physical activity on certain markers of mental health, such as perceived and emotional stress in children and young people, the existing, reliable, evidence suggests that there may be benefits (Mutrie and Parfitt 1998; Strong, et al. 2005; Whitelaw, et al. 2008). Overall, experimental trials indicate that physical activity does have a positive effect on psychological wellbeing (Biddle, et al. 2000).

A number of reviews have concluded that physical activity has a beneficial effect on symptoms of depression and anxiety, though the evidence of a positive association is weak and in some cases contradictory (Larun, et al. 2007; Strong, et al. 2005; Whitelaw, et al. 2008). Physical activity may have a beneficial impact on self-esteem and self-concept, in particular on children's physical self-perceptions (Biddle, et al. 2000; Whitelaw, et al. 2008). However there are still questions, due to the quality of the study designs (a reliance on small scale, cross sectional designs and problematic measures of self-concept and perceptions) from which this evidence is drawn, as to whether physical activity has a *sustained* impact on self-esteem and concept (Whitelaw, et al. 2008).

Physical activity may also have a positive effect on the cognitive function and academic performance of children and young people. Strong et al. (2005) found that the inclusion of physical education into the curriculum improves academic performance (although the improvement is slight). They report that allocating greater amounts of time to physical

education does not negatively affect academic performance, and, that there may be a 'relative increase in academic performance per unit of time' (p735). However, the evidence only indicates that there is a correlation rather than a causal relationship between physical activity and academic function.

There is some evidence to suggest that physical activity has a beneficial impact on social competence, social development and social relationships amongst children and young people (Whitelaw, et al. 2008). In young children physically active play has repeatedly been shown to have benefits for social development (Bailey 2005; Mutrie and Parfitt 1998). Though it was noted that this was not a universal relationship; the type of activity and the quality of interaction between participants is crucial for the positive impacts (Bailey 2005).

The direct improvement of adult health and wellbeing

As Boreham and Riddoch argued, it is possible that processes and behaviours which take place or begin in childhood have the potential to impact on the future health status of the adult. They state, 'it has been hypothesized that degenerative biological processes are initiated during infancy and childhood and that these processes will manifest themselves in chronic disease later in life'(2001p919-920). They went on to make the point that these processes can be rooted in environmental or behavioural factors such as inadequate childhood nutrition or physical activity. Despite the fact that there have been few experimental controlled trials which have tested this conclusion, there is some evidence to suggest that inadequate levels of physical activity during childhood can directly impact the health status of the adult. For instance physical activity during adolescence may reduce the risk of breast cancer during adulthood (Hallal, et al. 2006). These findings are, however, reliant on the recollections of adult participants as to the quantity and intensity of physical activity during their childhood; the conclusions are, therefore, questionable.

More reliable evidence (based on experimental data) indicates that physical activity during childhood, particularly that which is weight bearing, has a positive effect on bone health in later life (Malina 2001). Maximising bone mass, particularly during puberty and adolescence, is important as it reduces the risk of age related bone loss and osteoporosis (a

disease of the bone which results in reduced bone mineral density) in later life (Boreham and Riddoch 2001; Hallal, et al. 2006).

An increased likelihood of maintaining adequate activity into adulthood thus indirectly enhancing adult health and wellbeing

The third way that physical activity during childhood could benefit health and wellbeing is through the tracking of physical activity behaviours from childhood into adulthood. If behaviours established in childhood and adolescence do track through into adulthood, then as Boreham and Riddoch (2001 p920) commented, 'childhood activity can be considered to have an indirect influence on adult health status'.

There is some evidence to suggest that there is a relationship between levels of physical activity in childhood and adolescence and levels of physical activity in adulthood; however the associations are not particularly strong (Hallal, et al. 2006; Malina 2001). The lack of robust evidence may be the result of few studies, a lack of standardisation between those studies and the use of unsuitable analysis techniques, rather than the absence of a relationship (Hallal, et al. 2006). There are stronger associations between the reported experience of physical activity in childhood and rates of physical activity in adulthood (Malina 2001). For instance it was suggested that being forced to exercise in the pre-teen years was negatively associated with physical activity in adulthood (Malina 2001). However this evidence tends to rely on self-recall of physical activity (of both the rates of participation and of the perceptions of the activity) during childhood; measures which are highly subjective and are, therefore, difficult to rely on to draw definite conclusions regarding any relationship.

2.5.1 The impact of inadequate levels of physical activity at a population level

Low levels of physical activity have considerable consequences to both the individual but also to wider society. The English Chief Medical Officer's report states that 'low levels of physical activity have become a major public health problem in most western societies'

(2004 p9). The health impacts of insufficient levels of physical activity are now becoming clear; inadequate physical activity and low fitness are major risk factors for many chronic diseases (Chief Medical Officer 2004). A review by the Scottish Government (Scottish Executive 2002b) concluded that insufficient physical activity has a major impact on health at a population level. It was stated that it is likely that at least 2,477 deaths, in Scotland, each year, are attributable to inadequate levels of physical activity (2002a p2). The authors concluded that if Scotland was to improve the levels of physical activity by just 1% per year there would be a number of benefits. They estimated that the total number of deaths which result from inadequate physical activity would fall from 2,447 to 2,290 deaths annually. Annual hospital admissions would fall by approximately 2,231 cases, and the NHS would save around £3.5 million (Scottish Executive 2002a p7).

2.6 *Why are children's rates of physical activity low?*

Understanding children's physical activity behaviours, the motivations, facilitators and barriers, is notoriously complex (Kohl and Hobbs 1998; Lindquist, et al. 1999). Kohl and Hobbs (1998 p553) suggested that rates of physical activity amongst children are the result of a complex interaction of, 'physiological, environmental, and psychosocial/socio-demographic factors'. However systematic reviews of the evidence suggest that these complex and inter-related factors can be clustered into three underlying themes (Brunton, et al. 2003):

1. *Preferences and priorities*; low rates of physical activity are often a result of competing priorities for children's time.
2. *Family life and parental support*; low rates of physical activity amongst children have repeatedly been shown to correlate with parents' non-participation and negative attitudes towards physical activity.
3. *Restricted access to opportunities for participation in sport and exercise*; for many children the cost of physical activity opportunities, problems with transport and other access issues and a basic lack of facilities contribute towards the low rates of activity.

Children's perceptions of physical activity are key to understanding the low rates of physical activity in Britain; as they are of greater relevance to this study they are explored in greater detail in the following sections.

2.6.1 Children and young people's perceptions of physical activity

The majority of published research, found during this literature review, into children's perceptions of physical activity originates from Australia or the USA; there appears to be comparatively little which has focused on the British setting (Brunton, et al. 2003).

Differences in culture, attitudes and in factors as simple as the weather mean that those studies focusing on Australia or the USA may not be helpful when trying to understand children's physical activity in Britain, and more specifically, in Scotland. However a small number of published critical systematic reviews of research which had some focus on British children's perceptions of physical activity were found (Allender, et al. 2006; Rees, et al. 2001; Rees, et al. 2006; Whitelaw, et al. 2008).

Negative perceptions of physical activity and ability

Although, as Rees et al. noted (2006), most children and young people think that physical activity *is* important and can have multiple benefits, many children and young people hold negative perceptions of physical activity, particularly those with low activity levels.

Research has shown that perceptions of physical activity are often linked to participation; for instance the studies reviewed by Rees et al. indicated that negative self-perceptions were often related to low levels of physical activity. Children often reported that they were reluctant to take part in activities if they felt that they were incompetent or if the activity needed certain skills which they did not have. For others a lack of interest in activity may be a factor; some children participation in the various studies suggested that they had other, better, things to be doing with their time, and that physical activity had a low priority (Rees, et al. 2001). A lack of motivation to be physically active was a further factor; children,

especially girls, implied that they were 'lazy' and this was why they did little physical activity (Rees, et al. 2006).

Unsurprisingly the systematic review by Rees et al. (2001) found that children and young people's perceptions of and participation in physical activity was greatly affected by the real, or perceived, opinions of others. The children feared looking stupid or of losing, or of being un-able to maintain their 'image'. Males especially were conscious of the opinions of others regarding the types of activities they chose and of their ability to do the particular physical activity. Girls were more concerned with their physical image; self-consciousness, of their bodies and of the type of clothing they wore during physical activity, acted as a barrier to participation. A second review of perceptions of physical activity amongst young people stated that 'while many girls wanted to be physically active, a tension existed between wishing to appear feminine and attractive and the sweaty muscular image attached to active women' (Allender, et al. 2006 p830).

As suggested previously, parental perceptions, actions and behaviours have also been shown to have an impact on children's perceptions of physical activity. Parents concerns with safety can prevent children from taking part in physical activity (Rees, et al. 2006). Parents can exert this influence either directly by preventing their child from using certain spaces in which they could be physical activity, such as the street or a local park, or through a secondary mechanism where the parental concerns influence the child's own perceptions of its safety resulting in a reluctance to be physically active. Furthermore, and related to a previous point, parents' perceptions of gender may have an impact on their children's own perceptions of the gender appropriateness of particular activities (Koivula 1995).

Perceptions of physical activity in the school setting

Experiences of physical activity in the school setting were related to a number of negative perceptions of physical activity. Rees et al. (2006), found that many children, though mostly girls, had negative feelings about the physical activity they did at school, particularly that which was associated with physical education (PE). Girls complained about the clothing they had to wear and the effect physical activity had on their bodies. The type of facilities or the lack of, for changing and showering after PE lessons were associated with further

negative perceptions. Girls also discussed feeling marginalised by the boys during lessons, reporting that they felt they were unable to get involved during games and that they were occasionally prevented from using equipment (Allender, et al. 2006). Furthermore the traditional focus on competitive team sports in the school setting is related to negative perceptions amongst girls who, as recent studies have indicated, tend to prefer more individual sports such as swimming and athletics (Bailey 2005). Though Allender (2006) noted that both genders reported that they had a lack of choice and input into the types of physical activities they did during PE lessons; the lack of variety resulted in boredom.

2.6.2 Do children have positive perceptions of physical activity?

Despite the broadly negative impression of children's perceptions of physical activity described in the previous sections there is evidence that children and young people do, often, have a number of very positive perceptions of physical activity.

Importantly children and young people report that they enjoy physical activity and the majority do, on the whole, think that physical activity is important and beneficial (Rees, et al. 2001). Enjoyment of physical activity and physical education has been shown to be related positively to higher levels of physical activity in children (Heitzler, et al. 2006; Sallis, et al. 1999).

Many of the children, who participated in the studies reviewed by Rees et al. (2001) had positive perceptions of the benefits of physical activity to health and wellbeing. Girls, especially, thought physical activity was useful for maintaining weight and toning the figure. Physical activity was seen to positively contribute to boys' and young men's sense of identity and masculinity (Allender, et al. 2006). Children and young people also see physical activity as an opportunity for socialising (Rees, et al. 2001).

2.6.3 Gender and perceptions of physical activity

Although some may have argued that the concept of 'gender' is nothing more than a left over from the patriarchal system (McInnes 1998), others consider gender to be a defining principle in our lives (Francis 2000). The notion of gender is particularly relevant when considering, firstly, children and their worlds and, secondly, as has been indicated in the previous sections, when considering participation in and perceptions of physical activity. The concept of gender is briefly defined in the following section.

Gender

As Abercrombie et al. (2000) suggested, while the sex of a person (i.e. male or female) is biologically determined, gender (i.e. concepts of masculinity or femininity) are culturally and socially constructed. Ackner (2000) argued that a number of social process create and maintain the concept (and relevance) of 'gender,' not least the societal divisions according to sex, which range from perceptions of acceptable behaviours, jobs associated with one or other sex and the division in physical spaces (e.g. toilets or dressing rooms). In a broader sense Ackner suggested that it is through the family structure, social interaction and through wider symbols, images and language, that society constructs and maintains the concept of gender. However an individual's gender is not necessarily imposed through those socio-cultural processes, nor is it fixed; it is a fluid status which individuals manage and maintain, a status which can be threatened by the actions of the individual or the perceptions of others.

The work of Francis (1999; 2000), which focused on concepts of gender amongst children and in the primary school setting, indicated that children are fully aware of gender and have well developed understandings of 'gender issues'. Skelton et al. (2009) noted that even at very young ages children are aware of gender boundaries and what is 'acceptable' and 'appropriate' behaviour for either gender. Furthermore 'gender differences remain solidly entrenched in the interaction and social constructions of the next generation' (Francis 2000 p18). Nielsen and Davies (1999) suggested that gender is a fundamental aspect of children's social and personal identities; it is a status which, they argued, children go to extraordinary lengths to maintain.

Physical activity is a factor in children's maintenance of their gender identities (Koivula 1999). As was noted previously some girls appear to think that participating in physical activity will harm their gender identity; in particular girls worry about getting sweaty and associating themselves with the masculine image of sportswomen. Boys, on the other hand, often use physical activity and sports to reinforce their masculine gender identity (Allender, et al. 2006).

Koivula (1995) noted sports and physical activities have traditionally been perceived to be a masculine pursuit and, even now, many sports can be considered to be inappropriate for a female to engage in. This, she argued, results in 'gendered activities'; activities which are considered or perceived to be more suitable for one or other gender. The available evidence suggests that children internalise these messages and have negative perceptions of, and are often reluctant to participate in, activities which are considered 'inappropriate' for their gender (Koivula 1999). Studies have shown that children perceive of activities such as basket ball and football to be most appropriate for boys, dancing and gymnastics for girls (Lee, et al. 1999). Participation in an activity which had been strongly associated with a certain gender could threaten or, equally, promote the 'gender identity' of the child.

2.7 *Promoting higher levels of physical activity amongst children*

As the evidence discussed in the preceding sections suggests, increasing levels of physical activity amongst children would have a number of benefits to both individual and public health and wellbeing. Furthermore despite a number of negative perceptions and issues related to gender identities, many children are interested and motivated to be physically active. Therefore finding ways to promote physical activity amongst children is a major aspect of western government's efforts to improve and maintain public health.

2.7.1 *How might physical activity be promoted amongst children?*

A number of strategies to promote physical activity amongst children have been used in recent years; these include interventions aimed at girls, adolescents or overweight and obese children, interventions related to the home, school or urban environments and interventions which have aimed to promote activity through play or travel (NICE 2007).

One of the key ways in which physical activity is promoted amongst children, and which is of obvious relevance to this present research, is through encouraging the greater use of the 'outdoors', of green spaces and of the natural environment, in particular that which is local to the children's homes. The evidence for the relationship between physical activity and green spaces is explored in the following sections.

2.8 *Green space and physical activity*

Defining 'green space'

This review indicated that there appears to be no commonly accepted definition of the term 'green space'; the term is used to describe a variety of types of environments. What the various examples have in common is that 'green space' is generally used to describe an outdoor area with vegetation; however the term can be used to describe spaces in a rural or urban context and applied to natural, managed or wholly man made environments. The organisation 'greenspace scotland' provides the following definition, '...greenspace is any vegetated land or water within or adjoining an urban area. This includes, green corridors...woods, parks playing fields...countryside immediately adjoining a town' (greenspace scotland accessed Feb 2009). This definition is somewhat narrow, and focuses solely on the more vegetated areas close to built environments. Other definitions are unspecific, take for instance the one used by the American Centre for Disease Control, 'green space: open, undeveloped land with natural vegetation' (CDC Accessed March 2008). Although it is not made clear, this definition could be argued to have excluded 'man made' spaces such as parks and gardens; if so, this is, again, too narrow a definition for this discussion. Therefore this present research will use a combination of the two previous definitions: green space is 'land with natural vegetation, this includes green corridors, woods, parks, playing fields and countryside in rural or urban areas'.

2.8.1 Green space and public health

The impact of the wider built and natural environment on health and wellbeing is now well-acknowledged and this has resulted in the development of a 'settings based approach' to health improvement, for instance focusing on schools or workplaces (healthscotland Accessed 2008). The emphasis on focusing on the impact of place on health has subsequently led to interest in how certain environments, for instance the natural environment and green spaces, may promote healthy behaviours such as physical activity (Physical Activity and Health Alliance undated).

In Scotland both governmental and non-governmental organisations are actively promoting the potential of the natural environment for increasing physical activity levels. The Scottish Government has previously cited the importance of the natural environment and green space for promoting higher levels of physical activity in various policy documents. In particular the document 'Let's Make Scotland More Active: A strategy for physical activity' (Scottish Executive 2003) makes two key points. Firstly it suggests that 'active living' activities (such as dog walking) are the principle types of physical activity which the Scottish Government is seeking to promote, and these are 'likely to be undertaken in forests, woods and green spaces' (Physical Activity and Health Alliance undated; Scottish Executive 2003 p1). Secondly it is stated that improving access to the countryside and to outdoor recreation are key aspects of the Scottish Government's policy of promoting greater physical activity (Scottish Executive 2003 p31).

Scottish Natural Heritage (SNH) and the Forestry Commission Scotland (FCS) are examples of governmental departments, which are not typically associated with the health improvement agenda, but which have stated that they recognise their role in improving the nation's health. FCS, for example, published a strategy document (Forestry Commission Scotland 2007) underlining their commitment to contribute to the 'health agenda' and in particular through promoting physical activity. In this document the FCS stated, 'Forestry Commission Scotland and the whole forest sector can make a positive contribution to the health agenda... A desired outcome of the Scottish Forestry Strategy is improved health and well being of people and their communities with the objective of enhancing the

opportunities people have for health and enjoyment... the focus is on making local woodland accessible and welcoming – helping people build healthy activity into their daily lives’ (Forestry Commission Scotland 2007 p3). Non-governmental organisations, which are involved in the management and promotion of the use of the natural environment or green space, are also actively engaging with health promotion. The Royal Society for the Protection of Birds is one example; managing more than 100,000 hectares of land the charity has recognised its potential role in promoting physical activity in the outdoors. In a recent publication it stated ‘the environment sector should facilitate this by providing access to nature in a way that supports health needs’ (Royal Society for the Protection of Birds undated). One way it is fulfilling this is through the promotion of organised ‘health walks’ around reserves.

2.9 *Evidence to suggest that green space is associated with physical activity*

The majority of the research into green space and physical activity has focused on whether greener environments are associated with greater amounts of physical activity and originates from the USA or Australia (Bell, et al. 2008).

The current evidence is contradictory, with some research indicating that access to green space is associated with an increase in physical activity levels, while other research has found no association. For instance separate studies carried out in Australia, Finland and the US (Giles-Corti, et al. 2005; Neuvonena, et al. 2007; Roemmich, et al. 2006) have all found positive relationships between the quantity and proximity (to areas of residence) of public open green space and (self-reported) levels of physical activity. The Australian study (Giles-Corti, et al. 2005) found that access to attractive large public outdoor spaces was associated with high levels of walking. The Finnish study (Neuvonena, et al. 2007) found that the proximity of green space to homes was associated with a greater number of recreational outings which the authors suggests promotes an active lifestyle (though this hypothesis was not tested). However one must bear in mind that while these studies do appear to show a cross-cultural relationship between green spaces and physical activity they are not necessarily relevant to the British context.

Research which is of greater relevance to the Scottish situation, for instance a recent cross-sectional survey of a large sample of middle-aged people (n 4950) (Hillsdon, et al. 2006) undertaken in the east of England, found no relationship between self-reported access to green space and recreational activity. Similarly two Dutch studies have also found no association between the amount of local green space and the frequency of certain physical activities such as walking (de Vries 2002, quoted in Health Council of the Netherlands 2004; Maas J, et al. 2008). The findings of both these studies (and of the Finnish study mentioned above (Neuvonena, et al. 2007)) should be treated with some caution as they rely heavily on self-reported physical activity and use of green spaces such as parks. As will be discussed in a subsequent chapter there are many methodological issues related to the use of self-report measures; for instance such measures are limited by the ability of the individual to recall the intensity, duration and frequency of physical activity (Sallis and Saelens 2000).

Programmes, such as the British Trust for Conservation Volunteers' (BTCV) Green Gym (<http://www2.btcv.org.uk/display/greengym>) and the 'Walking the Way to Health Initiative' a joint venture between the British Heart Foundation and Natural England (<http://www.whi.org.uk/>), have both been evaluated as to their effectiveness for promoting physical activity. The un-published evaluation of the BTCV Green Gym (British Trust for Conservation Volunteers Accessed January 2008) found that the levels of physical activity during the Green Gym sessions were of sufficient intensity and duration to be of benefit to health. Evaluations of similar 'green exercise' programmes, by Pretty et al. (2005a), showed that participation resulted in improvements to the participants' self-esteem and in significant positive changes to mood and participants burnt between 330 and 3500 calories per session (Pretty, et al. Accessed January 2008). Despite these apparently positive findings, which have been used to promote the benefits of greenspace for health and wellbeing, both these pieces of research must be treated with some caution: for instance neither studies have a design (both were cross-sectional) which is adequate to draw any confident conclusions about a causal relationship or longer term benefits. As Bell et al. (2008) pointed out, the individuals who participated in Pretty et al.'s study (2005b) had already chosen to take part in these green activities, suggesting that they were already more motivated and physically active than other populations. Furthermore the evaluation of the physical activity during the Green Gym programme (British Trust for Conservation Volunteers Accessed January 2008) relied solely on a questionnaire to evaluate the quantity,

frequency and intensity of the physical activity; meaning that the conclusions drawn as to the energy expenditure maybe somewhat inaccurate.

While it is useful to understand whether there is an association between green space and physical activity, there appears to be no research which has *directly* investigated the 'motivational influence of a natural environment on exercise' (Health Council of the Netherlands 2004 p60). As with much research focusing on physical activity behaviours one is not able to disentangle the effects of the various contributory factors (Kohl, et al. 2000); for example the studies mentioned here were unable to ascertain the importance of proximity to, or of the type of, a green environment on physical activity, from other environmental or behavioural factors. It is possible that factors other than the greenness of the environment may be important. Similarly the evaluations of programmes intended to encourage physical activity in green space did not disentangle the various motivational factors. Although respondents reported being motivated by the chance to be in the natural world, the effectiveness of the programme in promoting physical activity may actually be due to another factor, such as being part of a group. As none of the evaluations appeared to have any kind of control it is difficult to draw a conclusion as to the importance of the greenness of the environment the programmes took place in.

2.10 *Green space and promotion of physical activity amongst children*

Despite the current interest in promoting the use of the natural environment as a means of increasing levels of physical activity amongst children and young people, there is surprisingly little published research which has investigated any relationships (Hume, et al. 2005). The narrow field of evidence has implications for the generalisability of the broad findings; a particular issue is that many of the studies have focused on specific populations (e.g. overweight children (Roemmich, et al. 2006)). Furthermore the majority of the available evidence originates from the USA and Australia (Bell, et al. 2008).

Despite the relatively small amount of research there does appear to be a positive association between children and youth's physical activity and green space (Bell, et al. 2008; Roemmich, et al. 2007). Systematic reviews of the evidence by Sallis et al. (2000) and by

Ferreira et al. (2007) have shown that time spent in the outdoors is a consistent and positive correlate of children and young people's physical activity.

Proximity to greenspace appears to be a strong correlate of children's physical activity; for instance Roemmich et al. (2006) found that greater amounts of neighbourhood park space was associated positively with young children's (aged 4-7 years) physical activity. Though for older children, the proximity of greater amounts of parkland was only positively associated with boys' physical activity (Roemmich, et al. 2007). Factors such as proximity between parks and children's home and feeling safe and secure in the local environment have repeatedly been shown to be associated with higher physical activity levels (Heitzler, et al. 2006; Roemmich, et al. 2006). However the findings of these studies are limited in that they did not objectively assess the children and young people's actual access to the parks or green spaces, nor did they objectively measure use, relying, instead, on self-reported measures.

Access to and ability to use green space may have a positive impact on children and young people's physical development; in particular free play in natural environments has been shown to be beneficial to the development of children's motor function. An experimental study (Fjørtoft 2004) concluded that children who played in a natural environment had significantly better motor, balance and co-ordination skills than those who played in a conventional playground. Again this evidence is from an international context and related to a specific educational approach meaning that it may not, therefore, be applicable to the situation in Scotland.

2.11 *Wider benefits of green space to health and wellbeing*

It has been hypothesised that green space may have some association with human health and wellbeing (Maller, et al. 2006). The authors of three systematic reviews concluded that there is a positive relationship between green space, the natural environment and human health and wellbeing. However they also noted the lack of rigorous studies and the methodological shortcomings of much of the existing research (Bell, et al. 2008; Croucher, et al. 2008; Health Council of the Netherlands 2004).

A large-scale Dutch study, of the relationship between the local environment and the health and wellbeing of residents (de Vries, et al. 2003 p1726), found that the 'greenness of the living environment' (the presence of a garden, percentage of 'green' and percentage of 'blue', i.e. sky) had a strong relationship with self-reported health and well being. The researchers reported that the people who lived in a greener environment had better self-perceived health and reported fewer symptoms of ill health (though the effect was not found for children). Furthermore they found a graded relationship between the amount of green in the environment and health; an increase of 10% in the amount of green space was associated with a decrease in the number of symptoms which is 'comparable to a decrease in age by five years'(de Vries, et al. 2003 p1726). Interestingly, despite previous assumptions, they found that the *type* of green space had little effect. Although, as they state, Dutch people tend to report preferences for forests and nature areas rather than agricultural green, it appears that all types of green may be effective and that it is the total amount of green that is important. Though again it should be noted that this study was cross-sectional, meaning that only an association was found, not necessarily a causal relationship. A study carried out in England (Mitchell and Popham 2007) reported similar results, finding, that in general, there was an association between greater amounts of green space and better self-reported health. However this study concluded that it is possible that the quality of the green space is important; as the authors found an association between worse health and a greater quantity of green space for low-income suburban areas. The authors suggest that this association may be due to the poor quality of the green space found in low-income suburban areas. This hypothesis is supported by findings from a further English study (Guite, et al. 2006), which found that negative perceptions of local green space were associated with poorer mental health.

The systematic reviews of the relationship between health and green space concluded that contact with nature and green space does have positive effects on mental health (Bell, et al. 2008; Croucher, et al. 2008; Health Council of the Netherlands 2004). Short-term contact with, or even just viewing images of nature or green space, has repeatedly been shown to have a significant positive impact on mood in adults. Contact with nature is also thought to aid psychological recovery from stress.

There is some evidence to suggest that exposure to green space can have a beneficial effect on physical recovery after illnesses or medical procedures. One of the key studies into the

link between green space, nature and physical recovery is Ulrich's (1984) research into recuperation rates after gall bladder surgery. Ulrich compared the recuperation of patients whose rooms had windows which overlooked natural scenes with those who had a view of a brick wall. He found the patients with views of nature had shorter stays in hospital after the operation, had fewer negative nurses comments, took fewer strong pain medicines, and had fewer post surgical complications (p421). However, as the authors of the Dutch systematic review suggest, this evidence should be treated with caution due to a number of methodological weaknesses (Health Council of the Netherlands 2004).

As has just been described it appears that there may be an association between health and the quantity and quality of green space. The reasons for this relationship between green space and health are complex, likely to be the result of interplay between psychological, behavioural, (possibly) genetic and other environmental factors. There is not, however, enough systematic and rigorous research to draw any firm conclusions (Croucher, et al. 2008; Health Council of the Netherlands 2004).

2.11.1 Specific benefits of green space to children's health, wellbeing and development

The reviews by the Dutch Health Council (2004) and Bell et al. (2008) also considered the effects of green space and nature to the educational and physical development of children. The authors concluded that the cognitive and emotional development of children benefits from exposure to, and contact with, nature. For instance an American study (Cornell, et al. 2001) concluded that urban children's adventure play in more wild spaces resulted in improved cognitive skills, including way finding and sense of direction. Another study from the US (Wells 2000) investigated the cognitive function of children who had moved into different environments. The author concluded that the children who had moved into the greenest environments (again within an urban context) had the highest levels of cognitive functioning. However both these studies are problematic as neither use adequate designs to draw meaningful conclusions; in particular the authors were unable to isolate the impact of the green spaces from other influential factors.

A further systematic review of the evidence (Faber-Taylor and Kuo 2006) found that multiple studies had indicated that contact with or exposure to natural environments had several positive effects on children's development, in particular greater self-perceived personal autonomy, self-concept and self-awareness and an improvement in interpersonal skills. Exposure to, or viewing nature was found to have a positive influence on attention and concentration. Children with ADHD who played in a natural environment had reduced symptoms of the condition (Health Council of the Netherlands 2004). Further research with children found that, for girls, views of nature from the home was positively associated with mental self-control and self-discipline (Health Council of the Netherlands 2004).

Green spaces may also stimulate more effective and constructive play in younger children, which as the authors of the Dutch review suggested, may promote feelings of competence and self-worth (Health Council of the Netherlands 2004). One American study (Taylor, et al. 1998) found that children's levels of play in relatively barren spaces were around half those in green spaces with trees, furthermore the children engaged in significantly less 'creative' play in the barren areas. It has also been suggested that outdoor play, in comparison to indoor play, also has the potential provide greater opportunities for learning control and mastery skills, developing different ways of moving, and understanding risk and engaging in risk taking activities (Lester and Maudsley 2006); however there appears to be no research which has tested these suggestions.

Whilst the findings discussed above indicate a positive relationship between greenspace and children's health, wellbeing and development they must be treated with some caution; primarily because few of the studies from which these conclusions are drawn are from the UK. As has been mentioned previously, variation in a number of factors between different cultures and societies (factors as diverse as cultural perceptions of 'nature' to crime levels) may mean that these international findings are not relevant to the British context.

Furthermore and, perhaps, more importantly, many of the conclusions discussed above are drawn from studies which used less than ideal measures of change; in particular there is a reliance on the use of self-report measures or inadequate tools which are intended to measure complex behaviours or psychological states. Finally as with much of the research discussed in this chapter almost none of the studies used a design which allowed the researchers to disentangle the impact of the environment from other influential factors.

2.11.2 Particular benefits relating to the use of green space in the school setting

There are a number of ways in which children may experience green space in the school context; from examining a tree on school grounds for a science project to extended residential trips away from the school environment, such as to an 'outward bound' centre. Typically these types of experiences are described as 'outdoor education' or 'outdoor learning' and are argued to have a range of benefits for those participating.

Definitions of 'outdoor learning' and 'outdoor education'

The terms 'outdoor education' and 'outdoor learning' (the term hereafter used) are broad, complex and have many definitions (Rickinson, et al. 2004). However outdoor learning is generally accepted to describe an approach which is 'other' to the typical indoor education which is the primary experience of the majority of children and young people in the west. Typically, and somewhat self-evidently, 'outdoor learning' is defined as education or learning which takes place in the 'outdoors' (i.e. in a location that is not 'indoors'), those locations range from the school playground to the top of a mountain (Rickinson, et al. 2004). Beyond this distinction outdoor learning encompass a myriad of philosophies, approaches and practices including, as Rickinson et al. (2004) noted, fieldwork and outdoor visits, outdoor adventure education, and school grounds and community based projects.

There is a wealth of research that indicates that education out of the classroom, and in particular that which takes place in more green environments, is highly beneficial (Dillon, et al. 2005; Hattie, et al. 1997; OFSTED 2004; Peacock 2006; Rickinson, et al. 2004). For instance an OFSTED report which focused on the potential benefits of outdoor education concluded that 'outdoor education gives depth to the curriculum and makes an important contribution to the student's physical, personal and social education' (2004 p2). One of the largest and most comprehensive reviews of the research on outdoor learning was carried out by Rickinson et al. (2004) for the National Foundation for Education Research (NFER). This critical review summarised the findings of 150 pieces of (international) research published between 1993 and 2003. Rickinson et al. concluded that there is substantial evidence which

indicates that outdoor learning, when 'properly conceived, adequately planned, well taught and effectively followed up' can increase knowledge, have a positive impact on long term memory, improve social skills and result in higher order learning (2004 p4).

More specifically the authors concluded that outdoor adventure activities are beneficial (in both the short and long term), though they note that these impacts vary between the different kinds of programmes. The most convincing evidence suggests that outdoor adventure programmes have positive impacts on participant's attitudes, beliefs and self-perceptions and for interpersonal and social skills. There is also an indication (though the evidence base is somewhat weaker) that these types of more adventurous outdoor learning can also have positive impacts on academic skills and behaviour, physical self-image and fitness. Less adventurous experiences, such as outdoor education which takes place in school grounds or in the local community may result in 'greater confidence, renewed pride in community, stronger motivation towards learning and a greater sense of belonging and responsibility' (Rickinson, et al. 2004p6). Furthermore this particular approach may have wider positive impacts for social development and community involvement.

A second study (Dillon, et al. 2005) concluded that education taking place in 'outdoor classrooms' has the potential to result in a broad range of positive impacts, in particular:

- *Cognitive impacts*: gaining knowledge and understanding and a number of academic outcomes.
- *Affective impacts*: related to attitudes, values and beliefs e.g. gaining a sense of wonder or respect for nature.
- *Interpersonal/social impacts*: improving communication skills, improving leadership expertise.
- *Physical/behavioural impacts*: improving physical fitness, improving fine and gross motor skills, personal behaviour and social actions (2007).

The evidence also suggests that children highly value the opportunity to take part in these kinds of learning experiences (Nicol, et al. 2007); children find the experience of out of classroom learning to be 'fun, exciting, enjoyable and better than working in the classroom' (Peacock 2006 p3).

Despite the breadth of positive findings discussed above, no research was identified which had focused specifically on the impact of the particular environment in which the outdoor learning takes place. Furthermore there appears to be very little research which has investigated the potential of outdoor education to provide physical activity opportunities (Rickinson, et al. 2004). This is despite the point that it is likely that outdoor education results in physical activity (and is sometimes promoted as doing so (House of Commons Education and Skills Committee 2004-2005)).

Much of the research which focused on the potential for outdoor learning to result in, or promote physical activity located during this review of the literature appears to originate from Scandinavia. For instance a Danish study (using an experimental design and objective measures) found that activity levels during outdoor learning days resulted in greater amounts of activity than traditional school days (Mygind 2007). Fjørtoft (2001 ; 2004) found that outdoor play amongst Norwegian kindergarten pupils resulted in significant differences in certain motor skills (co-ordination, balance skills and agility) in comparison to a control group, the differences were attributed to the benefits of the natural environment. This study also used an experimental design and objective measures. Beyond Scandinavia an Australian meta-analysis concluded that certain forms of outdoor education had positive impacts which related to physical ability self-concept and physical fitness (Hattie, et al. 1997). However the evidence reported by Hattie et al. is somewhat limited, primarily because of the sheer range in the types of outdoor learning, meaning that often the outcomes or impacts of one type of outdoor learning are unlikely to be replicated by another. No studies were found which related to outdoor education in the UK.

2.12 *Children's perceptions of green spaces*

Multiple pieces of research indicate that many children and young people have a clear desire to spend time in the outdoors and in particular green spaces; Worpole (2003) cited previous research which supports this. Of one thousand children surveyed in Leicester, 94% wanted to spend more time outside of the house. In another survey 80% of the 9-16 year olds reported preferring to being outside rather than inside.

The outdoor environment, and in particular green spaces, are often described as children's preferred places to play (Lester and Maudsley 2006; Whewey and Millward 1997). During a piece of qualitative research children were asked where they like to play, the spaces most regularly mentioned included formal gardens and green sports pitches, grassy fields and parks, nature reserves and waste grounds (Whewey and Millward 1997). The authors argued that these types of spaces offer children, of both genders, the opportunity to play, to explore, and to be active. Lester and Maudsley (2006) argued that green spaces are often dynamic and complex environments allowing the children to engage in a range of activities; from fantasy and make believe games to the construction of dens and forts. While green spaces allow opportunities to play for younger children, older children value green spaces and woodlands because they afford them an opportunity to explore and roam away from their 'home' environment. The results of several pieces of qualitative research suggest that teenagers appreciate the opportunity woodlands, in particular, give them to escape the gaze of adults and a space in which to socialise (Bell, et al. 2003; Gill 2006).

Positive childhood experiences of green space and woodlands may carry through into adulthood; it has been argued that adults who had had positive and frequent experience of green space and woodlands as children were more likely to have positive perceptions of these places as adults. For instance they were more likely to feel comfortable about visiting woodlands and green spaces alone, to perceive of them as 'special places', and to associate them with feeling energetic (Ward Thompson, et al. 2008). Similar results were reported in the US by Lohr et al. (2000); in particular they found that people who had planted trees as a child had more positive attitudes towards trees as an adult. Bixler et al. (2002) also reported finding a relationship between childhood play in wild environments and positive perceptions of natural environments and outdoor recreation. Ward-Thompson et al. (2008), who carried out two separate studies in different parts of the UK, found a consistent relationship between the frequency of childhood visits to either woodlands or green open land and adult use of these spaces. They concluded that frequency of childhood visits was a strong predictor of adult usage. The strongest relationship was reportedly found between lack of experience as a child and a reluctance to use woodlands or green space as an adult. Those who had had frequent and positive experiences as a child were argued to be more likely to make use of local green or wooded areas close to their home. Whilst these three studies have positive and apparently convincing conclusions one must be cautious as each research design relies heavily on the retrospective perceptions of the participants. For

example the study carried out by Ward Thompson et al. (2008) asked adult participants to recall their usage of particular environments during their childhood, a period of time which was many years previous to the questioning. It seems somewhat unlikely that the participants would have been able to accurately recall their usage to such a degree that a causal relationship could be identified. Perhaps the findings should be framed more in terms of an apparent relationship between *perceptions* of use of green spaces during childhood and subsequent adult usage.

Despite the evidence of the beneficial impacts of green space to children's health, wellbeing and physical activity behaviours, and of their preferences for such places, it seems that children are increasingly restricted in their ability to access and use these types of places (Travlou 2006). For instance an unpublished report from the Green Alliance and Demos reflects the popular assumption that children's opportunities to experience the natural environment are under threat: 'fear and risk, lack of investment, overcrowding and poverty are all restricting their opportunities to spend time outside' (Thomas and Thompson 2004). The myriad of reasons why children's opportunities to use greenspace are restricted are explored in the following, final, section of the background chapter.

2.12.1 Barriers to children's use of green space

The general impression, from many pieces of research, from different disciplines, is that children and young people are restricted in their opportunities to experience, play and use the natural environment or green space (Travlou 2006). These restrictions are evident in both the home and the school environment, and are felt by both rural and urban children (Lester and Maudsley 2006).

Barriers to children's use of green space in the school setting

Within the school setting children are facing reductions in the opportunities they once had to experience, use, and play in green space. Although, as Nicol et al. suggested there is 'strong and positive support for taking learning outdoors' amongst children, teachers and

providers of outdoor education, greater uptake of opportunity has been prevented by a number of barriers, both perceptual and physical (e.g. lack of resources, time, and issues associated with risk) (pp10). Factors such as the sale of school playing fields contribute to this; as Thomas and Thompson (2004) comment, applications to build on school playing fields more than doubled in the UK from 625 in 1999-2000 to 1325 in 2002-2003.

Whilst, as Rickinson et al. (2004) commented, it is almost impossible to actually quantify the number that take place, all the evidence suggests that opportunities for out of classroom education have declined substantially. The fear of accident or litigation appears to be great enough to prevent many schools from taking learning out of the classroom. The fear is so great that one of the biggest school teachers unions, the NASUWT (2003), specifically raised the point in its written submission to the 'Education Outside of the Classroom' inquiry (House of Commons Education and Skills Committee 2004-2005)

Barriers to children's use of green space outside of school

Research by Clements (2004) indicates that opportunities for play (outside of school) in the outdoors have significantly declined within a generation. By comparing the reports of over eight hundred mothers of their outdoor play experiences during childhood with the reports of their own children's experiences, Clements found a 39% reduction in the number of children who are able to play in the outdoors every day between the two generations. Only one third of modern day children were able to play outdoors each day. Though, again, one must be cautious of these findings as the researcher relied on the mothers self-report, many years after the events, of where they played and how often they were able to use certain spaces. Certain biases may also have been present; for instance the mothers may have romanticised or idealised their childhoods.

Children from all kinds of communities face barriers to the use of green space. Even children living in rural areas are restricted in their use of green space, despite the popular image of the rural idyll (Giddings and Yarwood 2005). Similarly lack of provision of or access to gardens or parks, severely limits the urban child's experience of green space. Children's often restricted opportunities to travel to different locations or to their friends, can prevent their use of green space (Giddings and Yarwood 2005). A review of research by

Lester and Maudsley (2006) indicates that children face increasing limitations on how far they are able to independently roam, thus further restricting their opportunities to use green space away from their homes. Class and ethnic background also appear to affect whether children have the ability to use green space. Several pieces of research indicate that in the UK children from lower social classes and ethnic minorities appear to have the least experience of green space, particularly that outside of their home environment (Travlou 2006).

A lack of adequate, safe and accessible outdoor green space also limits children's experience (Lester and Maudsley 2006). Even where there are such places, children report that they are severely restricted in how they can use the space. A survey of how children used their local parks found that 36% of the children reported that they were not allowed to climb trees, 45% were not allowed to play in or near water, 27% were not allowed to play on climbing equipment and 23% were not allowed to ride bikes or use skateboards (cited by Worpole 2003). However, this research focused solely on the children's perceptions, formal restrictions (i.e. those imposed by the local council) were not investigated.

Un-official adult regulation of green space also acts as a barrier to children's use of green space. A survey for the organisation the 'Children's Play Council' found that of the children surveyed, 50% reported having been shouted at for playing in the outdoors, and 32% of the children said that this had put them off playing outside. The children reported that they were told off for making too much noise or for being a nuisance (cited by Lester and Maudsley 2006). Older children and teenagers are often seen as a threat or a problem, particularly in urban green space, by both adults and younger children (Travlou 2006). Bell reports that they are often marginalised or even excluded from using certain green spaces (2003).

Fear is one of the main factors which prevent children using, exploring and playing in the natural world and green space; this fear can be both the child's and the parent's. Fear of traffic, the threat of abduction and risk of injury, are the main threats which both adults and children expressed in relation to outdoor play (Lester and Maudsley 2006).

Finally there is evidence of a gender bias in access to and use of the outdoors and greenspace (Humberstone 1993). In contrast to boys, who 'receive an experiential base of knowledge and understanding of the outdoors' (Nolan and Priest 1993 p15), girls, it has

been argued, are 'socialised away from the outdoors' (Neill 1997 p8). This results in a lack of knowledge and self-perceived competency which can act as barriers to their use of the outdoors.

2.13 Conclusion

This chapter has provided a general background to this present research. It was shown that current levels of physical activity, amongst children and young people, in Scotland are low, this is despite the benefits of physical activity to health and wellbeing. Recognition of the low levels of physical activity in Scotland have led to efforts to increase physical activity. One aspect of this effort is the promotion of green space as a context for physical activity. Green space has been shown to have a positive link with general health and wellbeing, with the cognitive and physical development of children, and has been shown to be a consistent and positive correlate of children's physical activity. Evidence suggests that green space is very important to children; children, of all ages, value the various opportunities green space and the wider natural world offers them. However they face many barriers to their use of such spaces. Perhaps by making an effort to circumvent a number of the barriers and by increasing children's opportunities to use green space, the result will be increased levels of enjoyable physical activity and, therefore, beneficial impacts to health and wellbeing.

3 Forest School

The purpose of the third chapter is to provide an introduction to the focus of this evaluation, Forest School. Its history, aims and practices are described, and this is followed by an examination of what is already known about the benefits of participation.

3.1 Forest School

The following sections describe Forest School in greater detail, focusing on the history of the programme, its status in the UK, and the general aims and practices.

3.1.1 The history of Forest School

Forest School and Forest School-like programmes appear to have developed independently in three locations; Scandinavia, Hungary and the United States of America.

The Hungarian Forest School movement began in the 1860s (Czippan Accessed October 2007), when schools for the treatment and teaching of children with respiratory illnesses were situated in forests. By the 1980s the practice was thought to be valuable as an educational approach in its own right. In 2002 various departments of the Hungarian government jointly backed a six year agenda supporting Forest School programmes. The stated intention was that every child in Hungary should have the chance to attend Forest School at some point in their schooling. The primary aim of the Hungarian Forest School programme is to develop environmental awareness and knowledge amongst participants. The literature regarding Hungarian Forest School also mentions the goal of the development of healthy lifestyles and 'community minded sensibilities' (Czippan Accessed October 2007).

In the USA a programme similar to Forest School developed in the early 1920s in northern Wisconsin as part of a re-forestation project. Schools were allowed to purchase tracts of land for re-forestation and the parcels of forest were known as 'school forests'. The intention was for the children to learn forestry and environment skills (Gilson-Pierce 1994). There are now some 346 school forests in Wisconsin (LEAF Accessed November 2007). The modern school forests are described as outdoor classrooms and used for a range of educational activities. The aims of the school forests moved away from purely forestry skills and are now similar to those of the Hungarian Forest Schools, with a strong emphasis on strengthening community relationships.

The type of Forest School currently run in the UK is generally said to have originated in Scandinavia (O'Brien 2009). The Scandinavian model itself originated in Sweden during the 1950s when a retired soldier taught children, through songs and games, about the natural environment in old railway carriages which were placed in forests and woodlands. By the 1980s the concept was adopted and further developed in the Danish early years education system. In Denmark Forest Schools are known as 'nature nurseries' and are just that; pre-school children attending a 'nature nursery' spend the majority, if not all, of their time (in all weathers, throughout the year) in a forest or woodland which is adjacent to the nursery building (Adhemar Accessed November 2007). The idea spread and currently nature nurseries and 'nature schools' (for primary aged children) can be found across Scandinavia and in Germany. In Denmark all county councils now have at least one or two nature nurseries (Adhemar Accessed November 2007).

3.1.2 Forest School in the UK

The concept of Forest School came to the UK after a team of nursery nurse students from Bridgewater College in Somerset visited Denmark on an educational trip in the mid 1990's (Bridgewater College Accessed June 2006). The students were impressed by the practice and apparent benefits of nature nurseries and on their return to the UK they developed the idea for use in the English Early Years setting (Borradaile 2006; O'Brien and Murray 2006). Initially the Forest School approach was used by Bridgewater College and other early years educational providers including outdoor education centres such as the Bishops Wood

Centre in Worcestershire (<http://worcestershire.whub.org.uk/home/wcc-edu-bishops-wood.htm>). The majority of these early Forest Schools were confined to the south west of England and South Wales. It appears that during this time the various providers of Forest School developed their approaches individually. However in 2002, after a seminar at Bishops Wood Centre a network of a number of the English Forest School practitioners was set up with the support of a Forest Education Initiative Coordinator (FEI) (the FEI is a partnership between a number of organisations which includes the Forestry Commission, The Tree Council, the Woodland Trust, the British Trust for Conservation Volunteers and the Field Studies Council (O'Brien and Murray 2006)) (Forestry Commission 2005); there are now individual networks for England, Scotland and Wales (www.foresteducation.org). The FEI network provided support materially and, in some cases, financially, to Forest School leaders. Parallel to the FEI network a number of other Forest School providers appear to have created their own informal networks; an instance of which is that associated with Archimedes Training (an organisation which provides Forest School leadership training in the north of England www.forestschoools.com).

Since the early 2000s the number of Forest School providers (both of Forest School leader training and of the educational programmes) has increased and Forest Schools are now (2009) found throughout the UK. Forest Schools are funded and run by a number of organisations; while some are privately run, others are supported by Local Education Authorities (LEA) or environmentally focused organisations and charities (including those discussed above). It is almost impossible to estimate how many Forest Schools are currently run in Britain (the difficulty stems from the fact that there is no central organisation or funding body responsible for Forest School) though as an indicator the FEI network states that over there are over 160 FEI qualified Forest School leaders in Scotland (suggesting that there may well be more leaders which are part of other networks) (Forest Education Initiative Accessed March 2009) and a recent publication suggests that there are currently (2009) around 120 functioning Forest School in the UK (O'Brien 2009).

Despite the range of organisations running Forest Schools there is a growing awareness of the approach. Numerous reports have been written about Forest School in publications such The Times (Gooding January 10th 2003) and The Guardian (Parsons April 20th 2006). Forest School is also making its way into the political sphere; questions have been asked about the promotion of Forest School in the Scottish Parliament (Scottish Government Written

Answers 16th March 2006 <http://www.scottish.parliament.uk/business/pqa/wa-06/wa0316.htm>). The English government included Forest School in its review of education outside of the classroom (House of Commons Education and Skills Committee 2004-2005) stating that they were 'particularly impressed by the (Danish) Forest Schools initiative' (p8). Learning Teaching Scotland also included Forest School as a case study of good practice in a document promoting learning in the outdoors (LTS 2007). The Scottish socialist party Solidarity included the pledge to support and promote Forest School in their manifesto for the 2007 Scottish elections, stating that 'Forest Schools can help our children and young people to achieve their full potential' (Solidarity 2007 p42).

3.1.3 The aims and practices of Forest School in the UK

As mentioned earlier there is no central overarching administration of Forest School in the UK. Instead a number of separate organisations are involved in the promotion and running of Forest Schools; this appears to have resulted in some variation in the stated aims and intended impacts between the different providers of Forest School.

The original aim of Forest School in the UK (the model used and promoted by the educators at Bridgewater College) was to provide a learning environment and curriculum which was tailored to the participant's learning style (Bridgewater College Accessed June 2006). It was intended that Forest School would provide an experience which would result in increased confidence, self-esteem and independence. This approach has been used by a number of other Forest School providers; for instance the aims of the Forest Schools run by the Green Light Trust are to 'focus on learning styles that maximise emotional, social and behavioural development' (Green Light Trust Accessed March 2009). Despite the fact that the use of the forest environment as a classroom is inherent to this approach, increasing the participant's appreciation of green spaces does not appear to be a key aim.

Forest School developed quite differently within the FEI network, and, although there is still a strong emphasis on psychological and social development, increasing interest in and respect for the natural environment and in particular the forest, is key. The FEI has stated that one of the primary aims of their Forest School approach is to 'increase the understanding and appreciation, particularly among young people, of the environmental,

social, and economic potential of trees, woodlands and forests' (Forest Education Initiative Accessed November 2007).

Other providers of Forest School have much broader aims, which encompass the psychological and social aims of the Bridgewater College approach as well as the more environment focused aims of the FEI Forest School network. The Archimedes Forest School approach is to 'encourage and inspire individuals of any age through positive outdoor experiences' (Archimedes Training Accessed May 20th 2008). The aim of which is to develop 'self-awareness, self-regulation, intrinsic motivation, empathy, good communication skills, independence, and a positive mental attitude, self-esteem and confidence'.

Just one of providers of Forest School appears to have any explicit focus on the potential for Forest School to provide physical activity. Gordon Woodall, one of the first users of the Forest School approach in the UK, now promotes Forest School with the following, 'at Forest School children are physically active a lot of the time and their stamina improves... their experience can also help lead to the development of healthier lifestyles as children ask parents to take them on trips to woodlands and greens spaces...' (The Forest School Training Co. Accessed March 2009).

Common aims

By drawing together the promotional literature from the major Forest School providers one can see that despite the differences there are a number of aims which are widespread; the basic aims of Forest School, which are common between the different providers (Archimedes Training Accessed May 20th 2008; Bishops Wood Centre Accessed December 10th 2005; Bridgewater College Accessed June 2006; Forest Schools East Accessed December 2005; O'Brien 2009; O'Brien and Murray 2006; The Forest School Training Co. Accessed March 2009), are:

- to provide the participants with the opportunity, freedom and responsibility to play and learn in a creative and imaginative way;

- to provide an alternative learning experience that is child initiated (and particularly suitable for those who find the classroom environment difficult and for kinaesthetic learners);
- for the learning experience to be fun and therefore to increase motivation and curiosity to learn;
- to increase the happiness of those who participate;
- to give the participant the opportunity to regularly experience the natural environment particularly that of woodlands and forests (provision of Forest School appears to be aimed at children who have little have little experience of the natural environment); and
- through the above aims to increase the self-esteem and self-confidence of the participants.

3.1.4 The Forest School experience

The following details general Forest School practices; where pertinent the practices of the specific Forest School, which this research focused upon, are described.

Despite Forest School having been introduced to the UK by nursery nurses, participants in the programme can be of any age (O'Brien and Murray 2006). However the majority of Forest School participants do appear to be children and young teenagers (typically between the ages of 4-13 years). While some Forest Schools are targeted at children who have particular educational, emotional or behavioural problems, the majority of participants are not selected for any such specific reason. Most participants attend through the involvement of their school (O'Brien 2009).

Typically around 12 participants will attend a Forest School session, though this number can be much larger (up to around 25, particularly when participants are older) or smaller (especially when the participants are selected to attend because of their behavioural, social or emotional difficulties) (Forest Schools East Accessed December 2005). The Forest School session will generally be led by a trained Forest School leader (Archimedes Training

Accessed May 20th 2008), and there will be a high ratio of adults to pupils; generally these are teachers, parents or other volunteers (O'Brien and Murray 2006).

In the case of the Forest School which was followed during this research whole classes of Primary five (aged 9-10 years old) and six (aged 10-11 years old) children (separately) attended Forest School through the involvement of their primary school. Typically there were around 25 children in each class. One or two Forestry Commission rangers (both of whom were trained Forest School leaders) led the sessions. In addition the class' teacher and one or two adult volunteers (generally parents) also attended; this resulted in an adult child ratio of around 1:6. The Forest School leaders worked in partnership with the teacher to decide upon the activities during the Forest School day, to maintain discipline and to ensure the safety of the participants.

The Forest School site will generally be as close to the school as possible. In some cases it will be close enough to walk to, while for others a short mini-bus trip is required. The site itself may be owned by the school, by the provider of Forest School or may be in other private or public ownership (O'Brien and Murray 2007). The characteristics of the forest or woodland are largely dependent on the geographical area and range from large broadleaf forests to small patches of mono-culture plantation. Some Forest School sites have fixed structures which are primarily used as a 'base' and to provide shelter (Forest Schools East Accessed December 2005). Other Forest Schools have no permanent structures and may erect tarpaulins if needed (Archimedes Training Accessed May 20th 2008). One feature common to almost all reports of Forest School practice is that there will be a small fire pit and a circle of seats, usually upturned logs or wooden benches, around the fire.

The site on which this Forest School, focused on during this research, took place was owned by the Forestry Commission and was a small piece of mixed broadleaf and conifer plantation surrounded by open scrub land, the remains of open strip mining and other larger and more mature forests. The woodland was approximately twenty to thirty years old. The site was just over one kilometre from the school and featured a semi-permanent 'base' constructed from tarpaulin and logs. In common with many Forest School's there was a fire area surrounded by logs for the children to sit upon.

In general participants attend Forest School for a minimum of six to twelve weeks. Any less is considered too short to experience the benefits (Forest Schools East Accessed December

2005). Some Forest School programmes run for a whole academic year. Participants attend for a half or whole day-, once a week or fortnight, whatever the weather (apart from in very high winds) or season (O'Brien and Murray 2006). The children are encouraged to wear appropriate clothing, and in the UK this tends to be waterproof and warm. In some areas, particularly those which are economically deprived, children may be loaned this clothing (Bishops Wood Centre Accessed December 10th 2005).

The children participating in this Forest School attended for six months in Primary year five and then for another six months in Primary year six; therefore by the end of their primary schooling the children would have attended Forest School, cumulatively, for a year. Forest School sessions took place once a fortnight for a whole school day (9am - 3:15pm).

Participants engage in a wide variety of different activities while at Forest School. In general the activities will have been devised by the leader prior to the session; in other cases activities will develop during the day and are often child-initiated. The content of each session will also vary according to the age and capabilities of the participants and by factors such as the site's characteristics and the weather on the day (Archimedes Training Accessed May 20th 2008). Throughout the promotional literature there is an emphasis on describing the tasks as being small and achievable and within the capabilities of each individual in the group (O'Brien 2009; The Forest School Training Co. Accessed March 2009). The activities are designed to develop both individual and team working skills. Some providers describe Forest School as education *in* the outdoors rather than education *about* the outdoors (O'Brien 2009); therefore more academic oriented activities, such as maths trails or science projects may be incorporated into sessions. Though not described as curriculum led, the activities 'intrinsically cover... many areas of the (English) National Curriculum Foundation to KS4 (Key Stage 4)' (Archimedes Training Accessed May 20th 2008) and, according to Borradaile, have the potential to 'contribute to both existing and proposed (Scottish) curriculum priorities' (2006 p15).

Typically during the first visit the group will walk the boundaries of the Forest School site and establish the codes of behaviour; this is often repeated throughout the programme, particularly after a break. The activities engaged in during a Forest School session include creating and lighting a fire and, depending on where the Forest School is, they may cook simple food on the fire (some Local Authority health and safety rules prohibit the eating of food not prepared in a certificated kitchen). Active games such as 'hide and seek' are

common to many Forest Schools. Many of the activities are creative, with participants being asked to fashion art works from materials they find in the woods. Some leaders devise activities that develop the observational skills of the participants, such as the surveillance of a particular area (for instance a stream bank) throughout the seasons. Another common feature to Forest Schools is the use of tools. Participants are encouraged to learn to use woodwork tools, such as bark strippers, simple saws, and loppers, in a safe and responsible way. By using tools and through some of the creative activities, the children often create something which they can take home with them. This, according to the Forest School literature, helps the parents engage in the child's experience of Forest School (Archimedes Training Accessed May 20th 2008; Bishops Wood Centre Accessed December 10th 2005; Forest Schools East Accessed December 2005; O'Brien 2009; O'Brien and Murray 2006).

The activities incorporated into the Forest School focused on during the present study were similar to those described above. Briefly, the session would begin with the children gathering in the base after the walk to the site. The leaders would then talk with children, describing the plans for the day. The rest of the Forest School day was structured around a morning break, lunch time and finally the walk back to the school. Between these points the children would play active games, be set a range of tasks (for example den construction or collecting materials for art projects) or learn new skills (including the use of woodwork tools, learning to measure the height of trees or identifying the flora and fauna around the site).

3.2 *What is known about the benefits of Forest School?*

There is a small body of literature which has focused on Forest School and the benefits it may have for participants. This literature, which consists mainly of evaluations, is reviewed in the following section.

Table 3-1 summarises the evaluation and other research literature relating to Forest School which was relevant to this present study. The studies were found through database, web and reference list searches and through contact with individuals and organisations involved with Forest School.

Table 3-1. Details of previous Forest School evaluation research or reviews.

Title and Author	Literature type	Focus of the research/evaluation	Methods, Age of Forest School participants (as reported in document) and location of research	Key findings
<p><i>Forest School Scotland: An evaluation</i> L Borradaile (2006)</p>	<p>Evaluation report for Forestry Commission Scotland and the Forest Education Initiative (unpublished)</p>	<p>Researched the ‘benefits of Forest School to the Scottish Governments educational priorities’ and ‘explored the benefits that Forest School could bring to Forestry Commission Scotland in a strategic and policy context’</p>	<p>Observation, interviews and self-evaluation and documentary evidence. Forest School observed involved children in Primary 4-7 Scotland</p>	<p>Forest School has ‘demonstrable, multiple, impacts’ to physical, social and emotional development, to their relationship and knowledge of the natural world, and to their health, attitude to learning, lifestyle choices and activity in the outdoors (Borradaile 2006 p42).</p>
<p><i>Forest Schools: Opportunities and challenges in Early Years</i> B Davis S Waite (2005)</p>	<p>Evaluation report based on a summary of work undertaken by undergraduate students and by a researcher at Plymouth University (unpublished) Research referred</p>	<p>The research focused on ‘self-esteem, children’s perspectives, language development, children’s learning in the outdoors and the role of the Forest School leader’</p>	<p>Observation, videotaping of Forest School , interviews, questionnaires, mapping and self-evaluation Reception and Year 1 children Devon</p>	<p>Forest School provides children with an enjoyable experience of education and provides a ‘myriad opportunities for rich experiential learning’ (Davis and Waite 2005 p25) May be of benefit to personal, social and emotional development, to the child’s knowledge and understand of the world, mathematical, physical and creative development and may have positive impacts on the child’s communication,</p>

	to in a paper by Davis et al. (2006)			language and literacy
<p><i>The Forest School Evaluation: An evaluation of the first three years of the Oxfordshire Forest School project</i></p> <p>G Eastwood H Mitchell (2003)</p>	Evaluation report (unpublished)	Evaluated the extent to which the stated aims of Forest School had been met.	Observation, interviews and documentary evidence Early Years Oxfordshire	Forest School 'has considerable benefits to offer children', in particular to linguistic and cognitive development, improvements to social skills and self-esteem (Eastwood and Mitchell 2003 p25)
<p><i>The benefits of a Forest School experience for children in their early years</i></p> <p>S Massey (2005)</p>	Research (unpublished)	Research into the experience of Forest School for a small group of 3-4 year olds and how that experience can contribute to the development of the child.	Questionnaires, interviews, observation and photography Early Years Worcestershire	Forest School can have a positive impact on personal, social, communication, and language development. Forest School also provides a 'safe risk taking environment' (Massey 2005 p9)

<p>Forest School Swansea Neath Port Talbot: An evaluation</p> <p><i>T Maynard</i></p> <p>(2003)</p>	<p>Evaluation Report for the City and County of Swansea Department of Education</p> <p>Also published papers (Maynard 2007a; Maynard 2007b)</p>	<p>Aim of the evaluation was to 'evaluate the impact and benefits of children's involvement in Forest School'</p>	<p>Interviews, observation, questionnaires, documentary evidence and standardised tests</p> <p>Reception class and a Special Teaching Facility</p> <p>Wales</p>	<p>Involvement in Forest School 'appeared to have apposite impact' on physical skills, confidence, disposition to learn and self esteem (Maynard 2003 p1). It may provide a different mode of learning to that of the classroom.</p>
<p>Forest School evaluation project</p> <p><i>R Murray</i></p> <p><i>L O'Brien</i></p> <p><i>Wales (2004)</i></p> <p><i>England (2005)</i></p>	<p>2 part evaluation (phase 1- Wales, phase 2- England) undertaken by the New Economics Foundation</p> <p>(unpublished)</p> <p>Reports published (O'Brien 2009; O'Brien and Murray 2006; O'Brien and Murray 2007)</p>	<p>Phase 1- developed self evaluation tools and researched link between Forest School and 6 positive outcomes</p> <p>Phase 2- aimed to explore whether and to what extent the benefits and impacts identified in phase1 could be observed in other settings. Also looked the efficacy of the self-evaluation kit developed in phase one.</p>	<p>Phase 1-</p> <p>Questionnaires and self- evaluation</p> <p>Selected children (who were identified as vulnerable) from two schools</p> <p>Nursery to year 7</p> <p>Wales</p> <p>Phase2-</p> <p>'Self-Appraisal' methods</p>	<p>Participation in Forest School may have possible positive educational, social, psychological, developmental and physical impacts.</p> <p>Positive changes to behaviour which 'could be attributed to...involvement in Forest School' (O'Brien and Murray 2006 p4)</p>

			Age 3-9 years Southern England	
<i>Self-esteem and successful interaction as part of the Forest School project</i> <i>N Swarbrick et al. (2004)</i>	Published article in the journal Support for Learning	Review of Forest School practice and some evidence (unpublished and very little detail) relating to self-esteem and interaction	Not Applicable	Forest School provides a positive and enjoyable experience of education, which 'could have far reaching effects on the success of the education system' (Swarbrick, et al. 2004 p146)

All the studies were recent, with the earliest dating from 2003 and all took place in the UK though the majority are from England and Wales. Most of the evaluations appear to be commissioned and funded by the organisations funding Forest School (though some do not explicitly state where the funding came from). The funders include the City and County of Swansea Department of Education (Maynard 2003), the Forest Education Initiative (the FEI) (Davis, et al. 2006; Davis and Waite 2005), the Forestry Commission (Murray 2004; Murray and O'Brien 2005) and Forestry Commission Scotland (Borradaile 2006).

Only four of the studies have been published in (or mentioned in papers published in) peer reviewed journals (Davis, et al. 2006; Maynard 2007a; O'Brien 2009; O'Brien and Murray 2007; Swarbrick, et al. 2004). The other six evaluation reports are unpublished.

3.2.1 The aims and methods of the previous research into Forest School

The aims of the evaluations were broadly similar. The following were common to all of the evaluations: to evaluate the process of Forest School; to evaluate the impacts and outcomes of participation; and to assess the contribution Forest School could have to educational and environmental policy and practice. For instance Maynard's (2003 p6) aims were to 'evaluate the impact and benefits of involvement in Forest School in relation to young children's learning and development'. Borradaile's (2006 p3) aims included 'exploring the benefits Forest School can bring to Forestry Commission Scotland in a strategic and policy context'.

The evaluators focused, predominantly, on evaluating Forest School against a broad range of educational, social, behavioural, psychological and emotional outcomes. The contribution of Forest School to key areas of relevant educational curricula was also assessed (Borradaile 2006; Davis and Waite 2005; Eastwood and Mitchell 2003; Massey 2005; Maynard 2003; Murray 2004)

Physical development outcomes were not assessed by many of the studies despite being one of the six key areas of the English Stage curriculum (DfES 2000). Only two studies explicitly focused on physical activity and physical skills development (Maynard 2003; Murray and O'Brien 2005). The second Murray evaluation aimed to assess whether motor skills improved. While for Maynard (2003) physical activity *was* a key aspect of the evaluation,

she states that the intention was to assess the participants' levels of physical activity during Forest School sessions and to evaluate whether participation in Forest School resulted in any behavioural change.

All the studies described, to some degree, the methods used, though some have more detail than others. Typically there is little information regarding the actual methods employed, how they were used and on whom. It is therefore difficult to assess how rigorous the data collection was and, as a result, how reliable the results are. Only Maynard (2003) used any kind of control during the evaluation.

The research methods used by the evaluators were predominantly qualitative. Typically the children, parents, teachers, and Forest School workers were interviewed by the evaluators. Maynard (2003) and Borradaile (2006) also interviewed educational specialists. Questionnaires, sent to parents, were also used in a number of the evaluations (Borradaile 2006; Davis and Waite 2005; Massey 2005; Maynard 2003; Murray 2004); there is little detail as to what the questions were. All the evaluators reported using various observational methods.

Only Maynard and her team of evaluators (2003) used (and described) identifiably quantitative methods. Using standardised tests various aspects of the children's educational development were tested before and after participation. The personal and social development of the participants (2003 p61) was also quantitatively assessed before and after participation in the programme using a 42 point questionnaire with scaled responses.

Maynard was also the only evaluator to formally assess the 'physical activity patterns and changes in levels of activity... following an outdoor programme [Forest School]' using quantitative methods. This section of the evaluation was described as a pilot study (2003 p46). Three different measures were used to assess the activity: firstly, heart rate was recorded using 'short range telemetry' (p47), secondly, a uni-directional accelerometer (a device used to measure acceleration, similar to a pedometer but somewhat more sensitive and can measure movement on a number of plains, see section 5.1.5 for description) assessed the amount of activity, and, thirdly, 24 hour recall interviews were used to assess changes in habitual physical activity. The researcher measured five children's (aged four to five years) physical activity (using the heart rate monitor and the accelerometer) over three separate measurement periods; the first measurement period acted as a baseline and

occurred during a normal school week, the second measurement period took place during a Forest School session and the third during a normal school week after completion of the Forest School programme. The children's habitual activity was assessed, using the 24 hour recall interview, once before the programme and then once after. It is not clear how many children participated in the 24 hour recall interviews (though it could be up to nine as they report that between five and nine children were assessed 'depending on the technique of data acquisition' (2003 p46)). There is no information regarding the time of the year at which each measurement took place.

3.2.2 The findings of the previous evaluations of Forest School

The discussion of the findings of the previous evaluations of Forest School will be split into three broad sections. The sections relate to the major findings which are of most relevance to the present study:

- Findings relating to the educational impacts and outcomes of participating in Forest School;
- Findings relating to the impact of participation in Forest School on self-esteem, self-confidence, self-belief and behaviour; and
- Findings relating to physical activity and motor development

Findings relating to the educational impacts and outcomes of participating in Forest School

All the evaluations concluded that Forest School had a positive impact on the communication and language skills of the participants. Maynard found that the children appeared to communicate more confidently and that their vocabulary had developed (2003 p20). Testing before and after participation in a Forest School programme showed that the children's length of utterances had increased when compared with the length before participation. This result must surely be treated with caution as the evaluators themselves

warn that 'whilst they [the changes] may be attributable to the Forest School experience, they might equally be the result of growing experience over time, other classroom teaching and the fact that they had already practised the tasks which acted as measures' (McDougall, et al. 2003 p41). A similar point was made by O'Brien and Murray (2006) who argued that is difficult to attribute particular improvements in learning and development, as well as other wider impacts to self-esteem or confidence, to Forest School, as 'the child may have improved anyway through natural development as they grew' (p44).

Davis and Waite found that the interactions between adult and child, where there was 'no adult agenda', appeared to have resulted in 'considerable...language benefits' (2005 p19). This conclusion appears to have been based solely on informal observation; no formal testing had taken place. They do, however, state in their conclusions that their findings are exploratory and therefore 'no definitive claims can be made'. Borradaile found that an outcome of Forest School was that participants developed 'more sophisticated uses of both written and spoken language, prompted by visual and other sensory experiences of participating in Forest School' (2006 p14). Again this conclusion appears to have been based solely on informal observation and anecdotal evidence.

Perhaps because of the age of the majority of the participants (most were below six years old) there are relatively few findings which related to specific educational gains. However, a number of the evaluations did conclude that participation in Forest School *could* benefit a range of educational factors. It was concluded in the first phase of the Murray evaluation (2004) that specific Forest School activities could be linked to the curriculum and this could increase the skills and knowledge of the participants. A teacher, who was interviewed by Eastwood and Mitchell, observed that 'some children use numbers better outdoors' (2003 p15). As this quote from Borradaile shows, Forest School leaders often build more 'formal' educational experiences into sessions which may be of benefit, '*we used the building of a willow hut to impress upon the children the use of maths in the field. We measured the circumference and diameter of our hut and calculated how many willow stems we would require if we planted at 200cm [sic] intervals*' (2006 p19).

Several of the evaluators concluded that the practical learning environment had a positive effect on a range of outcomes. Eastwood and Mitchell found that for older children 'the opportunity to engage in practical work in an outdoor learning environment allows these children to benefit from experiences they may have previously missed out on' (2003 p21). In

Davis and Waite's opinion Forest School represented a rich alternative learning environment to the school and classroom (2005 p18). Maynard (2003) took the analysis further by arguing that the Forest School approach had particularly positive impacts on those who are 'kinaesthetic learners'; kinaesthetic learners learn through experiences that emphasise 'doing', through physical involvement and manipulation of objects (Tanner and Allen 2004). She argued that 'providing experiences favouring kinaesthetic learners would at least balance out the approach adopted in most schools which tends to favour predominantly visual and auditory learners' (Maynard 2003 p17). An interview quote from a participant in Eastwood and Mitchell's study (2003 p20) supports Maynard's argument: '*it is particularly powerful for those children who find a classroom environment difficult to manage*', this interviewee, a teacher, also observed that for these struggling children the Forest School experience had resulted in '*raised self-esteem and a more positive attitude towards learning*'. Several of the evaluators concluded that the nature of Forest School experience allows the participants to initiate their 'own learning' (Eastwood and Mitchell 2003; O'Brien and Murray 2006). The children were motivated to learn and proactively seek out new learning experiences (O'Brien and Murray 2006). Again it must be noted that the majority of these findings appear to have been based on conjecture regarding the benefits of Forest School, or on 'untested' observations.

Findings relating to impact of participation in Forest School on self-esteem, self-confidence, self-belief and behaviour

The majority of the evaluators concluded that Forest School had a positive impact on the self-esteem, self-confidence and self-belief of the participants. One of the inherent aspects of Forest School is that the participants have a level of independence that they otherwise may not experience in the 'normal' school environment. The participants are allowed to explore, to be out of the sight of adults for prolonged periods of time, and, especially when the participants are older, are trusted to use wood-working tools and to use them away from the close supervision of adults. This independence and trust, according to many of the evaluators, had a positive effect on the self-esteem and the self-belief of the participants, though the evidence to back up these assertions seems to be predominantly anecdotal (Massey 2005; Murray 2004; Murray and O'Brien 2005; Swarbrick, et al. 2004). Murray and

O'Brien (2006) argued that the balance between the freedom the children were given and the strict routines for safe behaviour allowed the children to develop responsible independence and this has positive impact for self-confidence. Eastwood and Mitchell (2003) noted that the regular and sustained nature of participation in Forest School also had a positive effect on building self-confidence. Other evaluators attributed the perceived increase in self-esteem to the types of tasks the children undertook. Swarbrick et al. (2004), for example, argued that the self-esteem of the participants can improve through the completion of the small achievable tasks that they are set at Forest School. A number of the evaluators (Davis and Waite 2005; Eastwood and Mitchell 2003; Murray and O'Brien 2005) concluded that the participants enjoyed the experience of Forest School; and enjoyment of a learning experience can improve motivation to learn and tackle negative attitudes to learning in a wider context. They argued that this in turn increases the self-esteem and self-belief of the participants.

However a note of caution is sounded by Maynard (2003; 2007a). Her evaluation found no measurable change to the self-esteem or self-confidence of the participants, despite the Forest School workers observing that Forest School had had a 'profound' effect on the children, that they were 'happier, more confident, more alive' (p17). In contrast to the Forest School workers, the teachers, in Maynard's study, did not observe such impacts and felt that, although the children were happy at Forest School, they were also happy in the classroom. While she notes that self-esteem is especially difficult to measure in children and is 'a slow changing trait', it highlights the 'limitation of relying on impressions of different groups of individuals who may be influenced by their feelings about Forest School' (p18). A further argument should be made at this point regarding the design of many of the evaluations reviewed here: much of the 'evidence' and 'findings' presented in these evaluations should really be described as conjectural discussion of the potential benefits of Forest School and the types of activities undertaken. None of the studies had research designs which were rigorous enough to draw *causal* conclusions from the results. The majority rely on informal observational methods, interviews and anecdotal evidence. Without the use of controlled trials of one kind or another, it is very difficult, if not impossible, to produce reliable evidence as to the efficacy of the programme being evaluated, nor is it really possible to find causal relationships between the programme and the outcomes and impacts (Brown, et al. 2003a). Most of the evaluators recognise these

points and suggest, as Maynard does, that the 'findings are indicative', rather than statements of fact, and they should, therefore, 'be treated with some caution' (2003 p1).

Eastwood and Mitchell (2003) found across the Forest Schools they evaluated that the behaviour of the participants had been perceived, by the teachers and Forest School workers, to have improved or that behavioural issues were less of a problem in the outdoors. They quoted a Forest School worker: *'the other thing that is being fed back to us is the benefits in terms of improved behaviour that are witnessed actually during the Forest School sessions themselves don't stop when the children go back into the school. That better behaviour... gets taken back into school'* (p20). Conversely both Davis and Waite (2005) and Maynard (2003) found that reports of behaviour change were not always positive. A teacher in Maynard's evaluation reported that during Forest School there were some instances of 'negative' behaviour amongst the children from the special teaching facility (2003 p21). Davis and Waite report that the school teachers felt that the behaviour of the children had tended to deteriorate rather than improve. However this decline in behaviour had not been observed in the classroom, leading to the teacher questioning whether it was her expectations that were unrealistic. Specifically she noted that good behaviour in class is demonstrated by sitting still and listening, somewhat different to the expectations of behaviour at Forest School. At Forest School children are encouraged to take an active role in their learning, to be inquisitive, independent and adventurous.

Findings relating to physical activity and motor development

As discussed previously evaluating the physical activity and possible physical development that results from participation in Forest School was a not a high priority for most of the evaluators. As this is the key area of interest for this review each of the evaluations which had any focus on physical activity will be examined in turn.

Borradaile (2006) observed that the children participating in Forest School, were 'active a lot of time' (p25). She states that the children were physically active, on average 'for over 75% of time... walking, running, standing, bending, stretching, pulling, jumping' (p36). She also states that motor skills and stamina visibly improved over time (p25). There is, however, apparently no rigorous evidence to back up these statements. The finding that the

participants were physically active for 75% of the time was arrived at through 'observation'. Yet there is no mention of structured observation in her methods section. Nor is there any indication that the perceived improvement to stamina or motor skills is any more than conjecture.

Similarly Murray and O'Brien (2005) mentioned motor skills and stamina. They argue that 'Forest School is a place where... there are challenges to physicality, children handle tools, objects and use equipment' and this results in, 'an improved and increased use of motor skills, naturally the children improve their balance, and through physical activity, develop their stamina... they get to make use of gross and fine motor skills' (p50). They argued that the type of tasks that the children undertake and the repeated nature of Forest School allow the children to develop their motor skills. Fine motor skills are, they argued, developed through the use of tools and gross motor skills are developed by the terrain of Forest School and through activities such as climbing trees. Stamina is developed, they argue, through children having to walk to and from the site. Murray and O'Brien refer to observational evidence to support these points. However the evidence used to support these claims appears to be based on the perceptions of the observer and is somewhat anecdotal. There is no indication that the observation was standardised or that the observer was qualified to assess whether there was an improvement to motor skills. Nor is there any justification for the statement that any observed improvement in motor skills was attributable to participation in Forest School.

Davis and Waite (2005) concluded that Forest School does contribute to the 'physical development' aspect of the English Foundation Stage curriculum. They support this with the observation that the children were very active and practiced jumping and climbing. They also observed the children using tools and materials. Both parents and school staff ranked 'exercise' as the most important benefit of participation in Forest School. As with the previous two evaluations, the evidence used in Davis and Waite's evaluation appears to be solely observational and anecdotal.

The evaluation by Maynard (2003) had a greater focus on physical activity than the others. Similarly to Davis and Waite's (2005) conclusions, she noted that the teachers 'highlighted physical skills as the most significant area of improvement' (Maynard 2003 p18). The teachers had observed that the pre-school children had improved coordination, stamina and

strength. The reception class teacher thought that the children seemed more confident in PE classes and she appeared to attribute this confidence to participation in Forest School.

The results of the 24 hour recall showed that the children reported a decrease in inactivity and an increase in fast-moving activity during the active periods of school days and on weekend days after participation in Forest School. The authors concluded that 'the major finding from the pilot data was that the outdoor education programme tended to have a positive effect on the amount of self-reported fast moving and slow moving exercise' (Kingsley and Dietzig 2003 p53). The heart rate monitoring results showed that the children's heart rate was similar on Forest School days to active school days but that it was higher than on inactive school days. They found that the intensity of the physical activity was intermittent and that the children sustained physical activity at a moderate or vigorous intensity for only short periods of time. The majority of the physical activity on the Forest School day was of a low intensity. The results of the accelerometer measurement (which they converted into average energy expenditure) showed that the average energy expenditure of the Forest School day was similar to that of the other two day types. The researchers did not subject their findings to any statistical testing (perhaps because the sample size was small and this was described as a pilot study) so it is impossible to say whether any of these results are significant.

The results should however, as Maynard suggests, be treated with caution. The sample size was very small; five participants took part in the study which used the heart rate monitors and accelerometers and up to nine were questioned regarding their physical activity habits. There were no repeated measurements of the activity (week one acted as a baseline); the lack of repeated measures increases the risk that the variability in the findings could be due to external sources (such as the weather or unrepresentative types or amounts of activities engaged in). The authors do note that 'confounding variables... may have contributed to this change' (Kingsley and Dietzig 2003 p53). While the researchers appear to attribute Forest School with having 'a positive effect on the amount of self-reported fast moving and slow moving exercise' (Kingsley and Dietzig 2003 p53), it is difficult to attribute with any confidence, the increase in self-reported activity to Forest School with such a small sample and without the use of a more rigorous design (for instance the inclusion of a control group against which to compare findings). In addition the methods used to ascertain the participant's habitual activity (24 hour recall interviews of the children) should be

questioned. While self-report is one of the commonest ways to assess habitual physical activity, there are questions as to its suitability of use with children. Children may not have adequate cognitive function to recall the intensity, frequency and duration of activities (Sallis and Saelens 2000). Furthermore children's activity is often sporadic and done in short bursts making it difficult to categorize and quantify (Ott, et al. 2000; Sirard and Pate 2001; Welk, et al. 2000). A meta analysis of the suitability and performance of physical activity measurement devices by Kohl et al. (2000) suggested that self-report measures should not be used on children under the age of 10.

3.3 *Conclusions*

In conclusion it is apparent that although a number of previous evaluations of Forest School have been carried out, there is little reliable evidence as to the potential health and wellbeing impacts of participation in the programme Forest School. Furthermore, many of the conclusions which have been drawn should be treated with some caution.

It is therefore concluded that further evaluation of Forest School is justified, particularly an evaluation which uses rigorous and appropriate methods to produce reliable evidence. This is further developed in the following chapter.

4 The research aims, focuses and design

The following chapter discusses the focus of the research, the aims and the research design used during this evaluation. Specific relevant topics, such as evaluation and mixed method research designs are described. The chapter begins with an explanation of the background to this research.

4.1 *Background to this research*

4.1.1 Motivation of the funders

The primary motivation of the two organisations funding this research, the Forestry Commission and the Central Scotland Forest Trust, was to contribute to the evidence base which focuses on the potential benefits of the natural environment to human health and well being. In particular both organisations were interested in the potential impacts of trees, woods and forests.

The Forestry Commission recently stated that it and ‘the entire forest sector can make a positive contribution to the health agenda’ (2007 p3). The Forestry Commission’s responsibility to use its resources to improve the health and wellbeing are detailed in its strategy documents (DEFRA 2007); a specific objective of which is to ‘make it easier for people to use and enjoy woodlands particularly in ways that benefit their physical and mental health’ (p13). Similarly the Central Scotland Forest Trust has a specific aim that, through its development and promotion of the Central Scotland Forest, it should ‘promote healthy living and deliver health improvement programmes’ (Accessed March 2009). Both organisations have a particular focus on encouraging the use of woodlands for physical activity.

4.1.2 Researcher's personal motivation

The researcher has long had a specific desire to spend time in the natural environment, from her early years playing in woods and on moors close to her home, to adulthood, much of which has been spent walking in the Yorkshire Dales, the Grampian Mountains or on the South Downs. Despite this she focused on people and society during her early academic experience, completing a degree in sociology from Aberdeen University; however where possible the author focused on relationships between the environment and society, for example she chose to write her dissertation on rural community in North Yorkshire after the Foot and Mouth crisis. After the completion of the degree the interest in the natural environment re-asserted itself and the author spent a year working voluntarily as a forester for the National Trust. Finding a way to combine the two interests became increasingly important; the PhD proposal, originally titled, 'Forests, Trees and Human Health and Wellbeing' provided an ideal opportunity.

4.1.3 Relationship of the funders to the research

The funders of this study, the Forestry Commission Scotland and the Central Scotland Forest Trust, made no demands as to the focus of this evaluation or the way in which it was conducted. Meetings were held between the researcher and the funders in the early stages of the research to discuss what the funders hoped for; however the decisions as to the focus of the study and the methods used were solely in the hands of the researcher. It is also important to stress that the funders made no demands as to the 'usability' of the evaluation and its potential findings; the researcher was not obliged to modify or curtail her research interests to fit the expectations of the funders. However, in retrospect, the researcher is aware of her own concerns that the evaluation should have been 'usable' and relevant to the two funding organisations, and, perhaps, to the wider Forest School community. Despite this the researcher does not consider that these (personal) concerns affected, in any adverse way, the direction, focus or specifics of this research.

Although the Forestry Commission and the Central Scotland Forest Trust have a vested interest in Forest School (both, as partners in the Forest Education Initiative network, are

involved in funding and providing leaders for Forest Schools), the organisations in no way influenced this evaluation, exerted any pressure to study Forest School, or to use methods which would be more likely to result in positive findings. Representatives from the funding organisations did not attend supervisory meetings during which decisions as to the direction of the study were taken.

During the study the researcher reported regularly to the funders of the research. A formal approach was taken with the Central Scotland Trust; approximately twice yearly a short written report was prepared which updated the Trust as to the progress of the research. Perhaps due to a closer relationship between the researcher and members of the Forestry Commission, a less formal approach was taken to keep the organisation up to date with the study; the researcher verbally updated Forestry Commission contacts regularly during the research. Several presentations of the results of the research were made to both organisations. The researcher has also presented the results on behalf of the two organisations at conferences, workshops and seminars and has submitted written reports for internal and external publications.

4.2 *Selection of the programme for evaluation*

As was stated previously, despite the point that the general focus of the evaluation was determined by the funders, all decisions regarding the selection of the programme and design of the research were under the control of the researcher. To aid the selection of programme, a set of criteria that the programme should fulfil was established by the researcher:

- the programme had to explicitly use or take place in forests, woodlands or at the very least the natural environment. The greater importance of forests, woodlands or trees to the programme the better;
- the programme should promote the use and enjoyment of trees, forests and the natural environment;
- there should be some potential for improvement to health and wellbeing resulting from participation in the programme; and

- the programme should, ideally, have not been previously evaluated; however if it had, the focus should not have been on the health benefits.

Four months, in the earliest stages of the PhD, were devoted to exploratory work. The aim of this was to locate and review the various programmes taking place in the UK which fulfilled the above criteria. A basic understanding of the range of programmes in the UK was developed through online searches and through consultations with a number of individuals and organisations. Programmes of interest were then researched further. The researcher also either attended the programme or met with the leader, funder or provider of each programme. The programmes included community conservation work in the local environment, GP-prescribed walking groups and an award scheme that promoted understanding and involvement in the natural world.

The majority of the programmes which were identified focused on involvement in the environment in its broadest sense; the actual environmental context could be any type of natural (or in some cases urban) environment. It was determined that these programmes did not sufficiently fulfil the criteria; specifically, they lacked the focus on the particular context of forests, woodlands or trees, or had been or were currently subjects of health focused evaluations. Therefore these programmes were rejected. However this exploratory work was useful in that it highlighted current interest in the benefits of nature, green space and the natural environment to human health and wellbeing, meaning that this evaluation would be relevant to those who organised and funded these types of programmes as well as to the wider research community.

Following further research and discussion with an Educational Policy Advisor at the Scottish Forestry Commission, a programme was identified which fulfilled all aspects of the criteria: Forest School. The researcher spent some time attending Forest Schools (two in Scotland, one in England) and consulting with Forest School providers and users, the researcher also attended Forest School promotional events, introductory training workshops and a conference. One particular Forest School (which became the subject of this evaluation) was attended regularly for twelve months. This exploratory work gave the researcher a good grounding in Forest School, its aims, ethos and practices.

4.2.1 Justifying the selection of Forest School

Forest School fulfilled the majority of the stated criteria for the selection of a programme. As the name suggest, it takes place in woodlands or forests and one of the key aims of the much of the Forest School movement is to promote enjoyment of the natural world.

Although Forest School's stated aims (see section 3.1.3) are not specifically to improve the health of those who participate there are a number of ways that Forest School may affect the health and wellbeing of participants. These (hypothetical) impacts include the following:

- the time spent in a relatively green and natural environment may, as previous research has suggested, have benefited the participants' mental health and wellbeing (Health Council of the Netherlands 2004);
- a number of the previous evaluations of Forest School indicated that children's self-esteem, self-confidence and self-belief increased after attendance at Forest School, this may also have an overall impact on mental health and wellbeing;
- previous research on Forest School suggests that children have an increased interest in learning and this may benefit their mental health (Eastwood and Mitchell 2003);
- play in a natural environment may help develop crucial motor skills (Fjørtoft 2004); and
- it was observed that participants appeared to be active for much of the time they were at Forest School, it was hypothesised that Forest School may therefore result in an increase in the quantity of physical activity.

There was also current political interest in improving children's opportunities for outdoor education which further justified the time and expense of an evaluation. The English government, during a recent inquiry into education out of the classroom, stated, 'the committee has become convinced of the value of education outside the classroom,' and therefore all students should 'have the right to outdoor learning' (House of Commons Education and Skills Committee 2004-2005 p3-4); the authors of the report state that they were particularly impressed by the (Danish) Forest School model. Furthermore the Scottish

programme 'Outdoor Connections' (supported by Learning Teaching Scotland <http://www.ltscotland.org.uk/takinglearningoutdoors/about/outdoorconnections/index.asp> accessed March 2008) aims to conduct, support and promote research into ways of improving the quality of education out of the classroom.

4.2.2 What aspect of Forest School to evaluate?

Regular attendance at a Forest School in Scotland convinced the researcher that one of the most direct and evaluable ways in which Forest School could be of benefit to the health of the participants was through the provision of the opportunity to be physically active. Informal observations also indicated that the quantity and intensity of the participants' physical activity were likely to be quite high; furthermore the participants took part in a range of physical activity types. Finally the participants appeared to greatly enjoy Forest School and the physical activity.

The review of the existing evaluations of Forest School in the UK (detailed in chapter 3) showed that there had been no substantial investigation of the amounts and patterns of physical activity or of the participants' perceptions. While levels of physical activity at Forest School were briefly mentioned in a number of the evaluations (Borradaile 2006; Davis and Waite 2005; Murray and O'Brien 2005) only one study had focused on physical activity at Forest School and this part of the evaluation was described as a pilot study (Maynard 2003 p46).

The promotion of physical activity, as discussed in the background chapter, is one of the key strategies of many western government's attempts to improve public health and wellbeing. The Scottish Government has a particular aim of increasing children's levels of physical activity (2003). Official bodies who manage the UK's natural resources, including the Scottish Forestry Commission, are also actively involved in the promotion of greater levels of physical activity amongst children (Countryside Agency, et al. 2005). Although there is still uncertainty regarding the actual health benefits of physical activity for children, the current literature indicates that there are justifiable reasons why enjoyable physical activity should be promoted to improve children's health and well being (Boreham and Riddoch 2001).

For the reasons outlined above, firstly, the lack of research on physical activity at Forest School, secondly, the apparently highly physically active nature of Forest School and, thirdly, the current interest in the promotion of children's physical activity, the decision was taken that this evaluation would focus on the physical activity which results from participation in Forest School

4.3 *The specific aims of this research*

The specific aims of this research were to understand whether participants at Forest School were physically active; what amount of physical activity resulted from participation, how intensive was the physical activity and was it a greater amount than they would otherwise do? A further aim of the research was to try to understand participants' perceptions of Forest School and in particular to focus on their experiences of the physical activity in the natural environment; questions of interest included, was Forest School enjoyable, did the girls and boys experience it equally and what impact did the natural environment have on their experiences? The final aim of this research was to try to begin to evaluate whether Forest School may have any longer term impacts on the participants' perceptions of physical activity and green spaces. There was also an emphasis on attempting to make the evaluation as rigorous and effective as possible.

The justification for the breadth of these specific aims is that while it is useful and valuable to evaluate the amount, frequency and intensity of physical activity at Forest School it is the author's belief that one should attempt to understand the 'whole picture'. Assessing only those aspects of physical activity mentioned previously would not have provided as holistic an evaluation as could have been achieved. Equally important are the participant's *experiences* of the physical activity; on the most basic level the activity maybe enjoyable or it may be disliked, it might be easy or it may be hard. Furthermore the experience of physical activity at Forest School is framed against the participant's experience of physical activity in other contexts; it is contextualised by their age, gender and status (e.g. as pupils). It is necessary to understand these factors to fully evaluate the physical activity which results from participation in Forest School; to be able to draw conclusions as to the value of Forest School in providing an experience of physical activity and its potential as a tool for

increasing the quantity, intensity and frequency of enjoyable physical activity for children in Scotland.

4.4 *The research questions*

Four research questions were developed; these were informed by the exploratory work and by an understanding of the current literature of both Forest School and children's physical activity (the questions are not in order of importance; rather they should be seen as specifying the elements of the overall evaluation):

1. What are the amounts, patterns and intensities of the children's physical activity during Forest School sessions?
2. How do the amounts, patterns and intensities of the physical activity during Forest School sessions compare to those during typical school days?
3. How do the children perceive of Forest School and more specifically the physical activity they engaged in during the Forest School sessions?
4. Does Forest School have any particular value as a source of school based physical activity?

4.5 *The design*

The present study is an evaluation; evaluation research is the process of systematically collecting, analysing and interpreting information about programmes, practices and policies (Rossi and Freeman 1993 p.23). The need for efficiency, cost-effectiveness and, above all, the need to know 'what works' drives the practice of evaluation. Evaluation research is distinct from social research as the 'purpose' of the study is not just to gain new knowledge or insight to the subject; rather it is to provide information from which one can ascribe a 'value judgement'. One can describe evaluation as *applied* social research (Rossi 2004; Weiss 2004).

An implicit aspect of evaluation is the instrumental use of the work, the aim being to aid decision makers decisions (Rootman, et al. 2001).

The evaluation of social interventions, programmes and policies is crucial for a number of reasons. As Macintyre and Petticrew (2000a) pointed out, there is a misconception that a well meaning intervention does not have the capacity to do harm. They cite the example of a bicycle safety education programme an evaluation of which showed no evidence of injury reduction and in fact suggested the programme may have *increased* injury rates (Carlin, et al. 1998). Programmes must also be evaluated systematically and effectively. It is not adequate to base decisions on 'common sense'. What seems 'obvious' or 'plausible' often has unintended or unanticipated consequences (Macintyre and Petticrew 2000b). Finally, Macintyre and Petticrew argued that it is not enough to know merely whether the programme 'works'. They argue that it is necessary to evaluate how much good the programme does, how the programme has produced the outcomes and who experienced what outcomes. This deeper evaluation of the programmes is critical as decisions are usually made on factors further than basic effectiveness.

Evaluation is characterised by the plurality of conceptual outlook and methodological approach. Ovretveit (1998) suggested that each evaluation is different and therefore there are literally hundreds of different forms of evaluation practice and methodological approach. This plurality of approach, in both design and methods used means that is justifiable to select methods in order to tailor the evaluation to the programme and its context. Indeed it is crucial for the evaluation to be tailored to the programme for the value judgements to be valid and useful. As Rossi and Freeman commented 'the tasks that evaluators undertake depend on the stage of activity at which they are brought in and the needs and interests of such stakeholders as policymakers, programme managers and funding groups. Furthermore, evaluations vary according to whether the programme is new or innovative, an established programme being evaluated, or a programme that is in place being fine tuned'(1993 p105). A considerable number of factors must be considered when deciding on the particular evaluation design.

Evaluation research allows the researcher to draw from a wide range of designs. The choice is limited by the needs and wants of the funders and the situation and circumstances of the evaluator and the programme. Reflecting on this studies research questions it became clear that no single research method or approach would provide an adequate or accurate way of

answering the research questions of this evaluation. It was apparent that in order to make this evaluation both rigorous and effective, a range of methods would have to be utilised. Furthermore it was evident that methods would have to be drawn from the two dominant paradigms that are found in research into human and social phenomena.

4.6 Mixed method designs

Within the world of social research there is an identifiable split in the traditional approaches to research. Bryman (2001) argued that beliefs regarding epistemology (meaning the methods used for the acquisition of knowledge), ontological considerations (concerning the nature of reality), and the relationship between theory and research, have created ‘two distinctive clusters’ of research strategy. The two clusters are popularly and simplistically known as quantitative and qualitative, and advocates of either approach have ‘engaged in ardent dispute’ as to their application and worth for over a century (Johnson and Onwuegbuzie 2004). The basic differences between the quantitative and qualitative research approaches are summarised in Table 4-1.

Table 4-1. The basic differences between quantitative and qualitative research approaches.

	Quantitative	Qualitative
Principle orientation to the role of theory in relation to research	Deductive: testing of theory	Inductive: generation of theory
Epistemological orientation	Natural science model, in particular positivism	Interpretivism
Ontological orientation	Objectivism	Constructivism

From (Bryman 2001 p20)

It is worth noting that the differences highlighted in Table 4.1 are general and are not universal. However as Casebeer and Verhoef (1997) noted, despite it being somewhat naive to highlight the differences between the two approaches in such a simplistic manner, it is useful for understanding the definitions and divisions.

A purely quantitative approach to the research of human phenomena is based on an understanding of the social world as an external reality, that there is one truth, which is an objective reality (Sale, et al. 2002). Quantitative researchers argue that social phenomena can be studied using the same approaches as used in the natural sciences. For instance it is argued that by undertaking rigorous experiments, such as using a randomised, controlled, and blinded design, researchers can produce 'time- and context-free generalisations' (Johnson and Onwuegbuzie 2004). Therefore causal and generalisable theories of human reality can be generated and then tested and re-tested using statistical analysis.

A purely qualitative approach rests on the assumption that 'reality' is constructed by social actors. The emphasis is on understanding the complex picture of a socially-constructed reality using the detailed views of individuals. The influence of the researcher is acknowledged and reflected upon. Typical methods used in qualitative research include in-depth interviews and participant observation. Sample sizes tend to be smaller than for quantitative research as the aim is not to represent large populations. Furthermore researchers often use a purposeful sample (Sale, et al. 2002). The aim of qualitative research tends to be the understanding of process and meaning.

4.6.1 The 'fundamental contrast'

The argument has been made, by purists of either side that the two approaches are fundamentally distinct and are therefore incompatible; meaning that one cannot and should not integrate the two approaches into one study. The quantitative paradigm, underpinned by positivist theory, is incompatible with a qualitative paradigm which is underpinned by an interpretivist approach (Howe 1988; Howe 1992; Johnson and Onwuegbuzie 2004; Smith and Heshusius 1986).

Brannen (2005) argued that the division between the two approaches may be becoming more distinct. She argued that qualitative researchers are considering matters such as reflexivity and inclusivity to a greater extent than ever before. While quantitative researchers are, as she stated, urged by funding councils such as the Economic and Social Research Council (ESRC) to develop their skills and to use ever more sophisticated statistical techniques.

4.6.2 Combining methods

However as Bryman (2001) commented, it is not universally accepted that there is a fundamental distinction to be drawn between the two paradigms. Despite some 'purists' arguing that the approaches are fundamentally different and incompatible due to their ontological and epistemological bases, others argue that the distinction between the paradigms is not helpful, nor real, and that they *are* compatible. Some researchers such as Johnson and Onwuegbuzie (2004) believe that mixing methods from either paradigm is a valid and important research approach. Calling mixed methods research the 'third paradigm', they argued that using methods from both paradigms allows one to 'draw from the strengths and minimize the weaknesses of both in single research studies and across studies' (p14-15).

From here onwards the term 'mixed methods' will be used and is defined as 'the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study' (Johnson and Onwuegbuzie 2004 p17).

4.6.3 Situationalists and pragmatists

Those who believe that it is legitimate to use mixed methods can be broadly defined as belonging to one of two groups: a) situationalists and b) pragmatists (Creswell 1994; Onwuegbuzie and Leech 2005). Situationalists are similar to methodological purists in that they believe that there are real and fundamental differences between the two paradigms. However for situationalists, both methodological approaches have their own value. Situationalists do not 'mix' methods; rather they take the view that methods can be complimentary. They argue that certain questions lend themselves to being answered with certain methods. Pragmatists, however, do not believe that the dichotomy between the paradigms is real. Pragmatists maintain that methods traditionally associated with either paradigm can be incorporated into a single study. Arguing that researchers should 'make

the most efficient use of both paradigms in understanding social phenomena' (Creswell 1994 p176).

4.6.4 Why use a mixed method approach?

Mason (2006 p10) gave two justifications for using a mixed method approach in social research. Her first was that 'social experience and lived realities are multidimensional and that our understandings are impoverished and may be inadequate if we view these phenomena only along a single dimension'. She argued that our experience and understanding is so varied that expecting one research approach to represent this is unrealistic. That lived experience is multi-dimensional it therefore necessitates a multi-dimensional approach to the research of lived experience. Mason's second reason for using mixed methods was that 'social (and multi-dimensional) lives are lived, experienced and enacted on macro and micro scales' (2006 p12). She was highlighting the argument that our experiences do not happen on one plain, that a huge number of factors, on both the micro and the macro level, affect us. Therefore her argument was that certain research approaches are more suitable than others for understanding the different levels of experience and influence.

Greene et al.'s (1989) review of mixed method research found five purposes for mixed method research (the focus of their review was evaluation studies, however these purposes have been quoted in social research methods texts as well. Table 4-2 details the purposes of mixed methods in research:

Table 4-2. Purposes for using mixed method in research

Purpose	Rationale
Triangulation	Where mixed methods are used to seek convergence, corroboration, and correspondence of results. To increase validity of results.
Complimentary	The aim is to seek elaboration, enhancement, illustration and clarification of the results one method with the results of another. Overlapping and different facets of a phenomenon may be revealed.
Development	A first method is used sequentially to inform the second method.
Initiation	Fresh perspectives and contradictions emerge with use of different methods, increasing the breadth and depth of the inquiry.
Expansion	Where mixed methods are used to add scope and range.

Adapted from (Creswell 1994 p174; Greene, et al. 1989 p259)

4.6.5 Using mixed methods

Bryman (2006) noted that since the 1980s there has been an identifiable increase in the volume of research that uses methods from both paradigms, so much so that mixed methods research is now unexceptional and unremarkable. Furthermore there is now a specific academic journal entirely devoted to the approach (the Journal of Mixed Methods Research, Sage Journals). Mixed method research is now a relatively common evaluation approach and is argued to be a appropriate for health research (Johnstone 2004), educational research (Howe 1992; Miller and Fredericks 2006) and even research into physical activity (Henderson, et al. 1999).

The philosophy, justifications and practicalities of using mixed methods within a single study were reviewed in the preceding sections. The author of this present study was convinced that using a mixed method approach was both legitimate and valid, but also

represented the most effective way of investigating the experience and reality of physical activity at Forest School.

The research questions (detailed in section 4.4) clearly demand the use of different research approaches. The first two questions focus on the 'external reality' of the physical activity, on the quantity, the intensity and frequency, and of the amounts on the Forest School days in comparison to those on other days. To investigate these types of questions effectively and reliably methods drawn from the quantitative paradigm are most suitable; methods which are standardised, rigorous and repeatable. Efforts can and should be made to find the most accurate data which are relatively independent (though this researcher is not convinced it could ever be totally independent) of outside factors. The third research question focuses on the *experience* of Forest School, experience is not objective or external, it is the opposite, subjective and internal (to an extent). The research methods of the qualitative paradigm are the most appropriate for investigating experience and perception. In this researcher's opinion it is not possible (or necessarily desirable) to produce time and context free representations of experience or perception, one should acknowledge that experiences and perceptions are deeply rooted in context, in relationships, in history and in a myriad of other factors. A reflexive awareness of these factors is necessary. Recognising the multi-dimensionality of the research questions it was concluded that a design which used methods drawn from the two main social research paradigms would facilitate the most efficient and holistic understanding of the problem.

The researcher is not a methodological purist, but is certain that different research methods access different types of information and are based on different assumptions, therefore a 'situationist' approach to using methods from both the quantitative and qualitative paradigms was followed during this present study (i.e. the different methods were used separately) (Creswell 1994; Onwuegbuzie and Leech 2005). This research was not conducted according to a 'pragmatic' approach because the researcher considers the fundamental differences (in particular the epistemological assumptions) between the two paradigms, as discussed earlier in this section, mean that they should not be combined within a single study.

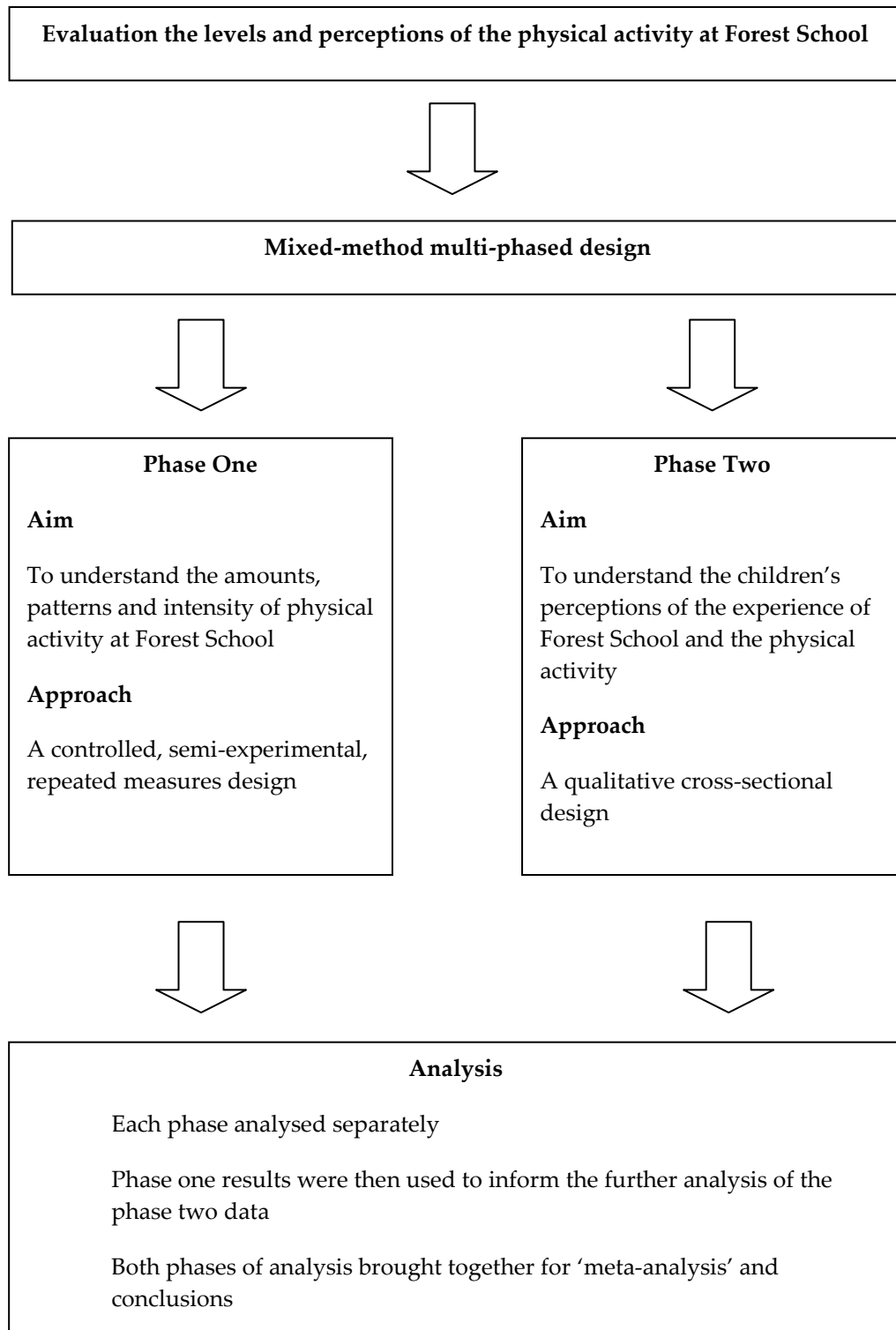
Unlike much mixed method research, in which one paradigm, usually the quantitative, dominates the other (O'Cathain, et al. 2007), neither research approach took precedence during this research. Rather than using the mixed methods for a triangulative or

developmental reasons (see Table 4-2) mixed methods were used for initiative and expansive reasons; increasing the depth and breadth of the study, while increasing the chance of different perspectives and possible contradictions in the results.

4.7 *The research design*

This section details the research design used during this evaluation. As a situational approach was used the two 'sets' of research methods were conducted and analysed separately, therefore this research was multi-phased. Figure 4-1 graphically illustrates the research design. This is followed by a description of each phase and of the sample and research location.

Figure 4-1. The research design



4.7.1 Phase one

The focus of the first phase was to objectively quantify the amounts, intensity and patterns of physical activity the participants engaged in during the Forest School sessions and to quantify the participants' feelings of enjoyment and exertion during the physical activity. Despite the author's convictions that experience and perception are best investigated using methods drawn from the qualitative paradigm (see section 5.3 for more discussion of the use of a quantitative method to assess perception), quantitative measures have been used in previous research focusing on children's perceptions of physical activity (Borg 1990; Pfeiffer, et al. 2002; Williams, et al. 1994) and in the interests of exploring the questions as effectively as possible the methods were used.

This research was situated within a public health context; the standards of evidence are different to those of other disciplines and much emphasis is placed on rigor and causality (the need for higher standards of evidence and the more rigorous research designs stems from the potentially harmful impacts of the programmes or phenomena under evaluation and, indeed, from the consideration that the results of the evaluation may also have the capacity to cause harm) (Craig, et al. 2008). Therefore in this first phase an effort was made to use a design which fulfilled these expectations. A review of the literature discussing research design showed that 'Random Controlled' designs are considered to be the 'gold standard' (i.e. the most effective) in providing evidence of change or efficacy and are capable of identifying programme effect (Kaptchuk 2001). However the random control experiment was not deemed practical as it requires time, expertise and considerable influence over the running of the programme. The researcher was in no position to influence who took part in, or how Forest School was run in Scotland. The pragmatic compromise, when one is unable to make use of the random control design, is the quasi-experimental approach. Quasi-experimental designs do not have randomised participants and often use groups whose composition is not strictly controlled (Bechhofer and Paterson 2000). It was therefore decided that a quasi-experimental design was the most appropriate design for this phase of the evaluation.

Instead of using a control group, comparisons, of the amounts and perceptions of the physical activity, were made between the types of school day (therefore the two non-Forest School day types (see below) acted as controls), between the activities the participants

engaged in and within the group (for instance between the genders). The data were collected over three types of school day; firstly a Forest School day (during which the children spent the whole school day at Forest School), secondly, an ordinary school day (during which the children had no timetabled physical activity), and, thirdly, an active school day (a school day during which the children had a timetabled physical education lesson). The measurements were repeated; the data collection spanned three weeks, over three months of the spring/summer term, this was partly to reduce the impact of weather, light levels and for the variability in the activities of each day type. Therefore the physical activity of 234 individual 'days' (26 participants x 3 day types x 3 weeks) was assessed.

The data collected during the first phase of this research are acknowledged to be limited in quantity; there were a number of reasons for this. Firstly, as will be described in a subsequent section, the tools used to measure the physical activity (accelerometers) are expensive and as the researcher's budget was limited 26 were borrowed from a researcher based at the University of Bristol (Dr Ashley Cooper). Whilst this meant that the researcher had enough of the tools for each child in the class they were only available for a very limited period of time (a total of just under three months of spring/summer 2006). This meant that the number of potential data collections periods was limited. Secondly, restricted access to the school which participated in this research further limited the quantity of data collected during the first phase of the study. Schools are generally very busy with little time to fit in non-essential activities; whilst the staff and pupils of the school were extremely accommodating and generous with their time, a number of the weeks, during which data collection could potentially have taken place (Forest School took place once a fortnight), had to be counted out because of other commitments and obligations. Finally the Scottish weather further reduced the quantity of data; heavy rain and strong winds resulted in the loss of a potential week of data collection after Forest School was cancelled.

4.7.2 Phase two

The aim of the second phase of this research was to understand, as comprehensively as possible, the participants' experience of Forest School and the physical activity which resulted from participation.

A qualitative cross-sectional research design was employed during the second phase of research; using qualitative techniques the participants' perceptions, experiences and opinions of Forest School and of the physical activity they took part in during the sessions were examined. To provide context the participants' experiences of physical activity and green space in other situations, for example during the PE lesson or outside of school, were also examined.

4.8 *Selection of the participants*

The final section in this chapter details the selection of the participants. In many research situations the sample which is used will be dictated by the real world context of the study, by what is realistically and practically available (Robson 2002). This was certainly the case for this research; Forest School was relatively new to Scotland, the earliest examples happening in 2003-2004 (this research began in 2004). Consequently there were few established or regular Forest Schools operating in Scotland. Of the Forest Schools that were running, only one was identified as being a suitable case for this research (the limitations of focusing on one example are acknowledged and are discussed in the final chapter). The reasons why this school was deemed most appropriate are detailed below:

- the particular Forest School was well-established. It had run for over a year previously;
- a whole class (Primary 6/7 class) participated at once. All members of the class (unless there were safety issues; for instance serious uncontrollable behaviour) participated. At other Forest Schools in Scotland children were chosen from one or more local schools for participation. Often these children or young people were chosen because of emotional, behavioural or attendance issues. It was felt that for this research to be of wider use the case chosen should be as representative as possible;
- other Forest Schools in Scotland ran intermittently or the researcher was unable to confirm that they would be running at the required time for the research;

- this Forest School was run in a small rural primary school within commuting distance from Edinburgh, allowing more flexibility of the design in terms of the researcher's time; and
- a good relationship had been built between the school, the leaders of Forest School and the researcher.

The same class, who were in primary 6 during the first phase of the research and primary 7 during the second phase, participated in the study. The majority of the children who participated in the first phase participated in the second phase; additional children who had joined the class at the start of the primary 7 year also participated in the second phase.

The school is a small rural primary in the central belt of Scotland. The village and immediate surrounding area has a population of around 6000. The residents of the village are relatively socially deprived (Scottish Public Health Observatory 2004). For instance 46% of the adults living in the village have no qualifications; this is 39% greater than the average for the Scottish population as a whole. Thirty eight percent of the residents are 'economically inactive'. Overall the village is the third most deprived in its county. The health of the residents of the village is also relatively poor; the average life expectancy is lower than that of the total Scottish population. Twenty four percent of the residents have a long term limiting illness and 16% of the adults are unable to work due to illness or disability, this is 53% greater than the average for the Scottish population. The area is predominantly post industrial and is dominated by the remains of open cast mining and other quarrying.

5 Phase one methods, data collection and analysis approach

The following chapter describes the methods, data collection and analysis approach of the first phase of this study.

5.1 *Objective measurement of physical activity*

As Strath et al. (2005) commented, one can measure physical activity in a variety of both direct and indirect ways. Identifying the most reliable and accurate method of assessing physical activity is complex. As with many choices that need to be made regarding the measurement of such complex behaviours as physical activity, a combination of validity, reliability, accuracy and practicality must be considered. The decision as to which measure to use was further complicated by the fact that it was children's activity that was being assessed; assessing the physical activity of children is problematic (Health Education Authority 1997).

The patterns of children's physical activity behaviours have historically been measured using direct observation, questionnaires, self-report measures, and more recently, using heart rate and activity monitoring (Argiropoulou, et al. 2004; Pate 1993). However, despite, the many strengths of these methods, there are identifiable methodological issues and problems. Furthermore the specifics of this research meant that certain measures would have been more practical than others. There is no 'gold standard' measure that can be used in every situation, the measure chosen should reflect the context, the research question, and the relative importance of practicality against accuracy (Health Education Authority 1997; Welk, et al. 2000; Wood 2000) .

In the following sections the various measures of physical activity which were considered practical for use in the study are briefly discussed; methods not considered to be realistic, such as the doubly-labelled water technique or indirect calorimetry (see Kohl, et al. 2000 for description of methods), will not be described.

5.1.1 Self-report, proxy report and diary measures

Self-report tools are one of the most commonly used methods of assessing physical activity in both adult and child populations. The method can take the form of recall questionnaires, diaries, or proxy reports, and can be either self or interviewer administered (Kohl, et al. 2000). Depending on the research question, the respondent may be asked to recall intensity, duration, frequency and type of physical activity engaged in. The term 'self-report' will be used to represent all these methods.

Self-report measures, despite being considered cost effective, suitable for use in large studies, unobtrusive and convenient to administer, have limitations which are especially relevant when the research participants are children (Kohl, et al. 2000; Koo and Rohan 1999). It is argued that in all populations self-report measures are limited in their reliability and objectivity (Argiropoulou, et al. 2004; Kohl, et al. 2000; Melanson and Freedson 1996; Pate 1993; Puyau, et al. 2002). Desire to conform or please can bias the reports of physical activity (Sallis and Saelens 2000). Closed questions, regarding the amount and type of physical activity, may result in underestimation of physical activity (Freedson, et al. 1998). Kohl et al. (2000) argued that many self-report measures are designed to be used in relation to structured or leisure time activity during defined periods, and are, therefore, unsuitable for the assessment of 'free-living' activity (i.e. everyday activity). Many of the terms used in the assessment of physical activity are ambiguous and hard for the lay person to interpret (Sallis and Saelens 2000). The validity and reliability of such measures are further limited by the ability of the individual to accurately recall and record their activity (Pate 1993); a point which is especially pertinent when considering their use with child and youth populations. Children lack the ability to recall the intensity, the frequency and duration of activities accurately (Sallis and Saelens 2000). Furthermore, children's activity is often sporadic, unstructured and done in short bursts making it difficult for the child to categorize and quantify (Ott, et al. 2000; Sirard and Pate 2001; Welk, et al. 2000). Kohl et al.'s (2000) meta analysis of measurement devices suggested that self-report measures should not be used on children under the age of 10.

5.1.2 Direct observation

Sirard and Pate (2001) argued that the direct observation of an individual's physical activity is the most accurate and comprehensive method of assessing quantity, frequency and intensity of physical activity. Direct observation is especially useful in the assessment of children's physical activity, particularly with younger children who have not developed the cognitive function for accurate self-recall (Kohl, et al. 2000). While Sirard and Pate (2001) pointed out that direct observation is able to capture the short-term sporadic nature of children's activity.

Despite the positive aspects of direct observation, the method is not suitable for larger studies due to the high demand on researcher's time and effort, nor is the method suitable for studies taking place over a wider geographical area. Furthermore it is argued that observation of the participant is likely to alter the behaviour to some degree (Health Education Authority 1997; Kohl, et al. 2000).

5.1.3 Heart rate monitors

Heart rate monitors record the participant's heart rate during the period it is worn. Heart rate monitors are cost-effective, can measure activity over time and suitable for use in larger studies including studies involving children (Health Education Authority 1997; Sirard and Pate 2001).

However in order to accurately estimate energy expenditure it can mean that the participants would be required to attend a laboratory where the baseline heart rates are measured. Furthermore, other factors such as temperature and humidity, hydration levels, the emotional state, and the fitness level of the participant can all effect heart rate (Eston, et al. 1998; Health Education Authority 1997; Ott, et al. 2000; Sirard and Pate 2001).

5.1.4 Pedometers

Pedometers measure the vertical acceleration of the body during activities such as walking and running, these are recorded as step counts and can be recorded over a period of time (Health Education Authority 1997). Researchers can make use of either simple mechanical pedometers or slightly more complex electronic pedometers. Pedometers are comparatively inexpensive, can be re-used, and are unobtrusive tools for measuring physical activity (Freedson and Miller 2000).

However most pedometers can only count total steps during the period it is worn. The majority have no means of indicating the intensity or the pattern of activity as pedometers cannot store counts over specific time periods (Freedson and Miller 2000; Sirard and Pate 2001). Furthermore pedometers are only capable of measuring forward movement; they cannot record movements such as climbing, nor can they represent the effort involved from certain physically activities such as lifting, pushing or carrying (Sirard and Pate 2001).

5.1.5 Accelerometers

Accelerometers are similar to pedometers in that they measure the acceleration of body movement. However, the accelerometers output is in the form of 'counts', groupings of the measurements of movement in predetermined time periods. Accelerometers use sensors to detect acceleration in one to three planes (vertical, mediolateral, anteroposterior) (Chen and Bassett 2005). The accelerometer converts the recorded accelerations into a 'quantifiable digital signal referred to as counts' (Sirard and Pate 2001 p445). These counts can be used to estimate physical activity and, as some argue, can be calibrated to indicate energy expenditure (Welk 2005b).

Accelerometers are a popular choice for the objective assessment of physical activity in studies of the physical activity of both adults and children. They are small, unobtrusive, many have a 'black box design' (i.e. no buttons to press, no displays to affect behaviour) and are capable of measuring physical activity over extended periods of time. Accelerometers have been validated for use in the laboratory and field setting (Eston, et al. 1998; Sirard and Pate 2001; UNCE-WHO 2004; Welk 2005a). However accelerometers have a limited capability of measuring activities such as cycling, climbing, or upper body activity. Furthermore, as with pedometers, they are unable to assess how strenuous the particular

activity was, for instance whether load was carried or the effect of gradient (Freedson and Miller 2000).

5.2 *Selection of the objective method for assessing physical activity*

Although it was recognized that direct observation may be the most accurate method to assess the intensity, duration and frequency of the participants' physical activity, it was rejected for three reasons. Firstly, there were not sufficient funds to provide enough observers to make this method viable. Secondly, during the key periods of interest (for instance while the children were at Forest School) the children were not accessible or visible. Thirdly, should it have been attempted, having the researcher running around after the participant would have likely have seriously affected both the behaviour of the participant, but also the ability of the researcher to accurately record the activity. Self-report methods were also rejected for use in this present study primarily because the researcher was unconvinced as to the accuracy of the data produced through the use of these methods. Furthermore the children who participated in this present study were nine to ten years old, arguably too young to be able to accurately recall activity (Sallis and Saelens 2000). Pedometers were also rejected as the variability of activity intensity, rather than just the total amount of activity, in the different contexts was of interest.

Bassett (2000) suggested that heart rate monitors and accelerometers are the most appropriate tools for assessing patterns of activity. However they are relatively expensive measurement tools. The budget was such that it would not have been possible to buy adequate numbers of the tools. For this reason enquiries were made about the possibility of borrowing appropriate numbers of either measurement tool. The decision as to whether to use heart rate monitors or accelerometers was made by an offer of a loan of enough accelerometers for each child in the class and for an extended period of time. Accelerometers, while not the 'gold standard' of physical activity measurement, are effective, reliable and relatively accurate tools, an opinion supported by Sirard and Pate; 'when direct observation is not possible because of long measurement time periods or

personnel or monetary constraints, accelerometers provide a promising alternative' (2001 p.452).

The accelerometers which were offered for use in this evaluation were the Computer Science and Application Actigraph 7164 accelerometer, a detailed description of the model type is provided below.

5.2.1 The WAM (CSA - Computer Science and Application) Actigraph 7164

The WAM Actigraph 7164 (Computer Science and Applications, Fort Walton Beach, Florida <http://www.theactigraph.com/aboutus.asp>) is a uniaxial accelerometer (meaning it measures activity on one plane – the vertical plane. It is sensitive to movement in all directions but most sensitive to movements in the direction parallel with the longest dimensions of the case (Puyau, et al. 2002)). Each 'movement' is summed over a pre-specified time period (epoch) and stored in the memory until downloaded.

The Actigraph is small (5.1 x 3.8 x 1.5 cm), light (43 - 45 gm) and has a robust design (although it is not water proof) and has an internal 'real-time' clock which allows the user to specify start and stop times. The accelerometer allows the researcher to select the most appropriate epoch for the research (Troost, et al. 1998). Experimental trials have shown that the Actigraph has good inter- and intra-instrument reliability (Freedson and Miller 2000; Metcalf, et al. 2002; Trost, et al. 1998; Welk, et al. 2004).

The Actigraph is the most commonly used model in studies of physical activity using accelerometers (Troiano 2005), and has been the subject of a number of validation and reliability studies (Ekelund, et al. 2001; Metcalf, et al. 2002; Trost, et al. 2005). It has been validated in controlled and free-living activities in both the laboratory and in field settings. It has been validated for use with children, in a range of settings, using a variety of objective validation tools (Ekelund, et al. 2001; Fairweather, et al. 1999; Puyau, et al. 2002; Trost, et al. 1998).

Two decisions need to be made when using accelerometers to assess the quantity, frequency and intensity of physical activity; firstly, what length of epoch (the length of time the

accelerometer sums the movement counts), and secondly, how and where the participants wore the accelerometer on their body.

5.2.2 Epoch time

Epoch time relates to the length of time the accelerometer sums up and records movement counts (the data which is downloaded are the counts that took place during each epoch of the time the accelerometer was recording activity).

The question of epoch time was especially pertinent for this research as it was focused on the physical activity patterns of children. As mentioned elsewhere, children's physical activity is typically sporadic and done in short intensive bursts (Bailey, et al. 1995). This means that within relatively short periods of time there can be a considerable variation in the intensity of the child's physical activity (Welk, et al. 2000). Therefore using too long an epoch (for example one minute) could result in an underestimation of higher intensities of physical activity and a 'flattening out' of the patterns of the activity, however using too short an epoch length may threaten the battery life and therefore the data collection. The epoch length for this present study was, therefore, set to thirty seconds as this was short enough to accurately represent activity patterns, while not too short so as to threaten the battery life of the unit; this epoch length has been validated for use in studies of children's physical activity (Baker, et al. 2008).

5.2.3 Placement of accelerometer

For the most reliable assessment of physical activity using a single accelerometer, the accelerometer should be placed as close to the centre of mass of the subject (Puyau, et al. 2002; Trost, et al. 2005). However for practicality, and for uniformity between subjects and over repeated use, choosing a single site, such as the hip or lower back, is suggested. A study focusing on the placement of the accelerometer found that there was no significant difference between the total counts per minute or the level of intensity of the physical activity when the accelerometer was placed on the hip or the back (Nilsson, et al. 2002). The

hip was chosen as the most appropriate site for this present study. According to the literature it makes little difference which side of the body it is placed on, however what is recommended is that it is placed on one side consistently (Ward, et al. 2005). For this research the participants wore the accelerometer on their right hip.

5.3 *Subjective measurement of the perception of the physical activity*

Despite the author's conviction that experience and perception are best assessed using qualitative measures; an attempt was made to quantify the children's perceptions of the physical activity both at Forest School and during the typical school days. The aim was to attempt to provide a quantified representation of the children's perceptions of the activity which could be compared against the results of the accelerometry. It was hypothesised that there may have been a relationship between the quantity, intensity and type of activity and the enjoyment of that activity.

Whilst such methods are, potentially, a useful approach to assessing perceptions, previous research has indicated they may be somewhat limited. In particular the desire to conform, please or impress can affect the participant's reporting of their perceptions of the physical activity (Sallis and Saelens 2000). Furthermore, it is the author's opinion that one should be wary of attempting to reduce such a complex outcome, in this case perception, to a quantified measure. As was discussed in the background chapter there are many factors which influence the experience of physical activity, not least the most fundamental aspects of an individual such as gender and age as well as more contextual factors such as prior experience of physical activity. There is a danger with using a quantified approach to measuring perception that one will lose the 'meaning' of the results. However the method was used as they, potentially, offered a method of associating the participant's perceptions with the quantified levels of physical activity.

Two measures were sought; one which assessed the child's perceived exertion during the physical activity and a second which assessed the perceived enjoyment of the activity. The emphasis was on finding simple and appropriate methods of assessing the participants' perceptions of the physical activity they engaged in through their school days.

5.3.1 Rating Scales

There are relatively few studies which have sought to quantify children's immediate (i.e. immediately after participating in physical activity) perceptions of the physical activity they engage in; therefore only a small number of previously validated tools, most of which focus on perceived exertion, were found. The tools most regularly used in studies of children's physical activity include the OMNI scale (Robertson, et al. 2000), the Borg scale (Borg 1990; Pfeiffer, et al. 2002) and the Children's Effort Rating Scale (Williams, et al. 1994). Although scales exist which aim to assess the child's overall enjoyment of physical activity and exercise, only one was found which assessed the child's enjoyment of a specific experience of physical activity (Hughes, et al. 2007). All the identified tools used either simple written or pictorial scales and had been formally validated for use with children.

5.3.2 Effort rating scale

The Children's Effort Rating Scale (CERT) (Williams, et al. 1994) was chosen for use in the present study as it has been used in a number of studies whose participants were of a similar age to those in the present study. For instance the CERT scale had been used in a recent study assessing response to physical exercise in a group of primary age children in southern Scotland (Hughes, et al. 2007). Furthermore it is simple, easy to use regularly and takes little time to complete. The CERT scale was used un-adapted. The effort rating scale can be seen in Figure 5-1 below:

Figure 5-1. The effort rating scale

How hard was the physical activity?

Please think about all the physical activity you did this *morning* and tell me how hard it was. '1' means it was very, very easy and '10' means you found it so hard you had to stop.

Please circle the number that best shows how hard the physical activity was this morning:

1	Very, very easy
2	Very easy
3	Easy
4	I was just feeling the strain
5	It was starting to get hard
6	It was getting quite hard
7	Hard
8	Very hard
9	Very, very hard
10	So hard I had to stop

5.3.3 Enjoyment rating scale

As mentioned previously only one, appropriate, self-perceived enjoyment scale was found. This was a simple scale, similar in form to the CERT scale, which had been designed and used by the evaluators of a pilot physical activity programme for overweight Scottish children (Hughes, et al. 2007).

The enjoyment scale was adapted to make it simpler. Originally the scale ranged from 1-10 but had just five visual anchors (five faces with varying smiles or frowns). Consultation with the teacher of the class indicated that the children may find the miss-match between the scale and the visual anchors confusing. The scale was adapted so that the scale ranged

from 1-5 and the visual anchors were removed. The scale was piloted with a representative group of children; the results of which indicated that the children understood the scale; Figure 5-2 details the adapted enjoyment scale

Figure 5-2. The adapted enjoyment rating scale

How much did you enjoy the physical activity?

Think about all the physical activity you did this *morning* and how much you enjoyed it overall; '1' means that you did not enjoy the activity and '5' means that you really enjoyed the activity.

Please circle the number that best shows how you feel:

1 I really, really did not enjoy the physical activity

2 I really did not enjoy the physical activity

3 I did not mind doing the physical activity

4 I really enjoyed the physical activity

5 I really, really loved the physical activity

5.4 *Phase one data collection*

The following section details the data collection during the first phase of this evaluation. The application for ethical approval and the gaining of consents are also discussed.

5.4.1 Ethical approval

Ethical approval was originally sought from the Moray House School of Education ethics committee at the University of Edinburgh. The Moray House ethics committee was approached as the Medical School (in which this research was done) did not have an

internal ethics committee and other research undertaken in the Medical School typically goes through local NHS ethics committees (a procedure which was not appropriate for this research). The Moray House ethics committee was thought to be most suitable as they regularly review research proposals from the educational and outdoor education departments of Edinburgh University. The ethical procedures were completed to the assessor's satisfaction and permission was granted in November 2005.

5.4.2 Obtaining consent

A fundamental aspect of good research practice is obtaining informed consent from the participants in the study. It is suggested that parental consent is required when researching with pre-adolescent children but opinion is divided over whether the child's permission is strictly required (Christensen and James 2000). In order to be ethically sound consent was sought from both parties.

The first requirement was to acquire formal permission from relevant individuals at the school which participated in Forest School. The teacher of the class, the Head-teacher and the individuals who ran Forest School, all verbally consented to participation in the research (in retrospect the author should have gained written consent; signed documents detailing both parties' desires and expectations would have protected both the author and the participants). Permission was also sought from the local council who had responsibility for the school, which was also granted. Separate information sheets and consent forms were produced for the children and the parents; these can be found in appendices one and two. The parental forms were sent home with the children. The responses were returned to the class teacher and then to the researcher. The research was explained to the children verbally. The children were also provided with a written information sheet and consent form.

Every child in the class agreed to participate in the first phase of the study and all the parents gave their permission for the child's participation. This meant that 26 children from a Primary 6 class (aged 9-10 years) participated in this first phase of the research.

5.4.3 Piloting

Whilst the value of piloting is fully acknowledged and as much effort as was possible was taken to test each of the methods prior to the data collection, a particular issue meant that the piloting was somewhat limited. As was stated earlier the author had borrowed the accelerometers for a limited time period (a period of two and a half months); the restricted access to the tools coupled with the fact that the Forest School sessions happened once a fortnight and a half term holiday meant that the author was unable to fully pilot this aspect of the first phase (and, therefore, identify the problems detailed in the following sections). However the basic use of the accelerometers was piloted on children known to the researcher. A total of five children wore the accelerometer for one day; the collected data was then reviewed and was subjected to basic analysis. No issues associated with the use of the tools were highlighted.

The two ratings scales were piloted on a representative sample of children attending a Forest School session. As was planned for the data collection proper, the participants were asked to fill in both scales twice during a Forest School session. The suitability of the method was assessed by discussing the tools with the participants (e.g. the children were asked whether they understood what was being asked of them and whether they understood the terms used) and the completed scales were also reviewed and subjected to basic analysis. Again no issues were highlighted with the use of the two self-perception scales.

5.4.4 The data collection

The first phase of data collection took place over three months of the spring/summer school term of 2006; there were three individual weeks of data collection. Data was collected on the Tuesday, Wednesday and Thursday of each week. On the Tuesday the class had no timetabled physical activity, on the Wednesday the children spent the whole school day at Forest School, and on the Thursday the children had one timetabled physical education lesson of around 30 minutes.

5.4.5 Assessing physical activity with the Actigraph

The original intention, which was followed during the first week of data collection, was to give the accelerometers to the children on the Monday afternoon and then to collect the accelerometers from the children on the Friday morning. The children were instructed to wear the accelerometer while they were awake; to take it off when they went to bed and when they were bathing, showering or swimming. However by the end of the first week it became clear that this approach was resulting in significant proportions of lost data. The main reasons for this were that the child forgot to put on the accelerometer in the mornings, the accelerometer was lost, or the parents were preventing the children from wearing the accelerometer (a decision had been taken to inform the children of the value of the accelerometer in the hope it would induce them to be careful with the units, the result of this decision was that some parents prevented their child from wearing the accelerometer during the Forest School sessions in case the unit was lost or damaged). Furthermore a number of the accelerometers malfunctioned, further reducing the amount of valid data.

The original protocol was devised as it was hoped that sufficient data would be collected outside of school time to address the issue of compensation (whether children compensate for inactive school days by being more active outside of school, or compensate for active days by being relatively inactive), however after reviewing the data collected during the first week of collection it was apparent that the further pursuit of the compensation question was likely to result in the loss of more important data, that of the school day. The decision was taken that the physical activity during the school day was the priority for this study, and, rather than try to bribe the children into wearing the accelerometers more regularly, the accelerometers would be distributed in the morning, at the start of the school day, and collected again at the end of the school day.

During the second and third week of recording the accelerometers were given to the children at around 8:55am in the morning and collected again at 3:15pm on each of the three days.

5.4.6 Assessing perception of physical activity using the rating scales

The self-perception rating scales were used on the days the children wore the accelerometers. The children were asked to fill in the two scales once before lunch and then again before the child went home. It was hoped that using the scales twice a day would allow for a more detailed understanding of the child's response to the physical activity they had engaged in at different points though the day.

The participants were instructed to sit separately from each other as far as was practically possible; this aim of this was to attempt to reduce the desire to conform or, equally, to influence others responses. The participants were regularly reminded that the responses they gave would be confidential; they were encouraged to be as honest as possible, that it did not matter, for instance, if they said they had not enjoyed their PE lesson or time at Forest School. The participants were also encouraged to give their own response, to try to ignore what their friends may have done.

5.4.7 Observational data collection

The researcher attended the participants' classes on the data collection days. An unstructured diary was made of the notable changes in physical activity which happened through the day. This included recording during break times and lunchtimes. The nature of the activity, and the approximate proportion of the participants who were taking part in the activity, were recorded. The results were not intended to be used as data in their own right, rather to give context to the accelerometer results.

The participants were reminded that the researcher was not a classroom assistant and was doing her own 'work'. However maintaining the role of separate and objective observer was difficult. On many occasions the researcher was drawn into the life of the class which, admittedly, reduced the opportunities to observe the physical activity. While becoming 'part of the class' did have the obvious drawbacks previously mentioned, it did mean that the relationship between the researcher and the teacher and the children was positive, allowing problems to be easily overcome (see section 5.4.5).

5.5 Data reduction

The data collected during the first phase of this research took three forms; the accelerometry data, the self-perception scales and the observational diary. The following sections detail the reduction of the data collected.

5.5.1 Accelerometer data reduction

A recent review of accelerometry data reduction techniques found that there are no overall standards and that the principles used in previous research were inconsistent, or even unreported (Masse, et al. 2005). The review found that the decisions regarding how, firstly, the data was 'cleaned' and then, secondly, how the data was transformed into variables, varied greatly, meaning that there are identifiable issues regarding comparison between studies. The authors of the review suggested that until consensus is reached, researchers should 'describe explicitly the decision rules they use in their studies' (Masse, et al. 2005 p(s)551). Therefore the following sections describe, in as much detail as is relevant, the decisions taken as to how the raw data was cleaned and then transform into meaningful variables.

The accelerometer stores the data it has collected as counts per epoch in the unit's memory ('count' will be the term used to discuss each data point in reference to the raw accelerometer data); the present study used a 30 second epoch. The data were downloaded at the end of each week using the software designed for use with Acti-Graph 7164 (version 3.3: downloaded from the Acti-Soft website

<http://www.theactigraph.com/downloads7164.asp>). Each downloaded file included a set of information which detailed the accelerometer unit number, the time the accelerometer began recording and the time the unit was stopped. Knowing the time that the accelerometer started recording makes it possible to link the counts to the time at which they happened.

As the decision had been taken to focus solely on the school day (9am to 3:15pm), the corresponding time period was isolated from the raw counts and placed in a separate excel

spreadsheet. Therefore, from each week, three sets of counts were extracted; each set represented the counts recorded during the time period of 9:00am to 3:15pm on the Tuesday, Wednesday and Thursday. This resulted in 234 'days' of accelerometer recording (26 participants x three days x three weeks) which equates to 1518 hours of recording or 45,562 thirty second epochs.

Further to the nine whole days, five additional sets of time periods which corresponded to specific events were extracted from the raw data and placed in Excel spreadsheets. These represent; firstly, the counts during the children's morning break of the typical school days (from 10:30 to 10:50 am); secondly the counts during the children's PE lesson (a duration of 30 minutes); thirdly, the walk up to Forest School and the walk down from Forest School (the walk up lasted for around 25 minutes and the walk down for around 30 minutes - a uniform amount of time was extracted for each; the first 25 minutes in the case of the walk up and the first 30 minutes of the walk down); and, finally, the counts during the active games played at Forest School (when extracted the games were found to have all lasted between 25 and 30 minutes - the first 25 minutes were extracted for each day). Two sets of data were created for the break time analysis, this is because the children were prevented, by adverse weather, from going outside on the first Thursday of week one. Due to being indoors the children were severely restricted in the amount of physical activity they could do during this period. Therefore one data set was extracted with all the breaks included and another was extracted which omitted the day with the indoor break.

5.5.2 'Cleaning' the data

Masse et al.'s (2005) review of accelerometer data reduction methods found that there is no consensus of opinion regarding how to deal with the data collected during the periods of time when it is likely the accelerometer was not worn. Identifying these periods of time are important for two reasons; firstly inclusion of the counts which were recorded during the period of time where the accelerometer was not worn may result in an underestimation of either the total activity or of average levels of activity. Secondly, if the recording includes long periods of time where the accelerometer was not worn, the 'day' may need to be excluded from the dataset (this is discussed in a subsequent section). Typically strings of

continuous zeros (no recorded movement) in the data indicate that the accelerometer was not worn.

After reviewing the accelerometer data collected during this study twenty one periods of between 10 minutes and 60 minutes of continuous zeros were identified; only four of these periods were over twenty minutes. Furthermore all but two of the identified periods of continuous zeros occurred at times when the child was observed to be sitting still for extended periods of time. It is acknowledged that accelerometers have a low capability of measuring upper body movement, and it is therefore feasible that the periods of < 20 minutes of continuous zeros represent periods of continuous sitting still. The present study followed the approach taken by Treuth et al. (2003), who removed periods of twenty minutes or more from their dataset. Stating that in their 'previous experience consecutive zeros for >20 min are not observed in an awake child wearing an accelerometer' (2003 p534). Four periods of twenty minutes or more of continuous zeros were removed from the dataset.

5.5.3 Spurious counts

Spurious counts refer to count values which are abnormally high. The presence of spurious counts is most likely due to temporary monitor malfunction. Using conditional formatting in an Excel spreadsheet several spurious counts were identified in this dataset.

It has been previously noted that there is currently no standardised procedure or guidance in published literature regarding the removal of spurious counts (Masse, et al. 2005). After consultation with an experienced accelerometer user (Dr Ashley Cooper, Bristol University June 2006) any individual count over 5000 was removed from the data set. The value of 5000 was decided upon for the following reason; as the threshold for 'vigorous' activity used for the present study was 1500 counts per thirty seconds, an individual count of over 5000 would represent a *very* high level of physical activity. Counts over 5000 per thirty seconds were probably due to the malfunction of the accelerometer unit and therefore were invalid. Eighteen individual counts over 5000 were removed from the data set.

5.5.4 Invalid days of data

There are occasions when whole days of accelerometer recordings may have to be discarded from the data set. Typically this is due to either incomplete days of recording or when the data is considered to be invalid (i.e. the machine malfunctioned).

Researchers who use accelerometry to understand patterns of physical activity, typically consider that a minimum of ten hours (accumulated) is needed for the recording to count as a 'complete day' (Masse, et al. 2005). Ten hours is argued to be an adequate proportion of the individual's waking (and therefore physically active) day; anything less than ten hours is likely to represent an underestimate of the individual's total amount of physical activity. However this rule was not relevant to the present study as the participants were asked to wear the accelerometer for a discrete period of time; the period of time that represented a 'day' was known (from 9am to 3:15pm – 375 minutes). The decision was taken to exclude days where there was one hour or more (which could be accumulated) of missing or invalid data. This decision was taken as it was thought any more than one hour's worth of missing data could result in skewed result, primarily a significant under- or overestimation of the individual's physical activity. No studies were found that used a similar protocol as this one and in which the data cleaning decisions were described.

The data were visually reviewed, in an Excel spreadsheet, in order to identify the 'days' with missing or invalid counts. Sixty-five 'days' were excluded from the data set.

5.5.5 Examining the impact of the excluded days

As described in the previous section 65 'days' of accelerometer recording were excluded from the dataset. The importance of this is explored in the following section.

Table 5-1 details the proportions of valid and invalid data. Overall, from a total of 234 days of accelerometer recording (26 participants x 9 days of recording), 169 were valid and 65 invalid (and removed from the dataset), therefore 72% of the total days of recording were valid and usable in the statistical analysis.

Table 5-1. Number and percentage of valid and invalid days.

Day type	Count	% of total days
Valid	169	72.2%
Invalid	65	27.8%
Total	234	100%

The relatively high proportion of missing data highlights the need to use a statistical approach which uses all the available data and that does not discard a subject with any missing data (see section 5.6). This was especially important for the present study as only five of the participants have valid recordings over the full nine days of recording, as can be seen Table 5-2.

Table 5-2. Number of children with number of full days recording

Days of valid recording	Count of children
9	5
8	4
7	5
6	5
5	2
4	4
3	0
2	0
1	1
0	0

The distribution of valid and invalid days of accelerometer recording was explored further, looking at the distributions within week and by day type, the results are detailed in Table 5-3.

Table 5-3. Number of valid and invalid days by week

Day type	Week one	Week two	Week three
	Count	count	Count
Valid	43	59	67
Invalid	35	19	11

The amount of invalid data was much greater in week one, was reduced in week two and again in week three. This is due to the change in data collection methods after week one, which greatly minimised the loss of whole days worth of data. The proportion of invalid or missing days of data was reduced from 45% of the total 'days' (26 children over three days = 78 days) during the first week to just 14% in week three.

Of perhaps greater importance is the proportion of invalid and valid days accelerometer recording by day type. The data collection took place over three day types - the Forest School day and the two control days; the day with a physical education lesson (PE) and the day with no timetabled physical activity. As can be seen from Figure 5-3 (with the values detailed in Table 5-3) there is some variation in the proportion of valid and invalid days of accelerometer recording between the three day types, though the variance is not as great as it was between the weeks.

Figure 5-3. Number of valid and invalid days of recording by day type

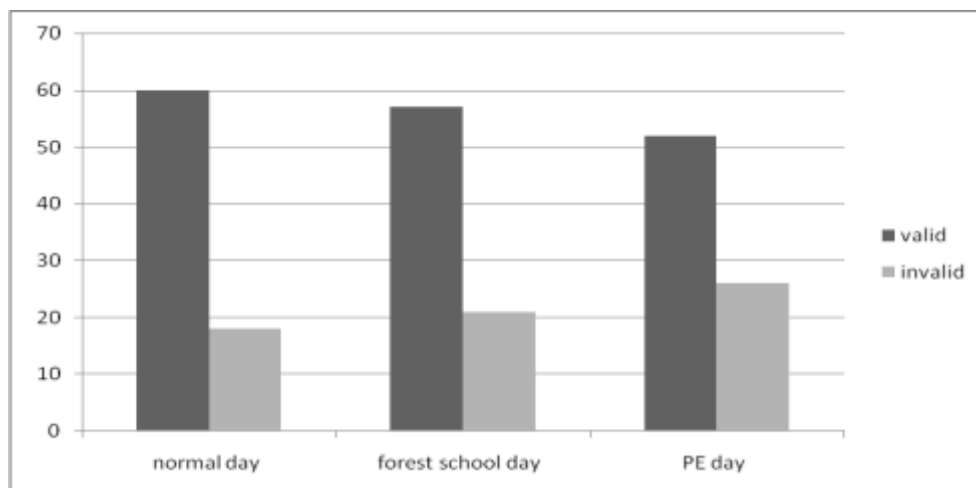


Table 5-4. Number of valid and invalid days of recording by day type

Day type	Normal day		Forest School day		PE day	
	Count	% of total days	count	% of total days	Count	% of total days
Valid	60	25.6%	57	24.4%	52	22.2%
Invalid	18	7.7%	21	9.0%	26	11.1%

Again the difference is probably explained by the data collection methods of week one, a greater number of participants remembered their accelerometers on the first day of recording (the normal day) than on the second (the Forest School day) and less still on the third day (the PE day).

5.5.6 Data transformation

From the raw accelerometry data three groups of variables were created; total activity, time spent at different intensities of physical activity and bouts of physical activity at moderate to vigorous intensity. The first, total activity, was used to give an overall impression of the total amount and intensity of the physical activity during the participants' day. The second two variables, time spent at different intensities of physical activity and bouts of physical activity at moderate to vigorous intensity, were used to give a greater understanding of the patterns of physical activity engaged in.

Total activity

The variable 'total activity' was created by finding the mean count for each child during the time period in question. This variable represents both the *total activity* and *average intensity* of physical activity. This is a valid measure as a previous study found that the mean count

of physical activity as measured by accelerometer (in a study of children) correlates with mean physical activity measured during laboratory based experimentation (Ekelund, et al. 2001).

An Excel function (AVERAGE) was used to calculate the mean count for each child from the raw accelerometer data.

Time spent at different intensities of physical activity

While the previous variable gives an indication of the average intensity and total amount of physical activity, which is both useful and valuable, for a greater understanding of the individual's physical activity the accelerometer data can be 'calibrated'. This allows the researcher to understand patterns of physical activity; this is particularly useful, for instance, when trying to find out whether the recommended levels of physical activity are being met.

Freedson et al. (2005) stated that to give the raw accelerometer counts more meaning the counts are 'translated, or calibrated, into a metric that is anchored to some biological variable (e.g. energy expenditure, heart rate) or to specific physical activity patterns (e.g. stationary or ambulatory)' (p(s)523). Freedson et al. went on to comment that this process of translation or calibration gives the raw accelerometer counts biological or behavioural meaning. Using previously devised thresholds provides a practical and relatively accurate interpretation of data collected in studies, such as this one, where it was not possible to develop thresholds (Freedson, et al. 2005).

As can be seen in Table 5-5 there are a number of calibration studies using representative populations (children) and activities (all studies mentioned used a combination of walking, running and various free living activities to determine the thresholds). 'Moderate intensity' activity refers to activity that raises the metabolism of the body by three to six times from its resting level. For inactive people brisk walking tends to constitute moderate physical activity, that which 'raises the heart beat and leaves the person feeling warm and slightly out of breath', for active people fast walking or jogging is likely to be necessary (Cavill, et al. 2006 p3). 'Vigorous intensity' generally refers to activity which raises the metabolism seven

or more times above resting level. To reach the minimum of this level one would, for example, need to jog at around five miles per hour or play a vigorous game of basketball (Cavill, et al. 2006).

Table 5-5. A selection of accelerometer calibration studies (adapted from Freedson et al. (2005))

Authors	Sample size	Age	Monitor	Criterion	Moderate intensity	Vigorous intensity
Treuth et al. (2004)	74	13-14	Actigraph	VO2	>3000cpm	>5200cpm
Trost et al. (1998)	30	10-14	Actigraph	VO2	>1002cpm	>3498cpm
Eston et al. (1998)	30	8.2-10.8	Actigraph	VO2	>500cpm	>4000cpm

Matthews (2005) noted that thresholds can vary by as much as 10 fold between calibration studies. There are a number of reasons why there are considerable differences between thresholds, but the primary reason is that the relationship between activity counts and energy expenditure varies substantially between individuals (Freedson, et al. 2005).

Ekelund et al. (2004) found that accelerometer counts for children walking at 4 kilometres (Km) per hour ranged between 400 and 2600 counts per minute (cpm) and while walking at 6 Km per hour the counts ranged from 1000 to 5000 cpm. A further issue is that, as mentioned in an earlier section, accelerometers are unable to capture *all* movement *all* the time; in particular they are unable to measure upper body movement. This means that accelerometers are likely to underestimate total physical activity particularly in free-living situations where a wide range of activity types are likely to be engaged in. Ekelund et al. (2001) concluded that ‘it is not likely that the relationship between activity counts and energy expenditure in a controlled laboratory setting reflects the relationship in free living children’.

Recognising these issues Ekelund et al. (2004) devised a set of thresholds which appear to occupy a middle ground between other published thresholds. Table 5-6 details the four thresholds, which are relevant to the present study, devised by Ekelund et al. (2004).

Table 5-6. Physical activity intensity thresholds devised by Ekelund et al. (2004)

Intensity of physical activity	Thresholds
Sedentary	<500 counts per minute
Light	500 – 1999 counts per minute
Moderate and vigorous	≥2000 counts per minute
Vigorous	≥3000 counts per minute

The thresholds devised by Ekelund et al. (2004) were selected for use in the present study. This is justified by the following reasons, firstly there is no generally recommended set of thresholds, secondly, as Ekelund et al. stated, this set represents a middle ground between the most and least conservative thresholds and are similar to those used in a number of other studies. Thirdly, recognising that accelerometers are likely to underestimate the total amount and average intensity of physical activity particularly in a free-living situation (this is particularly relevant to this study) it was considered that this set of thresholds were not too conservative and would allow for some underestimation of physical activity (however a further category of 'Very Vigorous' (≥4000 cpm – activity at an intensity which raises the metabolic rate nine or more times above its resting rate) was used for the present study, partly to allow comparison with studies which used more conservative thresholds than this one). Finally these thresholds (or ones very close to) have been used to estimate the amount of time spent at different intensities of physical activity in a number of recently published studies, some of which had large samples sizes, and where the participants were of the same age to the participants in the present study (Andersen, et al. 2006; Ekelund, et al. 2004; Riddoch, et al. 2004; Ridgers, et al. 2005).

The raw accelerometer data were placed into Microsoft Access, a query programme was written specifically for this study (written by C Skardon, a software engineer – personal contact), which extracted the number of minutes where the count was between two defined values.

Bouts of activity at a moderate and vigorous intensity

Current guidelines state that children should accumulate around an hour's moderate activity most days of the week (Chief Medical Officer 2004). However there is the question of how short the bouts of activity can be in order for them to count towards achieving the guideline ('bout' meaning sustained physical activity at or above a certain intensity). Masse et al. (2005) commented that it is suggested that for adults the guideline of thirty minutes of moderate physical activity can be accumulated in bouts of around 8-10 minutes. However they go on to note that there are no such suggestions as to how long children's bouts of moderate physical activity need to be. Only one recommendation was found by the author which related specifically to children. The National Association of Sport and Physical Education (NASPE), an American organisation, recommends the following guideline for children (ages 6-12); 'Guideline 2. Children should participate in several bouts of physical activity lasting 15 minutes or more each day'(NASPE accessed Jan 2006). It is unclear on what basis NASPE make this recommendation. No specific guidelines relating to children published in the United Kingdom were identified.

Five studies were found which extracted bouts from children's accelerometry data (Cradock, et al. 2004; Pate, et al. 2002; Trost, et al. 2001; Trost, et al. 1999; Trost, et al. 2002). The present study followed Trost et al. (2001) and extracted bouts of four different lengths (see Table 5-7); this approach provided the most relevant interpretation of the data gathered, allowing the patterns of activity to be understood in a clear and precise manner but with enough detail to be useful. A further issue relates to brief interruptions in the activity; for instance during a ten minute bout of vigorous activity, such as running, it is feasible that the individual may stop for a drink or to tie a shoelace. This brief pause may result in what was a prolonged bout of vigorous physical activity being discarded because it did not meet the criteria of ten *continuous* minutes. It has been suggested that one should allow a one or two minute interruption when extracting bouts, though this is in reference to adult studies, again there are no guidelines for children (Cradock, et al. 2004). Only one of the five studies identified above explained the criteria used in relation to these interruptions; Pate et al. (2002) allowed for proportional interruptions to each bout length.. The present study followed Pate et al.'s procedure; Table 5-7 details the bout length and number of minutes of interruptions allowed.

Table 5-7. Length of the bouts of continuous moderate to vigorous intensity physical activity and the number of outliers allowed

	Bout length	No of minutes of outliers
Bout 5+	5 minutes or more	1 minutes
Bout 10+	10 minutes or more	1.5 minutes
Bout 15+	15 minutes or more	2 minutes
Bout 20+	20 minutes or more	2 minutes

The bouts of moderate to vigorous intensity counts were extracted from the raw data using the data base query programme detailed previously and were calibrated using the moderate and vigorous threshold discussed for the previous variable (Ekelund, et al. 2004).

5.5.7 Self-perception scales data reduction

The participants were asked to fill in the two scales twice a day, once before lunchtime, at approximately 12:30pm, they were then asked to fill in the scales again just before the end of their school day at around 3:15pm. Therefore each child had two responses to the exertion question and two to the enjoyment question per day, overall this equates to 936 individual responses (4 responses per child x 26 children x 9 days).

At the end of each week the responses were placed into an Excel spread-sheet. The morning and afternoon responses were then summed to make a day response, the summed responses were then collapsed into the same format as the original responses. The day response was derived as it allowed for a comparison of the self-perception scores with the accelerometer recordings.

After reviewing the data it became obvious that the majority of the responses were clustered into two or three responses. The distributions of responses for the self-perceived enjoyment and self-perceived exertion scales are shown in Figure 5-4 and Figure 5-5.

Figure 5-4. Distribution of responses to self-perceived exertion scale.

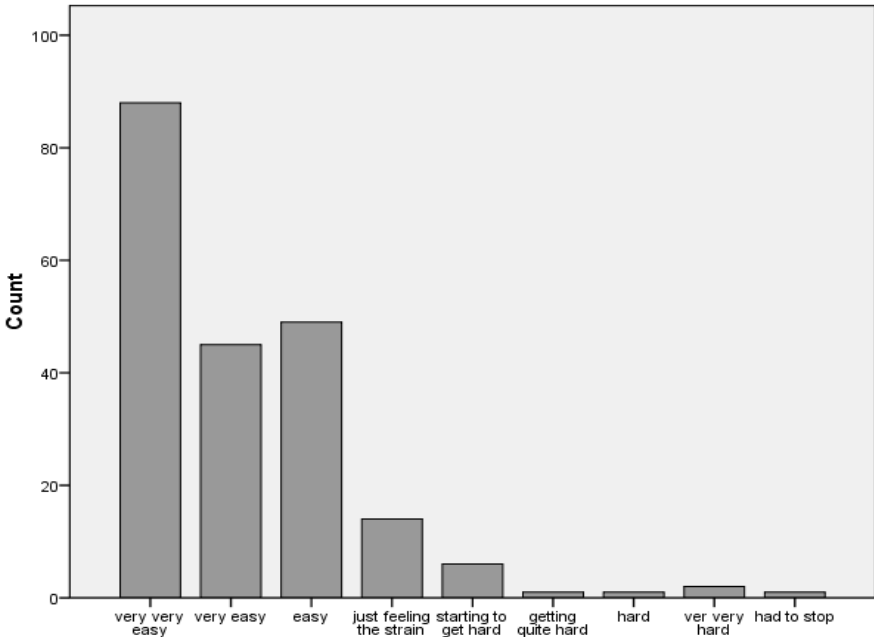
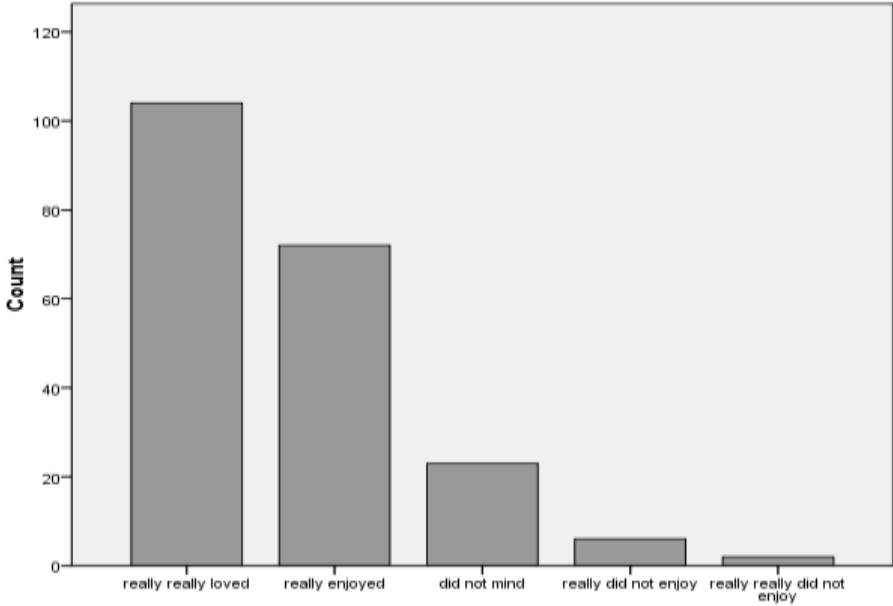


Figure 5-5. Distribution of responses to self-perceived enjoyment scales.



Analysis of the data (detailed in section 6.4) showed that there appeared to be no discernable association between the amount and intensity of physical activity and the responses. It was considered that the number of responses categories for each scale (5 responses for the enjoyment scale and 10 responses for the exertion scale) may have reduced

the chances of finding any relationship. Therefore the decision was taken to collapse both scales so that each had three response categories. It was hoped that this would increase the chances of finding any patterns in the data; Table 5-8 and Table 5-9 detail the collapsed scales. Following each table is a justification of why the responses were collapsed in such a way.

Table 5-8. Original and collapsed responses to self-perceived exertion scale

Response	Original response scale	Collapsed scale
Very, very easy	1	1 (very easy)
Very easy	2	
Easy	3	2 (easy)
I was just feeling the strain	4	3 (getting hard)
It was starting to get hard	5	
It was getting quite hard	6	
Hard	7	
Very hard	8	
Very, very hard	9	
So hard I had to stop	10	

Three broader response categories were created from the ten original perceived exertion response categories. The two 'very easy' response categories were collapsed into one 'very easy category', the 'easy' response category was left intact and forms the second collapsed category. Finally all the response categories where the participant could indicate they were feeling some strain were collapsed into a 'getting hard' category. Collapsing the categories in this way made sense logically and although degrees of perceived exertion may have been lost, the general meaning of the child's original response was kept.

Table 5-9. Original and collapsed responses to self-perceived enjoyment scale

Response	Original response scale	Collapsed scale
I really really did not enjoy the activity	1	1 (I did not enjoy the activity)
I really did not enjoy the physical activity	2	
I did not mind the physical activity	3	
I really enjoyed the physical activity	4	2 (I really enjoyed the activity)
I really really loved the physical activity	5	3 (I really really loved the activity)

Again three categories were formed from the original five responses to the self-perceived enjoyment question. The first three responses, which indicated that the child had a negative or neutral opinion of the activity, were collapsed into one category. The two positive responses were left as they were. In this case the proportion of responses guided the collapsing of the response categories, as the majority of the responses were positive, the two most positive categories were left intact. Therefore the analysis would investigate whether there was any relationship between the physical activity and the degree to which the children reported enjoying the physical activity.

5.6 Analytical approach

The data produced are repeated measures of the same group of participants. This means that particular attention must be applied to selecting a statistical method which is appropriate for the analysis of repeated measurements. As Ward et al. (2005) commented 'analysis of these data requires the use of procedures that account for the lack of independence in the data, that is, repeated measures are made of each study participant.

Such approaches as mixed modelling are necessary to control for the lack of independence in the data structure' (Ward, et al. 2005 p(s)585-6).

Following this advice (and advice from Mr G Der, a statistician at the MRC Social and Public Health Sciences Unit, Glasgow University) the Mixed Model approach (in SPSS Version 14.0 for Windows (Chicago, Illinois)) was used for the analysis of the phase one data. The mixed model was considered to be most appropriate for a number of reasons; as Brown and Prescott noted, mixed models are able to 'model data where the observations are not independent' (2006 p22). Furthermore, mixed models permit the data to exhibit correlation; repeated measures taken from the same individual are likely to display correlation and are, therefore, not independent and produce complicated covariance structures (Brown and Prescott 2006; Littell and Henry 1998; SPSS Accessed 2006). Another factor is that one does not have to 'make an initial distinction between within- and between-fixed effects' when using the mixed model (Wolfinger and Chan undated p3). Finally, mixed models were especially suitable for use in the present study as they are able to use *all* the available data; unlike other analysis approaches the mixed model does not ignore subjects with missing data (SPSS Accessed 2006; Wolfinger and Chan undated). This means that all the valid data was used in the analysis.

A typical example of the syntax used during the analysis with all the interaction terms included;

mixed

AverageLT BY week daytype_id gender

/fixed =week daytype_id gender week*daytype_id week*gender daytype_id*gender week*daytype_id*gender

/random intercept | subject(childid)

/emmeans tables (week)

/emmeans tables (daytype_id) compare (daytype_id)

/emmeans tables (gender)

/emmeans tables (week*daytype_id) compare (daytype_id)

/emmeans tables (week*gender)

/emmeans tables (daytype_id*gender)

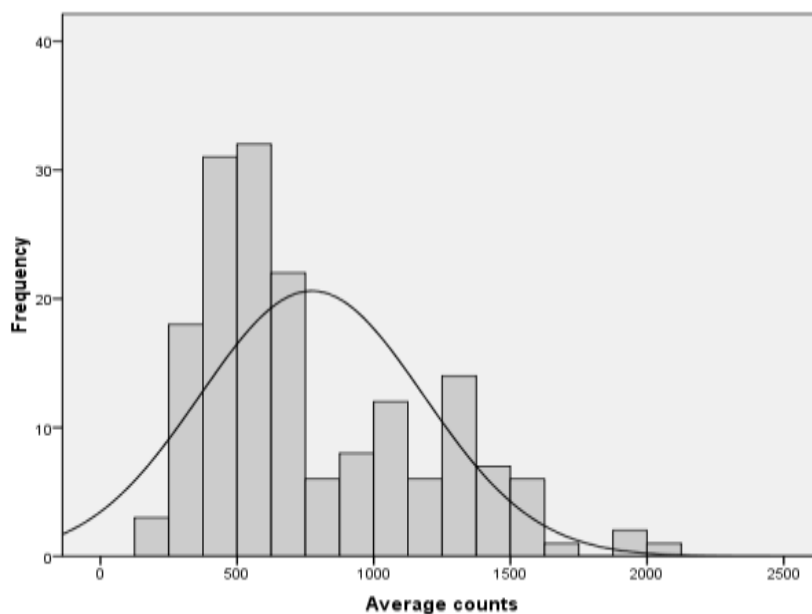
```
/emmeans tables (week*daytype_id*gender)
```

```
/print descriptives.
```

As this syntax indicates the use of this type of modelling allows the researcher to adjust for the effects of certain factors, such as day type or gender; therefore, one is able to test whether variation in the results is attributable to these factors.

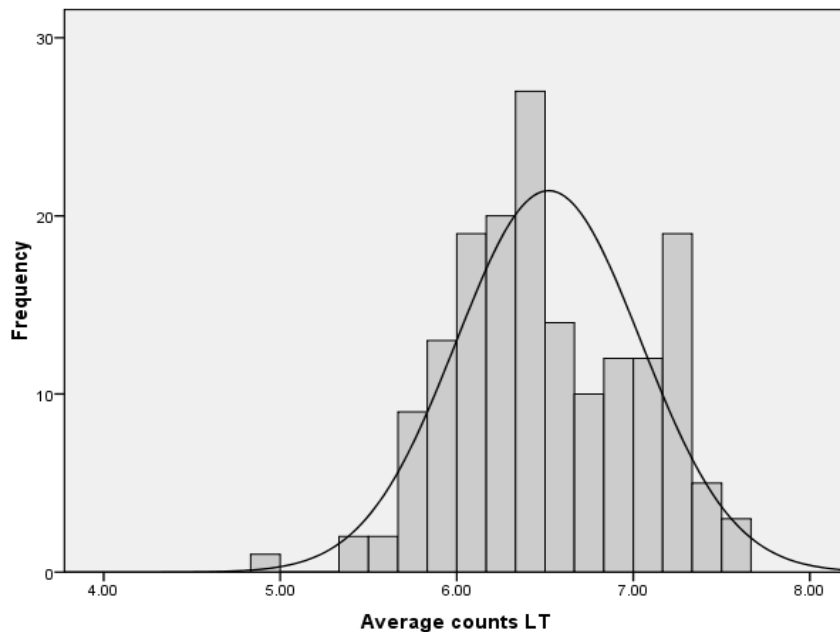
Using the SPSS mixed model approach requires the data to be normally distributed (Brown and Prescott 2006). The majority of the variables were found to be abnormally distributed and would therefore violate the assumptions of the mixed model test. Figure 5-6 illustrates that the variable 'total activity' was abnormally distributed, being skewed to the left and not fitting the bell curve of a normal distribution.

Figure 5-6. The abnormally distributed variable 'total activity'



The variables which were skewed (all of which were positively skewed) were corrected using the lognormal compute function in SPSS. Figure 5-7 illustrates how the skew was reduced and a more normal distribution was achieved, meaning that the data was suitable for use with mixed models.

Figure 5-7. Log transformed variable ‘total activity’



The significance of the variance in the results of the two self-perception questions was tested using the Friedman non-parametric test in SPSS. This is a two way analysis of variance which, similarly to the mixed models, allows for repeated measures, but makes no assumptions as to the distribution of the data (Dodge 2006).

5.6.1 Reporting of results

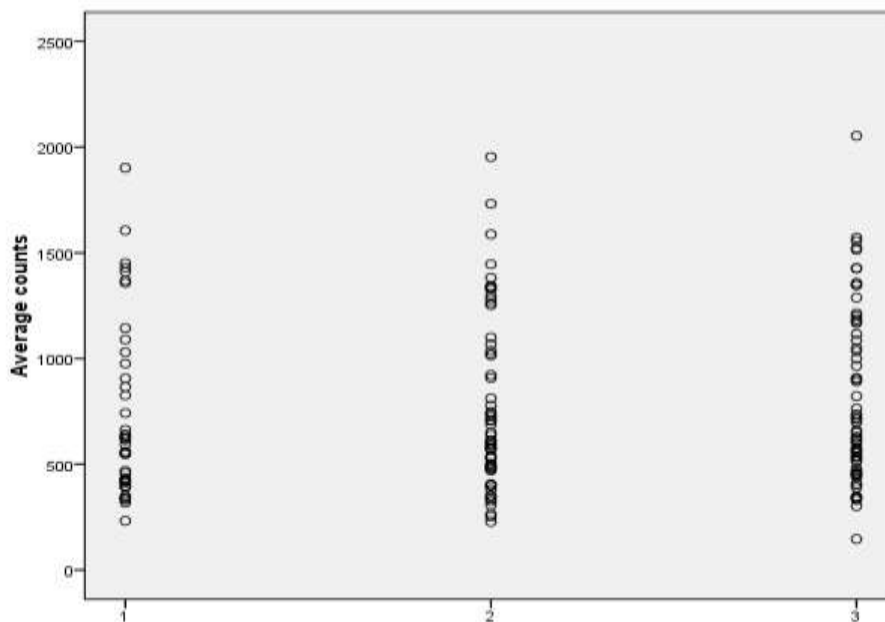
Following convention of reporting mixed model results only the p value is reported (Stevens, et al. 2004; Story, et al. 2003). The level of significance was set at $p < 0.05$. This significance level was chosen as it commonly accepted (though acknowledged to be contentious) to be the level at which findings are considered, and widely understood to be, significant (Bross 1971). Any results from log transformed variables were then anti-logged, so as to return the values back into meaningful results. As confidence intervals can be anti-logged but standard deviations and standard errors cannot, only confidence intervals are reported (Bland and Altman 1996; Olsen 2003).

5.6.2 Ensuring the reliability of the data

The present study used a repeated measures design, to ensure the reliability of the results; as the more measurements that are taken (of each individual) the more representative and accurate the overall results are likely to be. The following analysis examines whether there is any variation in the variable 'total activity' over the three weeks. This analysis is important for two reasons, firstly, to ensure that there were no considerable differences in physical activity between the three weeks and secondly, to examine whether the amount of missing data (which varied between the weeks) had any impact on the results.

Figure 5-8 (with the values in Table 5-10) shows that there are no strong differences in the distribution of the mean total activity between the weeks. The majority of the average counts for each of the three weeks are clustered between 250 counts per minute (cpm) and 1500cpm. The most noticeable difference is that there are less data points in the mid range (around 750cpm to 1250cpm) for week one. This is most likely to be due to the smaller number of valid recordings during week one. The data points are missing from this range because the Forest School days and the PE day had fewer valid recordings than the normal school day. Analysis detailed in a later section of this chapter finds that the total activity was higher on the PE and Forest School days.

Figure 5-8. Distribution of the variable total activity for each of the three weeks of recording.



Analysis using the mixed model approach confirmed that week did not contribute significantly to the variation seen in total activity ($p = 0.276$). The means and 95% confidence intervals are found in Table 5-10.

Table 5-10. Mean total activity by week

Week	Mean average count	95% Confidence Intervals	
		Lower bound	Upper bound
Week one	656.6	597.6	721.3
Week two	661.2	606.7	721.3
Week three	696.5	640.3	756.7

The analysis was taken further using the mixed model to investigate whether there was any variation in total activity between the different day types over the three weeks. This was done using a two way interaction between week and day type. Figure 5-9 indicates graphically the distribution of the average counts of the three different day types over the three weeks. The mixed model analysis finds that there was no significant interaction effect between day type and week on the variation in average counts ($p = 0.236$). The means and 95% confidence intervals are found in Table 5-11.

Figure 5-9. Distribution of the variable total activity by day type and week

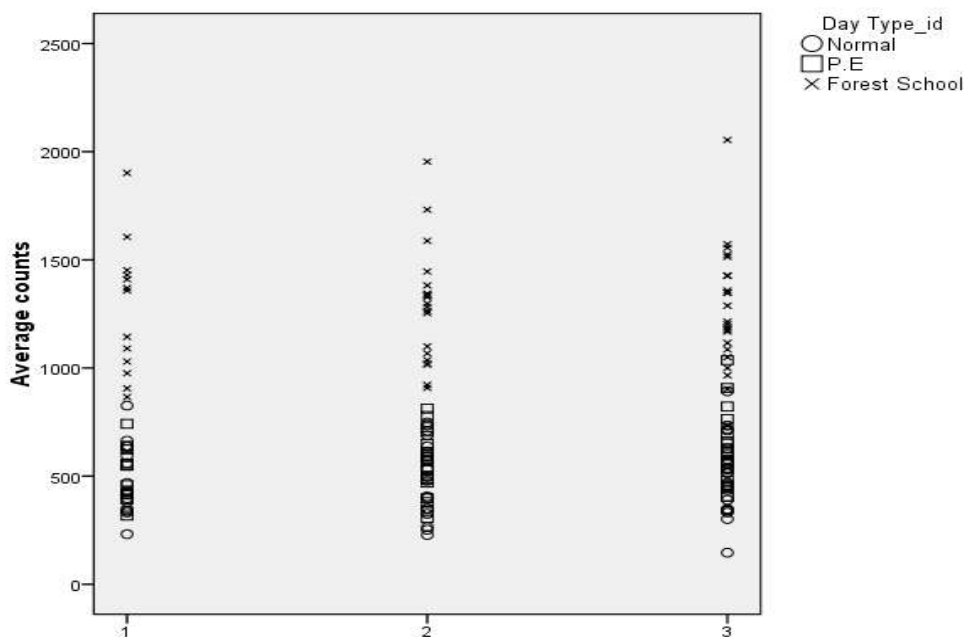


Table 5-11. Total activity by day type and week

Week	Day type	Mean	95% Confidence Intervals	
			Lower bound	Upper bound
Week one	Normal	462.2	409.9	521.1
	PE	500.2	433.5	577.1
	Forest School	1196.3	1051.5	1362.4
Week two	Normal	443.6	395.4	498.2
	PE	521.7	465.9	584.6
	Forest School	1245.1	1112.1	1394.1
Week three	Normal	449.9	404.2	501.2
	PE	603.0	539.2	673.8
	Forest School	1246.4	1119.9	1388.5

Therefore it is concluded that there is no significant variation in the data between the three weeks, and that the amount of invalid data between the weeks does not adversely affect the analysis.

The results of the analysis of the data collected during the first phase of this research are detailed in the following chapter.

6 Results of phase one data collection

The following chapter details the results of the first phase of data collection. The chapter is split into four sections: the first section explores the variation in the quantity, intensity and patterns of physical activity between the day types; the second section examines the variation in activity between the genders; in the third section the differences in the physical activity during specific periods of the Forest School days in comparison to those on the typical school days are explored; the fourth, and final, section focuses on the results from the self-perception measures.

6.1 *The quantity, intensity and frequency of physical activity at Forest School*

The primary aim of this phase of the evaluation was to investigate the levels of physical activity during the Forest School days. This was done by comparing the levels of physical activity on the Forest School days with those on the two typical school days; the results of this analysis are detailed in the following sections.

6.1.1 Graphical representation of the raw accelerometer data

The raw accelerometer data consists of a value for each point in time (the frequency of each data point depends on the epoch time (i.e. 10 seconds, 30 seconds or 1 minute) chosen for the data collection. This data can then be graphed, giving a useful, visually descriptive, sense of the differences in physical activity between the day types. Figure 6-1, Figure 6-2, and Figure 6-3 detail the patterns of physical activity for each day type. The following figures use averaged data from the three day types; each spike represents the total counts recorded during each thirty second epoch.

Figure 6-1. Accelerometer counts (per thirty seconds) during the normal school days

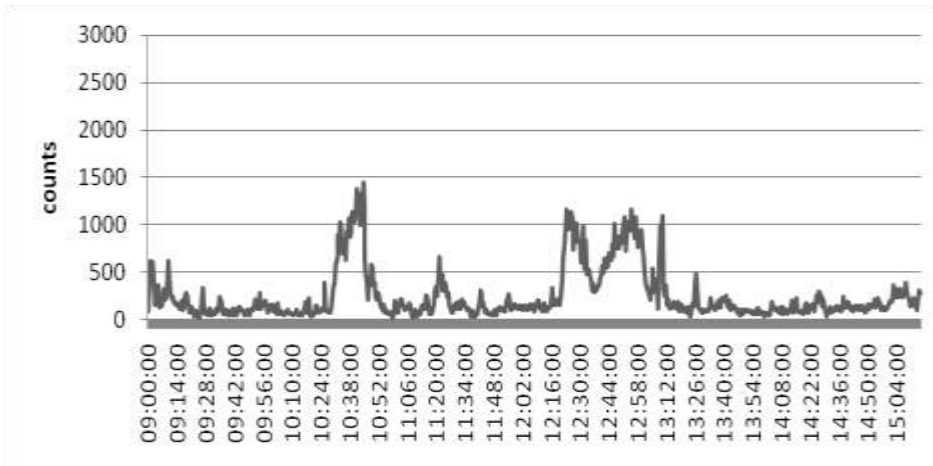


Figure 6-2. Accelerometer counts (per thirty seconds) during the PE days

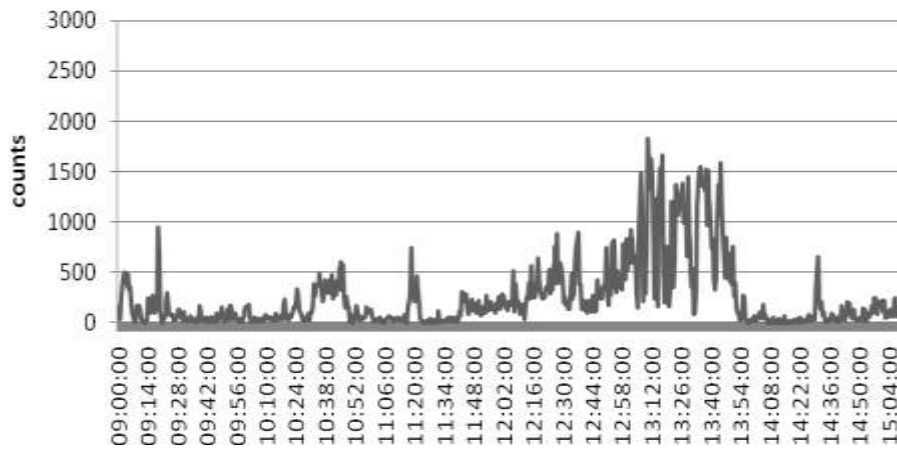
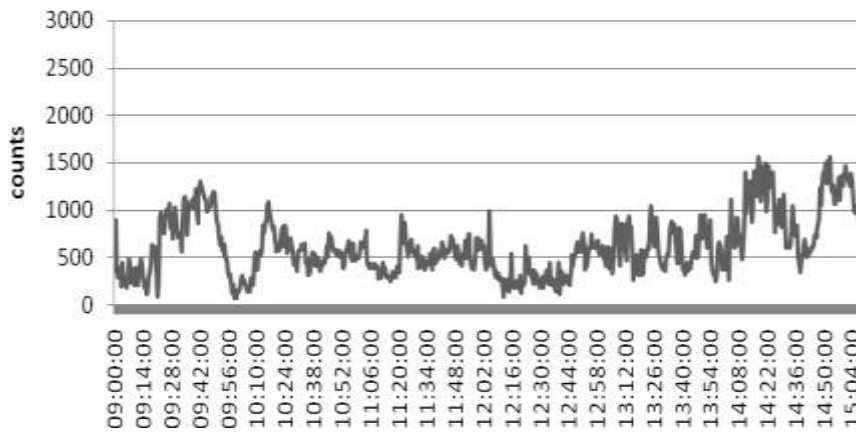


Figure 6-3. Accelerometer counts (per thirty seconds) during the Forest School days



These three figures indicate, visually, that there are differences in both the total amount and average intensity of physical activity between each of the day types. These preliminary results suggest that it is likely that the levels of physical activity were greater on the Forest School days than on either of the two typical two school days. Both the normal school day and the PE day are characterised by long periods of very low intensity physical activity punctuated by peaks of higher intensity physical activity. For instance in Figure 6-1 one can quite clearly identify the children's break and lunch times (break 10:30-10:50am and lunch 12:30-1pm) by the increase in the average intensity during these periods (this may be less obvious in Figure 6-2 as on one of the PE days the children were prevented from going outside during their break times thereby reducing their opportunity to be physically active). However, as can be seen in Figure 6-3, the average intensity during the Forest School days appears to be much greater, and, although there are identifiable peaks of particularly high intensity physical activity, the intensity is consistently higher.

6.1.2 Variation in total physical activity between day types

It is quite clear from the graphical representation of the raw accelerometry data (Figure 6-1, Figure 6-2, Figure 6-3) that the total activity was likely to be greater on the Forest School days than it was during the other two school day types. This was tested by examining the variation in the variable 'total activity'. Figure 6-4 and Table 6-1 which detail the variation in the total activity between the day types, show quite clearly that the total physical activity was considerably greater on the Forest School days than on either the normal or the PE days.

Figure 6-4. Total activity by day type (showing mean count per minute and 95% CI)

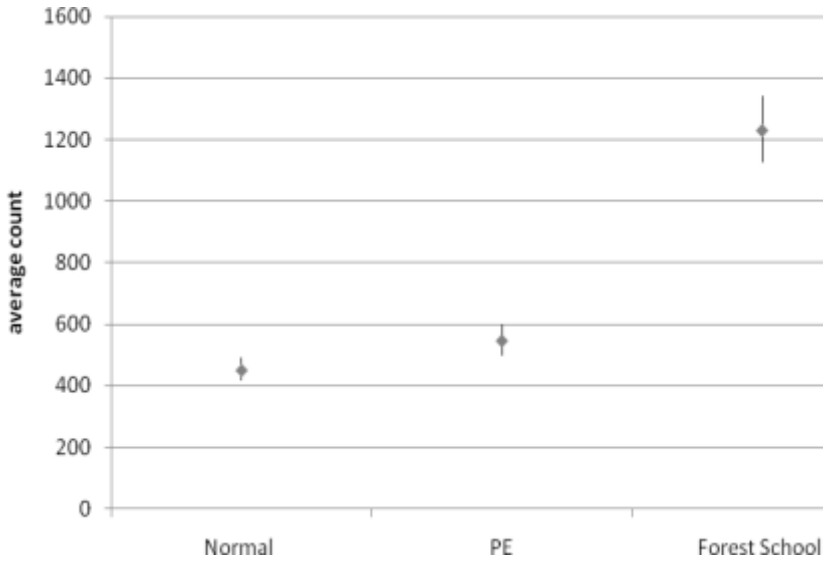


Table 6-1. Total activity by day type

Day Type	Mean average count	95% Confidence Intervals	
		Lower bound	Upper bound
Normal	450.3	420.2	490.3
PE	546.2	499.7	597.0
Forest School	1229.1	1127.8	1340.7

The mixed model analysis showed that there was a significant variation in the mean total activity between the day types ($p \leq 0.001$).

While the difference in total physical activity between the Forest School days and the two typical school days is (visually) obvious, it is not clear whether there is a difference in the total physical activity between the normal school days (when there was no structured physical activity) and the days with a PE lesson. A pairwise comparison was used to examine the differences between each paired day type: the variation in total activity between the individual day types was also found to be significant ($p \leq 0.001$ for each paired comparison). Therefore the children engaged in a significantly more physical activity on the PE days than they did on the normal days.

The mean total activity count on the Forest School day (1229.1 counts per minute (cpm)) was 2.2 times greater than the average total activity on the days with a PE lesson (546.2cpm) and 2.7 times greater than the average cpm of the normal days (450.3).

This variable can also be used to indicate the average intensity of the physical activity. The results show that the average intensity of physical activity during Forest School days (1229.1cpm), according to the thresholds used for the present study (sedentary <500cpm, light 500-2000cpm, moderate and vigorous ≥ 2000 cpm and vigorous ≥ 3000 cpm; see section 5.5.6), was of a light intensity. The average intensity during the PE days (546.2cpm) just qualifies as light intensity and on the normal school days the average intensity (450.3) is categorised as sedentary.

6.1.3 Variation in the time spent at different intensities of physical activity between the day types.

While the analysis of the variation of the total physical activity between the day types, is valuable and illuminating, only broad overall patterns are revealed. A commonly used approach, to gain a greater understanding of the patterns of physical activity, is to gauge the accumulated amount of time spent at different intensities of physical activity. In the following section the amount of time spent at different intensities of physical activity between the three day types is explored.

Initial exploratory analysis, detailed in Figure 6-5 which shows the proportion of time spent at three different intensities of physical activity for each day, indicates that there are differences between the day types. In particular, there are clear differences, in the proportion of time spent at each intensity of physical activity, between the Forest School days and the two ordinary school day types.

Figure 6-5. Proportion of each day type spent at a sedentary, light, or moderate and vigorous intensity of physical activity

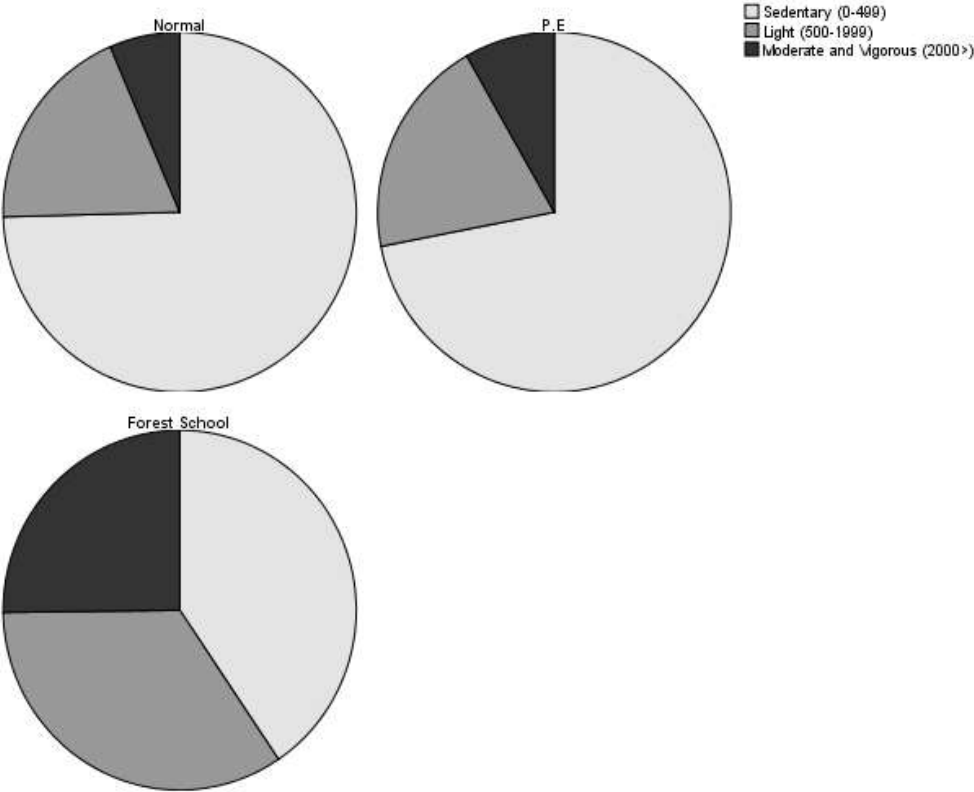


Figure shows percentage of the sum of total time spent at each intensity of activity.

As the results in Table 6-2 reveal, during the normal school days the children were found to be sedentary for almost 75% of their time. Only 6% of their physical activity was at a moderate and vigorous intensity (MVPA). The percentages were found to be broadly similar for the PE days; with the children spending just over 70% of this day type at a sedentary intensity of physical activity and 8% of the day at MVPA. However, during the Forest School days the picture is very different. The children were active at a sedentary level for only 40% of these day types. The proportion of MVPA increased to 25% of their day.

Table 6-2. Percentage of each day spent at each intensity of physical activity.

Day Type	Sedentary	Light	Moderate and Vigorous
Normal	74.58%	18.98%	6.44%
PE	71.95%	19.79%	8.26%
Forest School	40.55%	34.26%	25.19%

The following sections take a closer look at the differences in the accumulated time spent at different intensities of physical activity, between the day types. As a reference the length of the school day was six hours and fifteen minutes (375 minutes)

6.1.4 Variation in the time spent at a sedentary level of physical activity

Figure 6-6 graphically illustrates the fact that the participants were sedentary for a greater period of time during the normal and PE days than they were during the Forest School days. The mixed model analysis found, the results of which are in

Table 6-3, that day type did contribute significantly to the variation in the amount of time spent at the sedentary intensity ($p \leq 0.001$). However, a pairwise comparison found that the difference was only significant between the Forest School days and the normal and PE days ($p \leq 0.001$ for both paired comparisons). The difference in the number of minutes of sedentary activity between the normal and the PE days was not significant ($p=0.342$).

Figure 6-6. Number of minutes spent at a sedentary intensity of physical activity (showing mean and 95% CI)

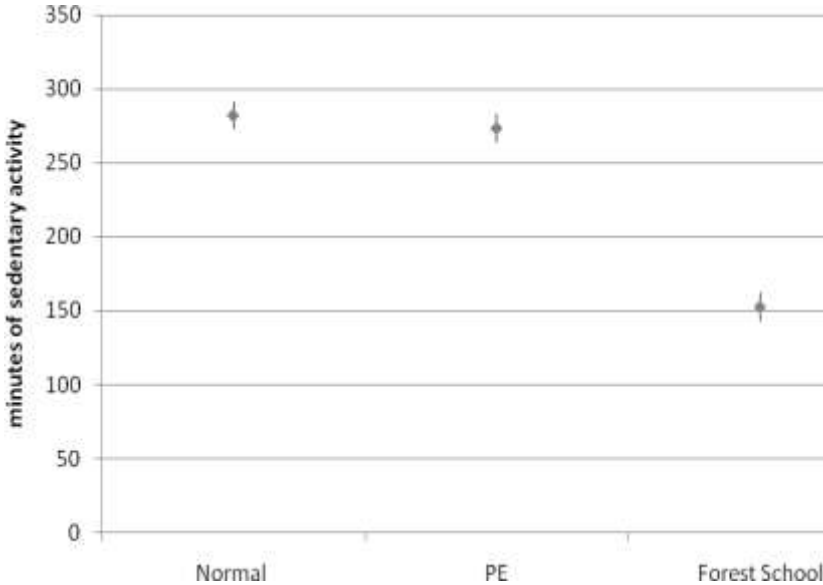


Table 6-3. Mean number of minutes spent at a sedentary intensity of physical activity

Day Type	Mean number of minutes	95% Confidence Intervals	
		Lower bound	Upper bound
Normal	280.33	266.67	294.71
PE	271.78	257.49	287.15
Forest School	147.23	139.77	154.93

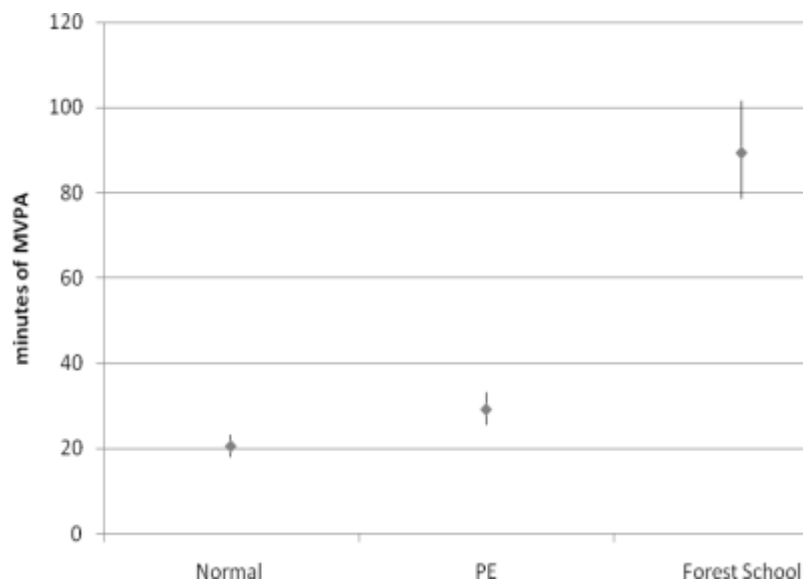
On average, the participants in the present study were sedentary for an accumulated 282 minutes of the normal school days and 280.3 minutes of the PE days. On Forest School days this fell to an average of 147.2 minutes of sedentary time, this is 84% less than during the normal days and 78% less than during the PE days (271.7 minutes).

6.1.5 Variation in time spent at a moderate and vigorous intensity of physical activity between the day types

The current Scottish guideline states that children should accumulate one hour of activity, of at least moderate intensity, on most days of the week (Scottish Executive 2003). Although the data collected in this study does not represent the participants' whole day, just the time the participants spent at school, it gives a useful indication of the opportunities the participants had to engage in moderate to vigorous activity (MVPA) within the school setting, which is a significant proportion of their waking day.

The children were found to have engaged in considerably more minutes of MVPA on the Forest School days than they did during either of the other two day types, Figure 6-7 illustrates this variation.

Figure 6-7. Number of minutes spent at a moderate and vigorous intensity of physical activity (showing mean and 95% CI)



Again one can see there is significant variation in the minutes of MVPA between the three day types; in particular between the Forest School days and the two ordinary school days. Table 6-4 shows the results of the mixed model analysis, which found that day type contributed significantly to the variation observed in time spent at a moderate and vigorous intensity ($p \leq 0.001$).

Table 6-4. Mean number of minutes spent at a moderate and vigorous intensity of physical activity

Day Type	Mean number of minutes	95% Confidence Intervals	
		Lower bound	Upper bound
Normal	20.45	18.03	23.17
PE	29.08	25.46	33.21
Forest School	89.39	78.57	101.60

In fact, there was, on average, a 337% difference in the mean number of minutes of MVPA between the normal school days and the Forest School days and a 201% difference between the PE days and the Forest School days. The children were also found to have engaged in 40% more minutes of MVPA on the PE days than they did on the normal school days. A pairwise comparison found that the difference between each of the day types was significant, ($p \leq 0.001$ for each paired comparison).

During the Forest School days the children, on average, accumulated 89 minutes (1 hour and 29 minutes) of physical activity at a moderate and vigorous intensity. However on normal school days the participants accumulated, on average, 20 minutes of MVPA and on P.E days, 29 minutes of MVPA. This means that during the Forest School days the participants easily reached, and exceeded, the recommended one hour of accumulated moderate activity, whereas on the normal and P.E days, the participants, on average, accumulated around a half and a third, respectively, of the recommended amount of MVPA.

6.1.6 Variation in the time spent at higher intensities of physical activity.

The following sections focus on the variation in the amount of higher intensity physical activity (vigorous and very vigorous) between the day types (see Table 5-6 for details of the thresholds).

6.1.7 Time spent at a vigorous level of physical activity

As with the previous analysis, day type was found to contribute significantly to the variation in number of minutes spent at a vigorous intensity of physical activity ($p \leq 0.001$) (see Table 6-5 and Figure 6-8). The pairwise comparisons found there was a significant variation in the time spent at a vigorous intensity of activity between each day type ($p \leq 0.001$ for both paired comparisons).

The children, on average, during Forest School days, engaged in 38.24 minutes of vigorous intensity physical activity. This is 30 minutes, or 335%, more than they did during the average normal day and 23 minutes, or 163%, more than during the PE days.

Figure 6-8. Number of minutes spent at a vigorous intensity of physical activity (showing mean and 95% CI)

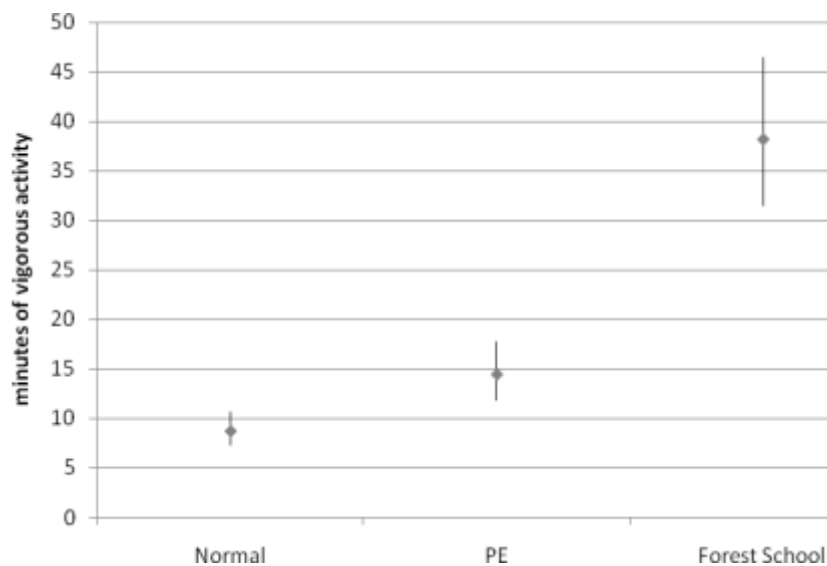


Table 6-5. Mean number of minutes spent at a vigorous intensity of physical activity

Day Type	Mean number of minutes	95% Confidence Intervals	
		Lower bound	Upper bound
Normal	8.78	7.26	10.63
PE	14.51	11.85	17.80
Forest School	38.24	31.47	46.48

6.1.8 Time spent at a very vigorous level of physical activity

The time spent at a very vigorous intensity was also found to vary significantly between day type ($p \leq 0.001$). The results of the mixed model analysis are detailed in Table 6-6.

Table 6-6. Mean number of minutes spent at a very vigorous intensity of physical activity

Day Type	Mean number of minutes	95% Confidence Intervals	
		Lower bound	Upper bound
Normal	4.36	3.52	5.41
PE	5.39	4.36	6.67
Forest School	13.28	10.88	16.22

While the children accumulated just 13 minutes of very vigorous intensity physical activity on Forest School days this was, on average, 2.4 times greater than during the PE days (5.39 minutes) and 4.2 times greater than during the normal school days (4.36 minutes)

Although day type was found to significantly contribute to the variation in the time spent at a very vigorous intensity, a pairwise comparison highlights the fact that only the variation between the Forest School days and the other two day types was significant ($p \leq 0.001$ for the comparison of Forest School with both the normal days and the PE days). There was no significant variation in number of minutes of very vigorous physical activity between the normal school days and the PE days ($p = 0.86$).

6.1.9 Bouts of physical activity at a moderate and vigorous intensity

The investigation of variation in the frequency and mean number of bouts of continuous moderate and vigorous intensity physical activity (MVPA) was the final way in which the differences in physical activity between the day types was examined. Four separate sets of bouts were extracted in four different time lengths, ≥ 5 minutes, ≥ 10 minutes, ≥ 15 minutes and ≥ 20 minutes of MVPA (see section 5.5.6 for more detail).

Unfortunately the data are not suitable for analysis using the mixed model (distributions could not be corrected or there were too few values for accurate modelling); therefore the variations have not been tested statistically.

6.1.10 The frequency of bouts of MVPA

Unsurprisingly, bouts of five or more minutes of MVPA were the most frequent, with fewer bouts found for each subsequent bout length. Table 6-7 details the total sum of instances of each bout length across the nine days of physical activity measurement.

Table 6-7. Sum of instances of each bout length

Bout length	Total sum of instances
≥ 5 mins	520
≥ 10 mins	163
≥ 15 mins	68
≥ 20 mins	35

The results show that the children engaged in a considerably higher number of bouts of five or more minutes of MVPA than of any of the longer bout lengths. In fact the number of ≥ 5 minute bouts was 3.2 times greater than the number of ≥ 10 minutes bouts, 7.6 times greater

than the number of ≥ 15 minute bouts and 14.9 times greater than the number of ≥ 20 minutes bouts.

6.1.11 The frequency of bouts of MVPA between the day types

The following results, which report the variation in the total sum of instances of the bouts between the day types, must be viewed with some caution as there are differences in the number of valid days of accelerometer recording between the day types. However the results are included as they provide a useful indication as to the differences in physical activity between the day types.

The frequency of bouts was found to vary noticeably between the day types. In particular the children engaged in a considerably higher number of bouts, of each length, on Forest School days than on either of the two typical school day types. Figure 6-9 clearly illustrates this variation, the values can be found in Table 6-8.

Figure 6-9. Sum of instances of each bout length by day type

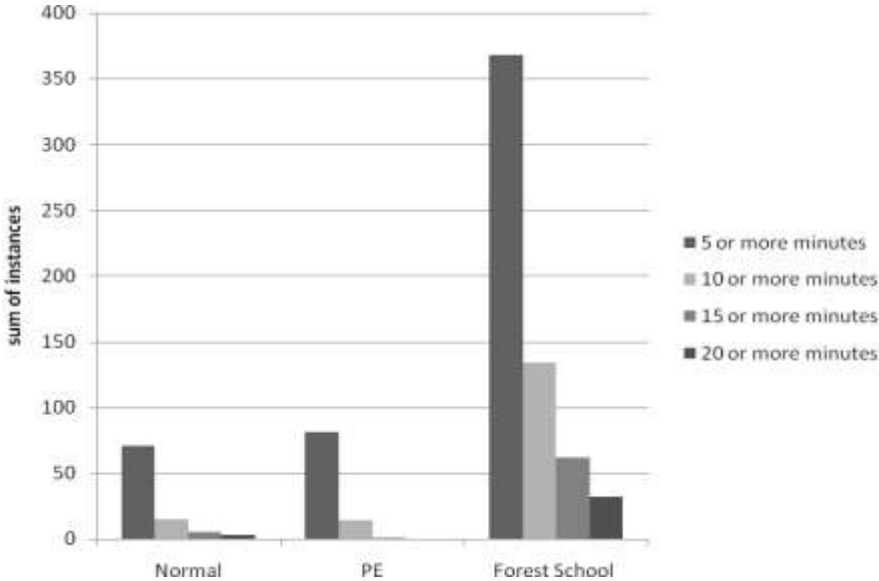


Table 6-8. Sum of instances of each bout length by day type

Bout length	Sum of instances		
	Normal (60 valid days recording)	PE (52 valid days recording)	Forest School (57 valid days recording)
≥ 5 mins	71	81	368
≥10 mins	15	14	134
≥15 mins	5	1	62
≥20 mins	3	0	32

The children clearly accumulated a far higher total number of bouts, of each length, on the Forest School days than they did on either the normal or the PE days. The children accumulated 4.5 times more bouts of ≥ 5 minutes on the Forest School days than they did on the PE day and 5.1 times more on than on the normal day. On the Forest School days they accumulated 9.6 times more bouts of ≥ 10 minutes than they had on the PE days and 8.9 times more than on the normal days. The difference between the day types becomes even more considerable as the bout length increases. Whereas only one instance of activity at a moderate and vigorous intensity, for 15 minutes or more, was recorded on any of the PE days, and just five bouts of this length were recorded over the normal days, the children accumulated 62 bouts of ≥ 15 minutes on the Forest School days. While no bouts of ≥ 20 minutes of MVPA were recorded on the PE days and just 3 on the normal days, 32 instances of bouts of this length were recorded over the Forest School days.

Two thirds of the children achieved at least one bout of ≥ 20 minutes across the three Forest School days. Seven of the children achieved two bouts, two of the children achieved three bouts and one child achieved five bouts of \geq twenty minutes of MVPA across the three Forest School days.

There is, however, little variation between the normal and the PE days. Despite the inclusion of the 30 minutes of physical activity during the PE lesson on the PE days, the children accumulated fewer longer-length bouts than on the normal days (this variation

could partly be due to the fact that on the PE day of the first week the children were prevented from going outside during their break times, which severely restricted their opportunity to be physically active). A greater number of bouts of ≥ 5 minutes were recorded over the PE days than over the normal days; these results suggest that the PE lesson gives the children a greater opportunity to participate in shorter rather than longer bouts of physical activity.

6.1.12 Variation in the mean number of bouts of MVPA between the day types

The following section examines the mean number of bouts between each of the day types, the means and standard deviations are in table 22.

Table 6-9. Average number of each bout length by day type (showing mean and SD)

Bout length	Normal		PE		Forest School	
	mean	SD	mean	SD	mean	SD
≥ 5 mins	1.20	1.3	1.56	1.2	6.46	3.4
≥ 10 mins	0.25	0.6	0.27	0.5	2.35	1.3
≥ 15 mins	0.08	0.3	0.02	0.1	1.09	0.9
≥ 20 mins	0.05	0.2	0.00	0.0	0.56	0.7

On average, the children achieved 1.2 bouts of ≥ 5 minutes of MVPA on the normal school days and 1.6 on the PE days. However on the Forest School days the mean number of bouts of ≥ 5 minutes was 6.5. Furthermore on the Forest School days the children, on average, engaged in bouts of MVPA of ≥ 10 minutes 2.4 times, an average of 1.1 bouts of ≥ 15 minutes and 0.6 bouts of ≥ 20 minutes. The mean number of the longer length bouts of MVPA was higher on the Forest School days than on either of the other two day types. On the non-Forest School days the mean number of the longer length bouts were considerably less, just 0.25 bouts of ≥ 10 minutes, 0.08 bouts of ≥ 15 minutes and 0.05 bouts of ≥ 20 minutes on the normal day. On the PE days the averages were 0.27 bouts of a length of ≥ 10 minutes, 0.02 bouts of ≥ 15 minutes and 0 bouts of ≥ 20 minutes. The children, therefore, engaged in a

greater number of bouts, of all lengths on the Forest School days than on the typical school days.

6.2 Differences in the quantity, intensity and frequency of physical activity between the genders

This section asks whether there were any differences in physical activity between the boys and girls who participated in this study.

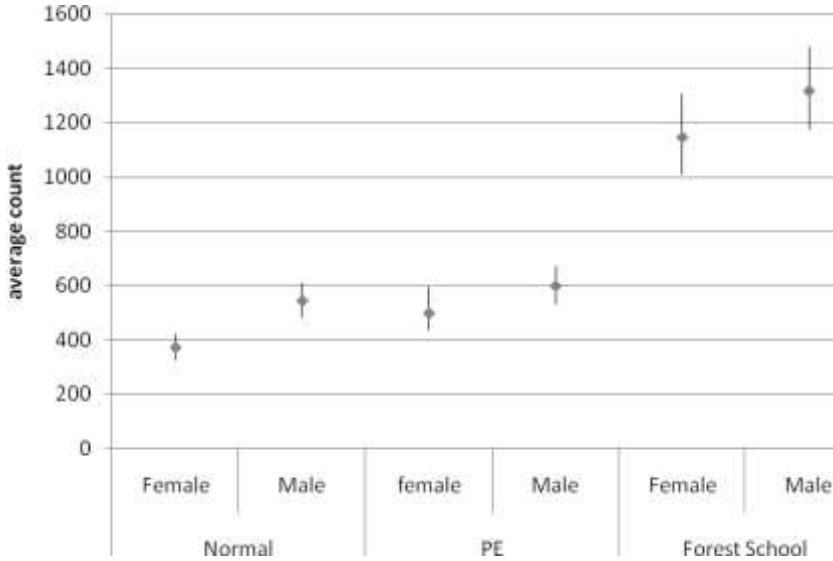
6.2.1 Variation in total activity between each gender and by day type

Mixed model analysis showed that there were considerable differences in the levels of physical activity between each gender. Overall the analysis found that there was a significant interaction between gender and day type in explaining the variation in the total activity ($p = 0.006$). Meaning that across the day types the boys' total activity was significantly different to that of the girls. The results of the analysis are presented in Table 6-10. The variation in average total activity between each gender, on each day type, is illustrated in Figure 6-10.

Table 6-10. Total activity by gender and day type

Day type	Gender	Mean average count	95% Confidence Intervals	
			Lower bound	Upper bound
Normal	Female	372.4	328.7	422.4
	Male	544.0	484.9	610.9
PE	Female	498.2	436.2	596.1
	Male	598.8	532.7	673.2
Forest School	Female	1147.1	1008.3	1305.1
	Male	1318.2	1173.8	1480.3

Figure 6-10. Total activity by gender and day type (showing mean and 95% CI)



Despite the fact that *overall* there is a significant variation in the levels of physical activity between each gender on the different day types, further analysis of the data finds that the levels of physical activity between the genders for each of the day types are not all significantly different. A pairwise comparison showed that the variation in total activity between each gender on the normal school days is strongly significant ($p \leq 0.001$), the difference on the PE days is weaker but still significant ($p = 0.042$). However the variation in total activity between the genders on the Forest School days is *not* significant ($p = 0.112$).

The inequality in average intensity between the genders was the most pronounced on the normal days; the average intensity of the boys’ physical activity was 46% greater than the girls’ on the normal day. On the PE days this difference was 20%. However on the Forest School days the inequality in the average intensity of physical activity between the genders was the least, and was found to be just 15%.

The data were analysed further to examine whether the levels of physical activity were different between each day type for each gender, (i.e. did the boys do significantly more physical activity on the Forest School days than they did on the normal or PE days?).

The results showed that there was a significant variation in the boys’ total activity between the normal school days and the Forest School days ($p \leq 0.001$) and between the PE days and the Forest School days ($p \leq 0.001$). The boys’ total activity during the Forest School days represents an increase of 142% in comparison to the total activity of the normal school days

and a 120% increase against the PE days. However the boys' total activity was not significantly greater on the PE days in comparison to the normal days ($p = 0.077$); the total activity was just 10% greater.

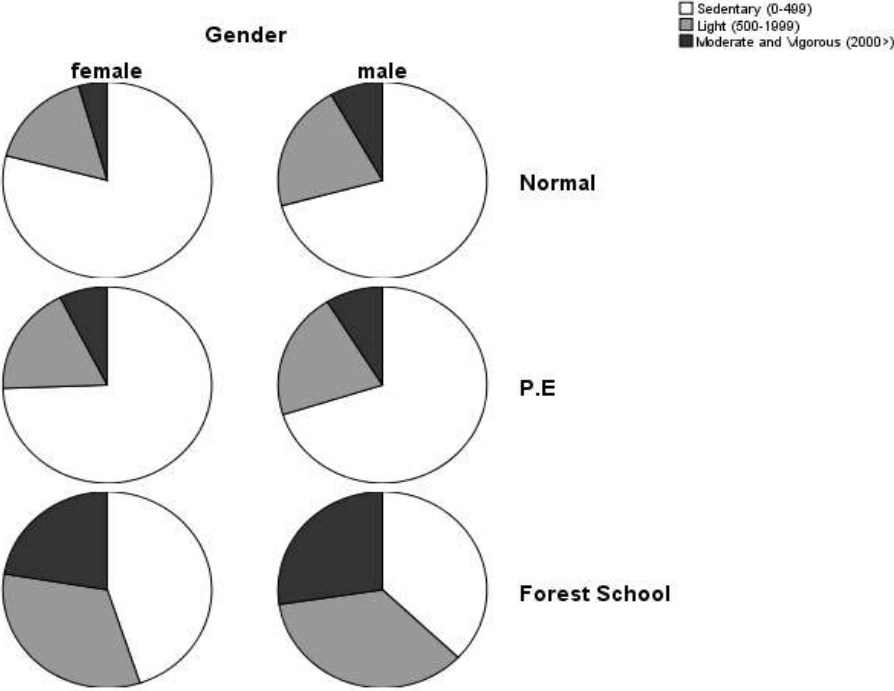
There was also a significant variation in the girls' total activity between each of the day types ($p \leq 0.001$ for each paired comparison). Their total activity on the PE days was 34% greater than it was on the normal days. The girls' total activity during the Forest School days was, on average, 298% greater than the total activity during the normal school day and 130% greater than during the PE days.

6.2.2 Variation in the time spent at different intensities of physical activity between each gender and by day type.

The following section examines whether there was any variation in the time spent at different intensities of physical activity between the genders on the different day types.

As can be seen in Figure 6-11, there are noticeable differences in the proportions of time spent at the three intensities (sedentary, light, and moderate and vigorous) of physical activity between the boys and the girls between the day types. The girls appear to have accumulated less light intensity physical activity and less moderate and vigorous intensity physical activity (MVPA) than the boys, on each of the three day types. The girls appear to have been more sedentary than the boys on each of the day types.

Figure 6-11. Proportion of each day type spent at a sedentary, light or moderate and vigorous intensity of physical activity by gender



Charts show percentage of the sum of total minutes of activity at each intensity of activity.

These differences were explored further in order to investigate whether the variation in the amount of time spent at the different intensities of physical activity, between the boys and the girls, was statistically significant. The following section focuses on the same four intensity categories which were discussed previously (section 6.1.3); sedentary, moderate and vigorous (MVPA) and the two higher intensity categories (both of which are a component of MVPA), vigorous and very vigorous. The variation in time spent at a moderate and vigorous intensity is examined first as it can be argued to be the most valuable indicator of the children’s physical activity.

6.2.3 Variation in the time spent at a moderate and vigorous intensity of physical activity between each gender and by day type.

Overall the boys accumulated more minutes of MVPA than the girls. As can be seen in Table 6-11, the boys accumulated an average of 44 minutes of MVPA to the girls' 32 minutes of MVPA, this is a significant difference ($p = 0.005$).

Table 6-11. Mean number of minutes spent at a moderate and vigorous intensity of physical activity by gender

Gender	Mean number of minutes	95% Confidence Intervals	
		Lower bound	Upper bound
Female	31.91	27.19	37.45
Male	44.30	38.32	51.21

A significant interaction effect was also found between gender and day type ($p \leq 0.001$), meaning that, overall, there were significant differences in the number of minutes of MVPA, across the day types, between the boys and the girls; these variations are illustrated in Figure 6-12, with the means and 95% confidence intervals in Table 6-12.

Figure 6-12. Number of minutes spent at a moderate and vigorous intensity of physical activity (showing mean and 95% CI)

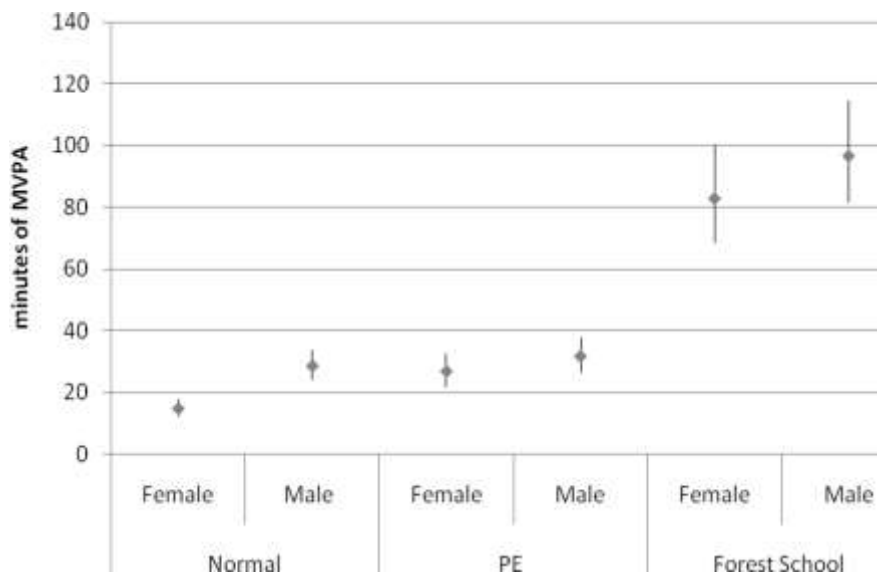


Table 6-12. Mean number of minutes spent at a moderate and vigorous intensity of physical activity by gender and by day type

Day type	Gender	Mean number of minutes	95% Confidence Intervals	
			Lower bound	Upper bound
Normal	Female	14.67	12.21	17.65
	Male	28.50	24.02	33.78
PE	Female	26.74	21.93	32.59
	Male	31.63	26.58	37.64
Forest School	Female	82.76	68.37	100.08
	Male	96.54	81.45	114.43

Despite the fact that, overall, the interaction between day type and gender contributed significantly to the variation in the number of accumulated minutes of MVPA, a pairwise comparison shows that only the difference between the boys' and girls' activity on the normal days is significant ($p \leq 0.001$). The variation in the number of minutes of MVPA between the boys and girls on the PE days and the Forest School days were found to be insignificant ($p = 0.202$ PE days, $p = 0.231$ Forest School days).

The girls accumulated significantly more minutes of MVPA on the Forest School days (82.76 minutes) than they did during either of the other two day types (PE day 26.74 minutes; Normal day 14.67 minutes) ($p \leq 0.001$ for each paired comparison). They also accumulated a significantly greater number of minutes of MVPA on the PE days than they did during the normal days ($p \leq 0.001$). Like the girls, the boys also accumulated significantly more minutes of MVPA on the Forest School days (96.54 minutes) than they did on either the normal or the PE days (PE day 31.63; Normal day 28.50 minutes) ($p \leq 0.001$ for both paired comparisons). However the variation in the number of minutes of MVPA between the normal and the PE days was, for the boys, not significant ($p = 0.191$).

The number of minutes of MVPA, accumulated by the girls, on the Forest School days, was a considerable 464% greater than the number they accumulated on the normal school days and 209% greater than they did during the PE days. The girls also increased their average

number of minutes of MVPA on the PE days in comparison to the normal school days by 82%. While the boys also increased the number of minutes of MVPA between the normal and PE days, the differences is not nearly as great as for the girls, and represents an average increase of 11%. They did, however, accumulate considerably more minutes of MVPA on the Forest School days than they did on either of the two other day types; an increase of 238% between the Forest School days and the normal days and 205% between the Forest School days and the PE days.

6.2.4 Variation in the time spent at a vigorous intensity of physical activity between each gender and by day type.

Again the boys accumulated a greater number of minutes of vigorous intensity physical activity than the girls on each of the day types. Overall a significant interaction effect was found between gender and day type in the variation in number of minutes of physical activity at a vigorous intensity ($p = 0.017$). The means and 95% confidence intervals are displayed in Table 6-13.

Table 6-13. Mean number of minutes spent at a vigorous intensity of physical activity by gender and by day type

Day type	Gender	Mean number of minutes	95% Confidence Intervals	
			Lower bound	Upper bound
Normal	Female	5.89	4.45	7.82
	Male	13.09	10.11	16.93
PE	Female	12.92	9.55	17.50
	Male	16.31	12.50	21.26
Forest School	Female	32.36	24.22	43.21
	Male	45.24	34.95	58.56

A pairwise comparison showed that the variation in minutes of vigorous intensity physical activity between the genders was only significant on the normal days ($p \leq 0.001$); the boys, on average, accumulated 122% more minutes of vigorous intensity physical activity than the

girls. The variation between the genders was not significant on either the PE days ($p = 0.247$) or the Forest School days ($p = 0.087$). The day with a PE lesson resulted in the least difference between the genders; the boys accumulated an average of 26% more minutes of vigorous physical activity than the girls, while on the Forest School days the boys accumulated 40% more minutes than the girls.

The girls accumulated significantly more minutes of vigorous physical activity on the Forest School days (32.36 minutes) than they did on either the normal school days (5.89 minutes) ($p \leq 0.001$) or the PE days (12.92 minutes) ($p \leq 0.001$). They also accumulated significantly more minutes on the PE days than on the normal days ($p \leq 0.001$). The girls' participation in Forest School resulted in an increase in the number of minutes of vigorous physical activity by 449% compared to normal school days and 150% greater than the PE days.

The boys also accumulated significantly more minutes of vigorous physical activity during the Forest School days (45.24 minutes) than during either the normal (13.09 minutes) ($p \leq 0.001$) or PE days (16.31 minutes) ($p \leq 0.001$). The boys accumulated a considerable 245% more minutes of vigorous physical activity on the Forest School days in comparison to the normal school days and 177% greater than during the PE days.

6.2.5 Variation in the time spent at a very vigorous intensity of physical activity between each gender and by day type.

As the values in Table 6-14 illustrate, there is little variation in the number of minutes of very vigorous intensity physical activity between the genders over the different day types. The mixed model confirms this, finding that there was no significant interaction between day type and gender ($p = 0.956$). A pairwise comparison shows that while there is significant variation in the number of minutes of very vigorous physical activity each gender accumulated on the normal school days ($p = 0.043$) and on the Forest School days ($p = 0.038$) these variations are not considerable. There was no significant variation in the number of minutes of very vigorous physical activity between the genders during the PE days. As with the previous variable, the inequality in activity between the genders was the least on the PE days, with the boys accumulating 6.53 minutes and the girls 4.45 minutes, a difference of

46%. On Forest School days the boys accumulated 16.33 minutes, the girls 10.79 minutes, a difference of 51%.

Table 6-14. Mean number of minutes spent at a very vigorous intensity of physical activity by gender and by day type

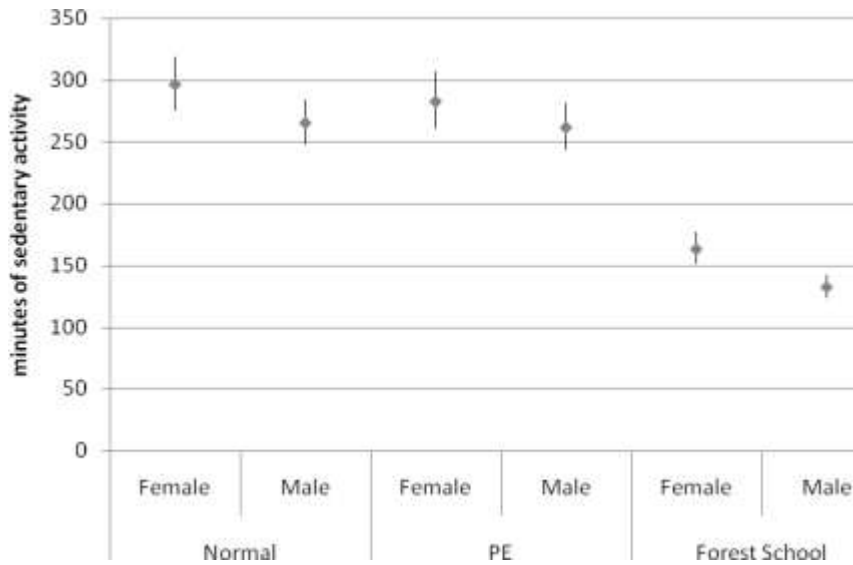
Day type	Gender	Mean number of minutes	95% Confidence Intervals	
			Lower bound	Upper bound
Normal	Female	3.49	2.50	4.87
	Male	5.45	4.15	7.17
PE	Female	4.45	3.25	6.10
	Male	6.53	4.97	8.57
Forest School	Female	10.79	8.05	14.47
	Male	16.33	12.55	21.26

The boys accumulated a greater number of minutes of very vigorous intensity physical activity on the Forest School than on either of the two control day types ($p \leq 0.001$ for both paired comparisons). Equally the girls accumulated significantly more minutes on the Forest School days than on either of the other day types ($p \leq 0.001$ for both paired comparisons).

6.2.6 Variation in sedentary time between each gender and by day type.

Unlike for each of the three previous variables (time spent at a moderate to vigorous intensity, at a vigorous intensity and at a very vigorous intensity), where the boys were found to have accumulated the greatest number of minutes at each intensity, this variable, time spent at a sedentary intensity of physical activity, exhibits a different pattern. Figure 6-13 illustrates this pattern.

Figure 6-13. Number of minutes spent at a sedentary intensity of physical activity (showing mean and 95% CI)



The girls accumulated the greatest number of minutes of sedentary time. However the results of the mixed model analysis show that there is no significant interaction effect between gender and day type in explaining the variation in minutes of sedentary intensity physical activity ($p = 0.092$). The results of the analysis are displayed in Table 6-15 and Figure 6-13 (above).

Table 6-15. Mean number of minutes spent at a sedentary intensity of physical activity by gender and by day type

Day type	Gender	Mean number of minutes	95% Confidence Intervals	
			Lower bound	Upper bound
Normal	Female	296.49	275.34	318.94
	Male	265.34	247.89	284.01
PE	Female	282.59	260.60	306.43
	Male	261.65	243.72	280.90
Forest School	Female	163.23	151.41	176.44
	Male	132.56	123.84	141.88

A pairwise comparison reveals that only the variation in number of minutes of sedentary intensity activity, between the genders, on the PE day is not significant (boys 261.65 minutes; girls 282.59 minutes) ($p = 0.152$). The variation between the genders on the normal day is weak but still significant (boys 265.34 minutes; girls 296.49 minutes) ($p = 0.031$) and the variation on the Forest School day is highly significant (boys 132.56 minutes; girls 163.23 minutes) ($p \leq 0.001$). On the Forest School days the girls were sedentary for an average 31 minutes more (23%) than the boys.

6.2.7 Variation in the total and mean number of bouts of physical activity at a moderate and vigorous intensity between the genders

As Figure 6-14 shows, there are differences in the total number of bouts between the genders, the values can be found in Table 6-16. Again, it must be noted that using the total sum of instances of each bout length is limited in its usefulness as there are differences in the amount of valid days of accelerometer recording between the day types and between the genders. However, the results are reported, and cautiously interpreted, as they do indicate differences in the number of bouts between the sexes. Unfortunately the data is not suitable for analysis using the mixed model (see section 6.1.9); therefore the variations have not been tested statistically.

Figure 6-14. Sum of instances of each bout length by gender

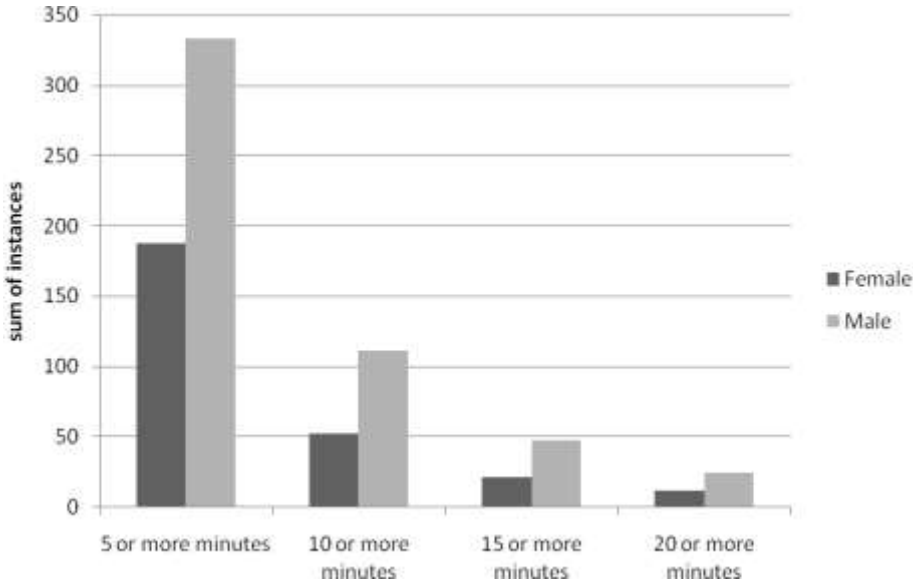


Table 6-16. Sum of instances of each bout length by gender

Length of bout	Female (74 valid days recording)	Male (95 valid days recording)
≥ 5 min	187	333
≥10 min	52	111
≥15 min	21	47
≥20 min	11	24

Clearly the boys accumulated a greater number of bouts, of each length, than the girls. This pattern is reflected in the average number of bouts between the sexes; the values can be found in Table 6-17. For instance the boys, on average, achieved 3.54 bouts of ≥5 minutes; this is 39% greater than the girls 2.53 bouts.

Table 6-17. Mean number of bouts of each length by gender

Length of bout	Female		Male	
	mean	SD	mean	SD
≥ 5 min	2.53	2.9	3.54	3.4
≥10 min	0.70	1.1	1.18	1.3
≥15 min	0.28	0.6	0.50	0.5
≥20 min	0.15	0.4	0.26	0.5

This was a consistent pattern across the day types; with the boys having accumulated a higher number of bouts, of each length, on each of the day types than the girls. Table 6-18 details the total number of bouts accumulated by either gender on each of the three day types and Table 6-19 details the mean number of bouts between each gender on each day type.

Table 6-18. Sum of instances of each bout length by gender and day type

Length of bout	Normal		PE		Forest School	
	Female (27 valid days recording)	Male (33 valid days recording)	Female (22 valid days recording)	Male (30 valid days recording)	Female (25 valid days recording)	Male (32 valid days recording)
≥ 5 min	18	53	28	53	141	227
≥10 min	2	13	4	10	46	88
≥15 min	0	5	0	1	21	41
≥20 min	0	3	0	0	11	21

Table 6-19. Mean number of bouts of each length by gender and day type

Length of bout	Normal		PE				Forest School					
	Female		Male		Female		Male		Female		Male	
	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD
≥ 5 min	0.67	1.1	1.66	1.2	1.27	1.1	1.77	1.2	5.64	2.9	7.09	3.7
≥10 min	0.07	0.4	0.41	0.8	0.18	0.4	0.33	0.5	1.84	1.2	2.75	1.3
≥15 min	0.00	0.0	0.16	0.4	0.00	0.0	0.03	0.2	0.84	0.7	1.28	1.0
≥20 min	0.00	0.0	0.09	0.3	0.00	0.0	0.00	0.0	0.44	0.5	0.66	0.7

Despite the differences between the sexes, both males and females did consistently, and considerably, more bouts, of each length, during the Forest School days than during the other two day types.

6.3 *Examining the quantity, intensity and frequency of physical activity during particular episodes of the children's school days*

The physical activity which the participants engaged in during five distinct activities, at both Forest School and during the conventional school days, is examined in the following section. The activities which are examined are:

- the physical activity during active games played at Forest School;
- the physical activity during the walk up to and during the walk down from Forest School;
- the physical activity during the morning break time at school; and,
- the physical activity during the PE lesson.

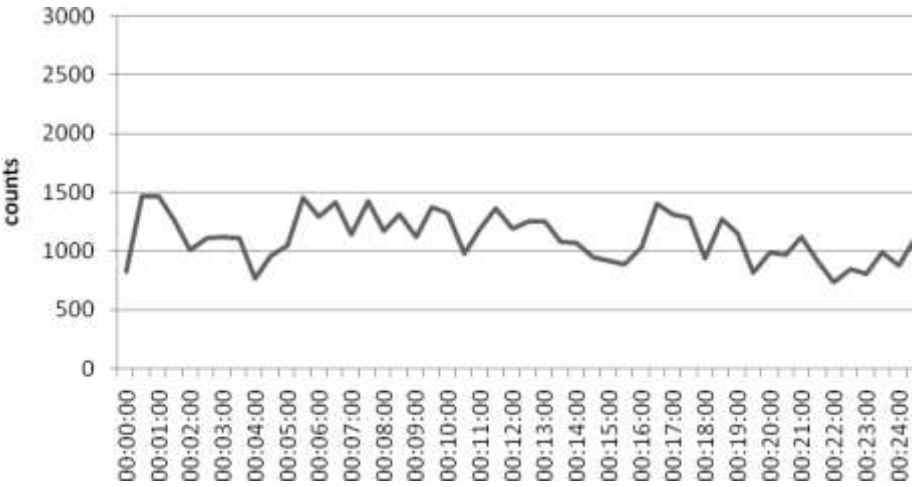
Each of the distinct activities will be examined separately. The raw accelerometry counts were graphed to illustrate the pattern of physical activity. Each section then focuses on the total activity, the number of minutes spent at a moderate and vigorous intensity and at a vigorous intensity during the activity in question.

6.3.1 The physical activity during the active games played at Forest School

During a typical Forest School session the children play an active game such as tig, capture the flag or foxes and hounds. The games generally last for around 25 minutes. The activity during these games is examined in the following section.

The raw accelerometry data, which graphically represents the (average) physical activity levels during the active games played at Forest School, can be found in Figure 6-15.

Figure 6-15. Accelerometer counts (per thirty seconds) during the active games played at Forest School



This graph visually indicates that the children were consistently active at a relatively high intensity during the active games.

Total activity during the active games played at Forest School

The average total activity during the physically active games, played at Forest School, was found to be 2283.9 counts per minute (cpm) (*SD* 851.1) (this result appears inconsistent with the data displayed in Figure 6-15; this is because the raw accelerometer data, which is used in Figure 6-15, is the count per each thirty second epoch and therefore is half of the minute average). As the value used to indicate total activity also indicates average intensity, we can see that the average intensity of physical activity during the active games was considerably higher than the average intensity for the whole of the Forest School day (1229.1 cpm); according to the thresholds used for this study, 2283.9 cpm represents moderate and vigorous intensity physical activity.

As can be seen from the values in Table 6-20, there is little variation in the total activity of the boys in comparison to that of the girls. Mixed model analysis confirms that gender did not contribute significantly to the variation seen in total activity during the active games ($p = 0.086$).

Table 6-20. Total activity during the active games played at Forest School

Gender	Mean average count	95% Confidence Intervals	
		Lower bound	Upper bound
Female	1967.4	1532.6	2402.2
Male	2468.1	2082.0	2854.4

Time spent at moderate and vigorous intensity of physical activity during the active games

Of the 25 minutes spent playing each game, an average of 12.75 (*SD* 5.9) minutes were above the moderate and vigorous intensity threshold (2000cpm); this represents 51% of the total time.

There was no significant variation in minutes of moderate and vigorous intensity physical activity between the genders ($p = 0.115$); the means and 95% confidence intervals can be found in Table 6-21.

Table 6-21. Mean number of minutes spent at a moderate and vigorous intensity of physical activity during the active games played at Forest School by gender

Gender	Mean number of minutes	95% Confidence Intervals	
		Lower bound	Upper bound
Female	10.85	7.97	13.73
Male	13.88	11.32	16.44

Time spent at a vigorous intensity of physical activity during the active games

During the active games the children were physically active at a vigorous intensity for an average of 7.96 (*SD* 5.1) minutes; this represents 31% of the total time.

Mixed model analysis showed that there was a significant variation in the number of minutes at a vigorous intensity between the boys and the girls ($p = 0.017$). The boys accumulated 67% more minutes of vigorous intensity physical activity than the girls. The means and 95% confidence intervals can be found in Table 6-22.

Table 6-22. Mean number of minutes spent at a vigorous intensity of physical activity during the active games played at Forest School by gender

Gender	Mean number of minutes	95% Confidence Intervals	
		Lower bound	Upper bound
Female	5.70	3.38	8.01
Male	9.52	7.46	11.58

6.3.2 The physical activity during the walk up to and during the walk down from Forest School

Figure 6-16 shows the average pattern of physical activity during the walk *up* to Forest School and Figure 6-17 during the walk *down*. Again the children are shown to be consistently active during both the walk up to and down from Forest School (the low spikes

at the 3:00 minute mark on the walk up graph and at the 28:00 mark on the walk down graph are due to the children waiting to cross a road close to the school).

Figure 6-16. Accelerometer counts (per thirty seconds) during the walk up to Forest School

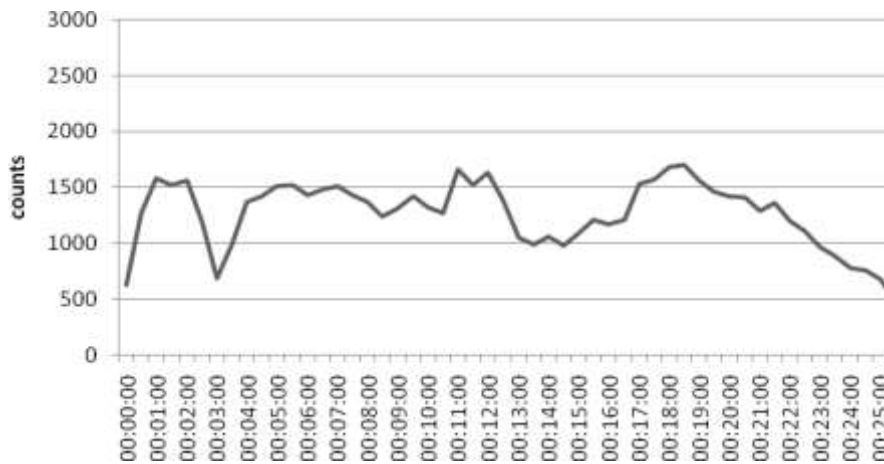
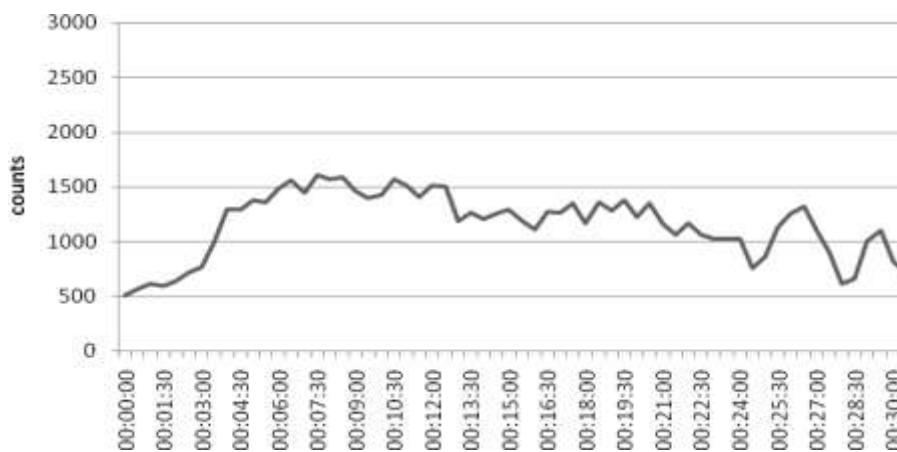


Figure 6-17. Accelerometer counts (per thirty seconds) during the walk down from Forest School



Total activity during the walk up to and the walk down from Forest School

The average total activity during the walk up to Forest School was found to be 2562.4 (*SD* 727.2) cpm; the total activity during the walk down from Forest School was lower 2346.2 (*SD* 619.3) cpm, which is surprising considering the walk to Forest School is uphill and the

walk back from Forest School is downhill, though this may be due to the children being tired after a day at Forest School.

Mixed model analysis showed that gender did not contribute significantly to the variation in total activity ($p = 0.178$) during the walk up to Forest School; the means and 95% confidence intervals can be found in Table 6-23. The difference between the boys' average count and the girls' average count was just 14%.

Table 6-23. Total activity during the walk up to Forest School

Gender	Mean average count	95% Confidence Intervals	
		Lower bound	Upper bound
Female	2383.8	2006.5	2761.0
Male	2721.7	2386.7	3056.7

There was also no significant variation in total activity during the walk down from Forest School between the genders ($p = 0.153$); the boys' total activity was found to be just 13% greater than the girls'. The means and 95% confidence intervals can be found in Table 6-24.

Table 6-24. Total activity during the walk up to Forest School

Gender	Mean average count	95% Confidence Intervals	
		Lower bound	Upper bound
Female	2200.5	1908.9	2492.0
Male	2476.2	2217.3	2735.1

Time spent at moderate and vigorous intensity of physical activity during the walk up to and the walk down from Forest School

The walk up to Forest School was of 25 minutes duration, the walk down from Forest School was of 30 minutes duration.

The children's physical activity was, on average, at a moderate and vigorous intensity for 17.70 (*SD* 5.6) minutes of the walk up to Forest School, this equates to 71% of the total time. An average of 17.26 (*SD* 6.9) minutes, of the walk down from Forest School, were at the moderate and vigorous intensity; this is 58% of the total time. Again no significant variation was found in the number of minutes of moderate and vigorous intensity physical activity between the boys and the girls, for either the walk up or the walk down ($p = 0.429$ walk up, $p = 0.398$ walk down). The means and confidence intervals for the walk up can be found in Table 6-25 and for the walk down in Table 6-26.

Table 6-25. Mean number of minutes spent at a moderate and vigorous intensity of physical activity during the walk up to Forest School

Gender	Mean number of minutes	95% Confidence Intervals	
		Lower bound	Upper bound
Female	17.0	14.4	19.6
Male	18.3	16.0	20.6

Table 6-26. Mean number of minutes spent at a moderate and vigorous intensity of physical activity during the walk down from Forest School

Gender	Mean number of minutes	95% Confidence Intervals	
		Lower bound	Upper bound
Female	16.3	13.2	19.3
Male	18.0	15.3	20.7

Time spent at a vigorous intensity of physical activity during the walk up to and the walk down from Forest School

The mean number of minutes of vigorous intensity physical activity accumulated during the walk up to Forest School was found to be 10.16 (*SD* 6.7) minutes. The mean number of minutes during the walk down from Forest School was found to be 9.19 (*SD* 6.2). Therefore, on average, 41% of the time it took to walk up to Forest School and 31% of the time it took to walk down from Forest School the physical activity was of a vigorous intensity.

The boys were found to have spent an average of 11.59 (*SD* 6.2) minutes at a vigorous intensity of physical activity during the walk up to Forest School. The girls spent an average of 8.32 (*SD* 7.0) minutes at this intensity. The difference in the time spent at a vigorous intensity between the genders was 39%.

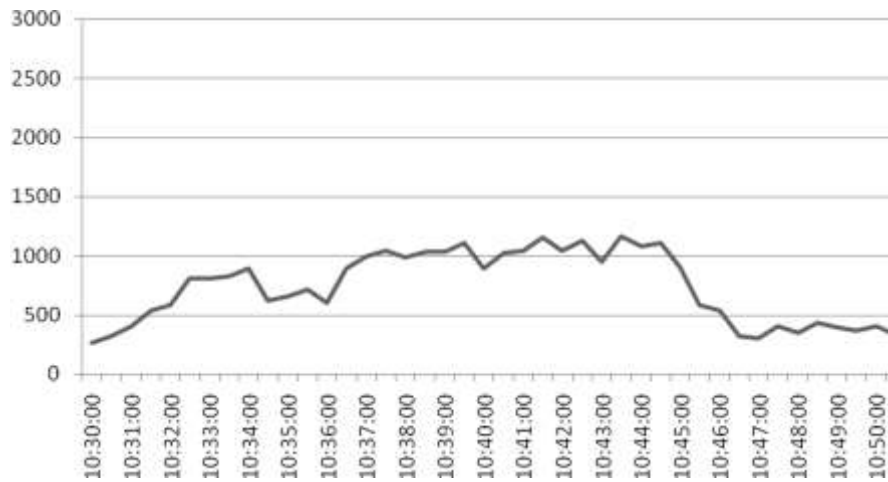
During the walk down the girls accumulated an average of 7.88 (*SD* 5.6) minutes of vigorous intensity physical activity, the boys accumulated, on average, 10.22 (*SD* 6.5) minutes. This is a difference of 29%.

It was not possible to estimate whether there is a significant variation in the minutes of vigorous intensity physical activity between each gender as the data was not suitable for mixed model analysis.

6.3.3 The physical activity during the morning break time at school

Figure 6-18 illustrates the average pattern of activity during the children's morning break times (this graph uses data which does not include the recordings made on the day when the children were prevented from going outdoors during their break time (see section 5.5.1)). Although the graph indicates that the children were consistently active for a period of time, it is quite different to the graphs of the Forest School activities (Figure 6-15, Figure 6-16 and Figure 6-17). The average value of the counts appears much lower and is frequently below 1000 counts per thirty seconds. Furthermore, unlike any of the Forest School graphs, the average intensity dips below 500 counts per thirty seconds for a prolonged period.

Figure 6-18. Accelerometer counts (per thirty seconds) during the morning break time (of the normal and the PE days)



Total activity during the morning break time at school

The total activity during the morning break time was found to be 1478.2 (*SD* 779.7) cpm (if one includes the day where the children were prevented from going outside the total activity was found to be 1400.0 (*SD* 790.5) cpm). According to the activity intensity thresholds used for the present study, the average intensity can be described as light. The total activity during the break time is a considerably lower than that which was recorded during the Forest School activities (2283.9 cpm during the active games, 2562.4 cpm during the walk up to Forest School and 2346.2 cpm during the walk down from Forest School), all of which were categorised as at a moderate and vigorous intensity.

There is a significant, though only just so, difference in the total activity during the break time between the boys and the girls ($p = 0.049$); the boys' total activity was 38% greater than the girls'. The means and 95% confidence intervals can be found in Table 6-27.

Table 6-27. Total activity during the morning break time at school

Gender	Mean average count	95% Confidence Intervals	
		Lower bound	Upper bound
Female	1217.6	864.9	1570.4
Male	1691.0	1367.8	2014.2

Time spent at moderate and vigorous intensity of physical activity during the morning break time at school

The duration of the morning break was 20 minutes.

On average, the children accumulated 5.49 (*SD* 4.20) minutes of moderate and vigorous physical activity during the morning break time; this equates to 27% of the total time.

The average number of minutes of moderate and vigorous physical activity accumulated by the boys during the break was 67% greater than the girls' average number of minutes. The boys accumulated an average of 6.65 (*SD* 4.1) minutes of moderate and vigorous physical activity, the girls 3.98 (*SD* 3.9) minutes.

It was not possible to estimate whether there is a significant variation in the minutes of moderate and vigorous intensity physical activity between each gender as the data was not suitable for mixed model analysis

Time spent at a vigorous intensity of physical activity during the morning break time at school

Of the total time, during the morning break, an average of just 3.09 (*SD* 3.3) minutes (15% of the total time) were spent at a vigorous intensity of physical activity.

The boys, once again, were found to have accumulated more minutes of vigorous intensity physical activity than the girls. While the boys accumulated, on average, 3.67 (*SD* 3.198)

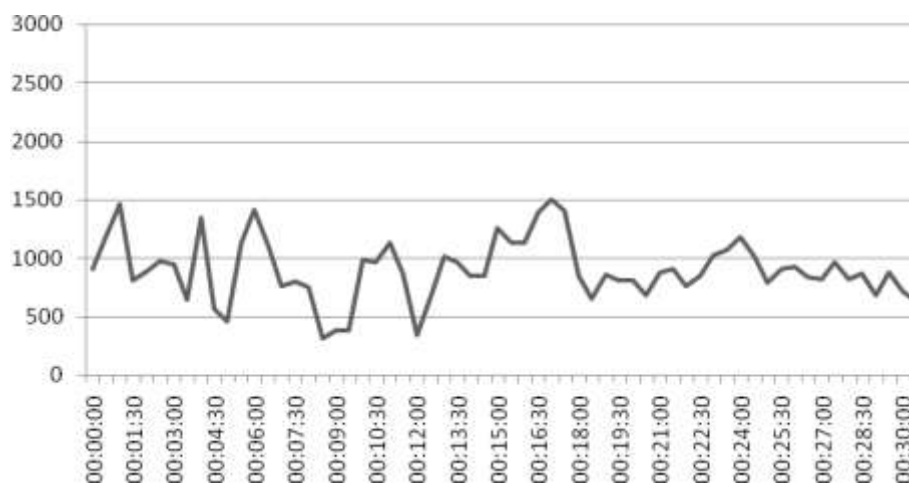
minutes of vigorous intensity physical activity, the girls accumulated an average of 2.34 (*SD* 3.4) minutes, this is a 56% difference.

Again it was not possible to estimate whether there is a significant variation in the minutes of vigorous intensity physical activity between each gender as the data was not suitable for mixed model analysis.

6.3.4 The physical activity during the PE lesson

Visually the graph in Figure 6-19 is quite different to the other graphs presented in this section. This graph can be described as being characterised by sharp peaks and drops; from peaks of activity, at around 1500 counts per thirty seconds, to lows of around 300 counts per thirty seconds. The graph suggests that the physical activity during the PE lesson was sporadic, with bursts of high intensity activity interspersed with periods of relatively low intensity activity.

Figure 6-19. Accelerometer counts (per thirty seconds) during the PE lesson



Total activity during the PE lesson

The average total activity during the PE lesson was found to be 1752.8 (*SD* 636.7) counts per minute. Therefore the average intensity of activity during the PE lesson can be described as light.

Mixed model analysis shows that there is no significant variation in the total activity between the boys and the girls during the PE lesson ($p=0.703$); the means and 95% confidence intervals can be found in Table 6-28. The difference, in average intensity of activity, between the boys and girls, was found to be just 4%.

Table 6-28. total activity during the PE lessons

Gender	Mean average count	95% Confidence Intervals	
		Lower bound	Upper bound
Female	1747.3	1427.2	2067.3
Male	1824.4	1547.2	2102.7

Time spent at moderate and vigorous intensity of physical activity during the PE lesson

The duration of the PE lessons was 30 minutes.

The average number of minutes, of moderate and vigorous intensity physical activity, during the PE lesson, was found to be 9.84 (SD 4.2). Therefore, the children spent 33% of their PE lessons at moderate and vigorous intensity of activity.

The boys were found to have engaged in, on average, 9.93 (SD 4.3) minutes of moderate and vigorous intensity physical activity, the girls engaged in an average of 9.73 (SD 4.1) minutes. This is a difference of just 2%.

Unfortunately the data was not suitable for mixed model analysis; therefore the significance levels of this variation cannot be estimated.

Time spent at a vigorous intensity of physical activity during the PE lesson

6.37 (SD 3.4) minutes of the PE lesson were, on average, spent at a vigorous intensity of physical activity. Considering that the lessons lasted for 30 minutes, the children, therefore, spent 21% of the total time at a vigorous intensity.

The girls accumulated an average of 6.27 (SD 3.4) minutes of vigorous intensity physical activity and the boys 6.45 (SD 3.5) minutes. There is a difference of 3% between the boys' and the girls' average minutes.

Again the data was not suitable for mixed model analysis; therefore the significance of this variation cannot be estimated.

6.4 *Examining the results of the self-perception questions*

The results of the two self-perception questions are examined in the following sections (details of the scales can be found in section 5.5.7).

6.4.1 *Enjoyment of the physical activity*

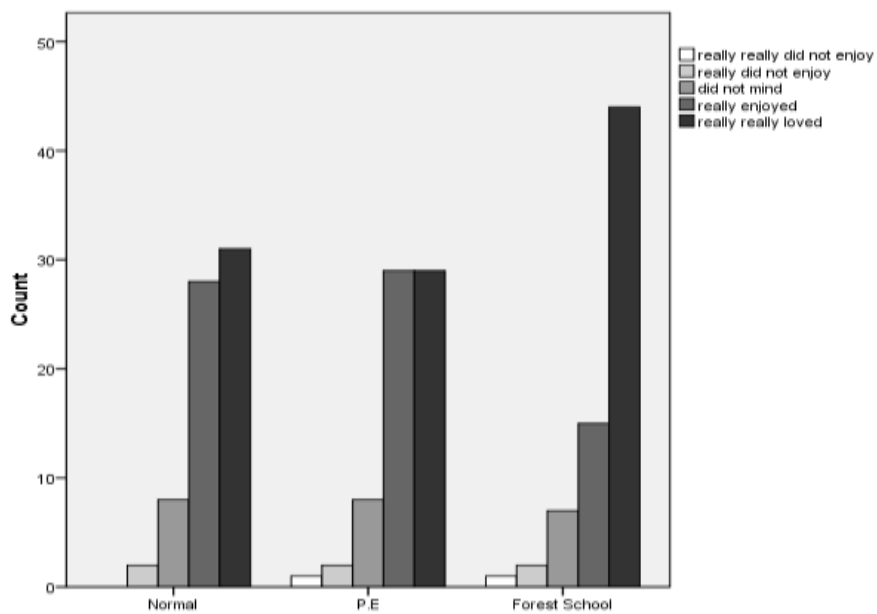
Variation in response given between the day types

A cross tabulation, the results of which are in Table 6-29, was used to examine whether there were any differences in the responses given to the self-perceived enjoyment question between the day types. Figure 6-20 graphically represents the responses.

Table 6-29. Count and percentage of responses given to the self-perceived enjoyment questions by day type

		Really really did not enjoy	Really did not enjoy	Did not mind	Really enjoyed	Really really loved
Normal	Count	0	2	8	28	31
	% within day type	0%	2.9%	11.6%	40.6%	44.9%
PE	Count	1	2	8	29	29
	% within day type	1.4%	2.9%	11.6%	42%	42%
Forest School	Count	1	2	7	15	44
	% within day type	1.4%	2.9%	10.1%	21.7%	63.8%
Total	Count	2	6	23	72	104
	% within day type	1%	2.9%	11.1%	34.8%	50.2%

Figure 6-20. Distribution of responses given to self-perceived enjoyment questions by day type (count)



These results show that the children, overall, appeared to enjoy the physical activity they engage in. On each day type, at least 84% of the total responses were in the two most positive categories ('really enjoyed' and 'really really loved').

There is an identifiable variation in the pattern of responses, in particular, in the distribution of the two positive response categories, 'really enjoyed' and 'really really loved'. The distribution is similar between the normal and the PE days with similar percentages of the children responding that they 'really enjoyed' (40% normal day, 42% PE day) and 'really really loved' the physical activity (44.9% normal day, 42% PE day). However the responses given during the Forest School days are somewhat different, with 63% of the responses in the 'really really loved' category and a lower percentage of responses in the 'really enjoyed' category (21.7%). A Friedman test indicates that there is a significant variation in the responses given between the day types (chi-square 182.3, $p \leq 0.001$). Interestingly across the three day types a consistent number of responses were given in the two most positive categories (59 on the both normal and Forest School days and 58 on the PE days) despite the variation in proportion in either category.

The distributions of the less positive responses are broadly similar between each of the day types, with around 10-11% of the responses in the 'did not mind' category, 2.9% in the 'really did not enjoy' and 0-1.4% in the 'really really did not enjoy' category.

These results indicate that a greater number of children enjoyed the physical activity of the Forest School days to a greater degree than they enjoyed the physical activity of other two day types.

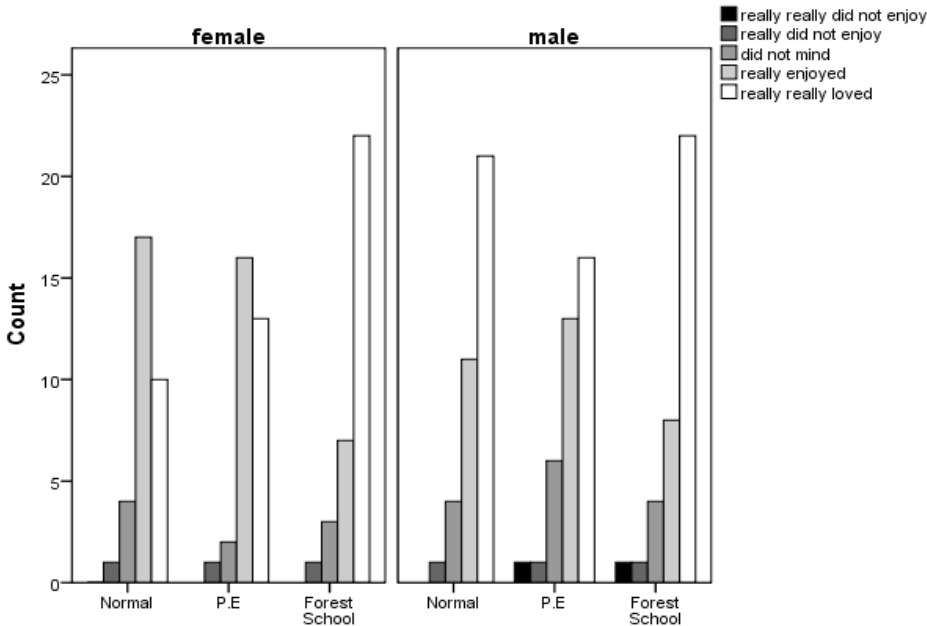
Variation in response given by either gender between the day types

The analysis was taken further to examine whether there was any variation in the responses given by either gender between the day types. Table 6-30 details the results of this analysis; Figure 6-21 graphically represents the data.

Table 6-30. Count and percentage of responses given to self-perceived enjoyment questions by gender and day type

			Really really did not enjoy	Really did not enjoy	Did not mind	Really enjoyed	Really really loved
Female	Normal	Count	0	1	4	17	10
		% within day type	0%	3.1%	12.5%	53.1%	31.2%
	PE	Count	0	1	2	16	13
		% within day type	0%	3.1%	6.2%	50%	40.6%
	Forest School	Count	0	1	3	7	22
		% within day type	0%	3.0%	9.1%	21.2%	66.7%
Male	Normal	Count	0	1	4	11	21
		% within day type	0%	2.7%	10.8%	29.7%	56.8%
	PE	Count	1	1	6	13	16
		% within day type	2.7%	2.8%	16.2%	35.1%	43.2%
	Forest School	Count	1	1	4	8	22
		% within day type	2.8%	2.8%	11.1%	22.2%	61.1%

Figure 6-21. Distribution of responses given by the girls and the boys to self-perceived enjoyment questions by day



A Friedman test suggests that the variation in responses is significant (Chi-Square 318.6 $p < 0.001$). There is noticeable variation in the distribution of the two most positive categories, particularly on the two typical school days. When comparing the distribution of positive responses for the normal and the PE days one can see that the girls had a greater number responses in the 'really enjoyed' category than in the 'really really loved' category. The situation is the reverse for the boys, with a greater number in the 'really really loved' category than in the 'really enjoyed' category. This indicates that a greater number of boys really enjoyed the physical activity they engaged in during the typical school days than the girls, who appeared to have slightly more tempered responses.

Was there any relationship between the self-perceived enjoyment scores and the physical activity the children engaged in?

As can be seen from the values in Table 6-31 the variation in the self-perceived enjoyment scores is not related to the total activity variable.

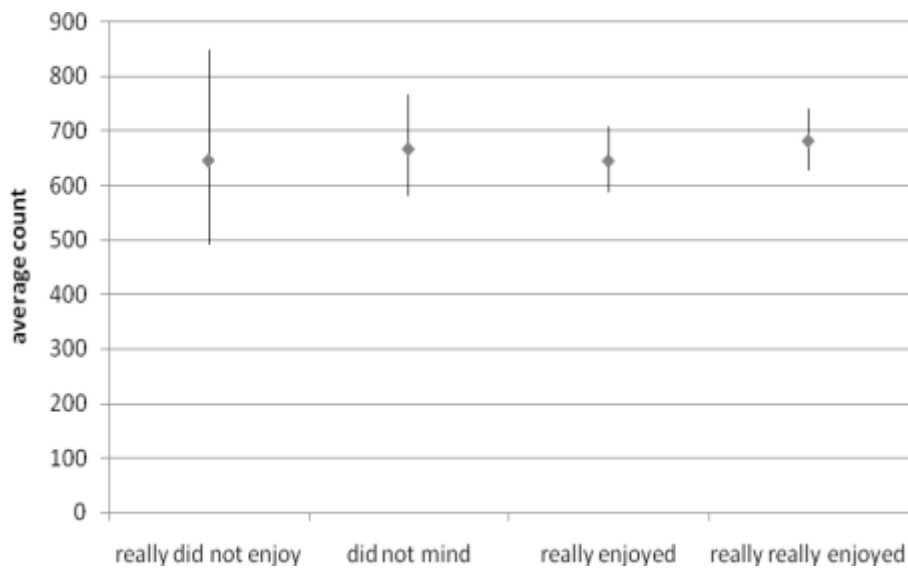
Table 6-31. Total activity by response to self-perceived enjoyment question

Response	Mean average count	95% Confidence Intervals	
		Lower bound	Upper bound
Really did not enjoy	646.13	492.75	848.10
Did not mind	667.14	581.15	765.86
Really enjoyed	645.48	588.75	706.98
Really really loved	681.98	627.66	741.74

(SPSS omitted the fifth category 'really really did not enjoy' from the model as there were too few responses in this category)

Analysis using the mixed model confirms that there is no relationship between the variation in total activity and the responses given to the self-perceived enjoyment question ($p = 0.716$). Figure 6-22, which shows the means and 95% confidence intervals, clearly illustrates this lack of relationship.

Figure 6-22. Total activity by response to self-perceived enjoyment question



The analysis was repeated using the collapsed responses data set (see section 5.5.7 for details).

Again the mixed model found no relationship between total activity and the (collapsed) responses to the self-perceived enjoyment question ($p = 0.520$). The means and 95% confidence intervals are in Table 6-32.

Table 6-32. Mean average count by response to self-perceived enjoyment question (collapsed)

Response	Mean average count	95% Confidence Intervals	
		Lower bound	Upper bound
Did not enjoy	663.81	582.31	756.72
Enjoyed	644.84	588.75	706.98
Really enjoyed	681.98	627.66	741.74

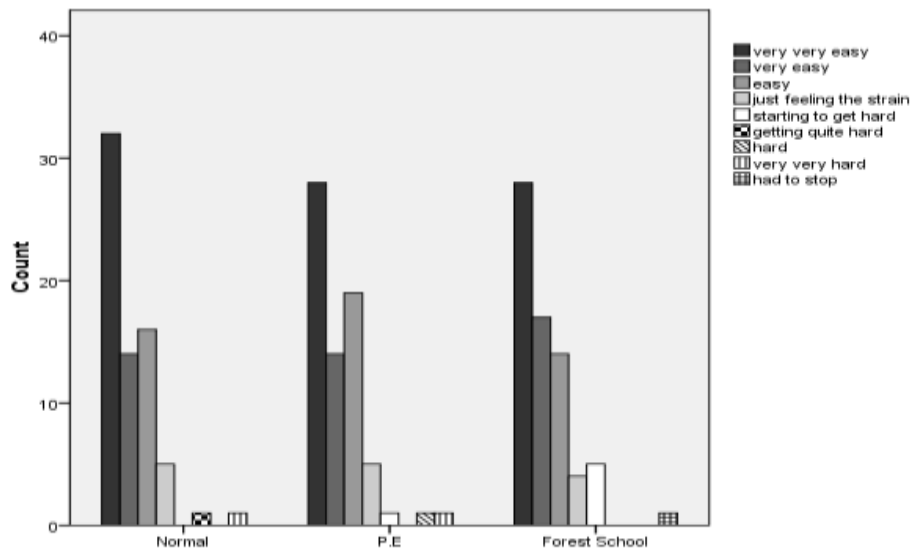
The analysis was repeated for each of the primary variables derived from the accelerometry data, no significant relationships were found.

6.4.2 Perceived exertion during physical activity

Variation in response given between the day types

A cross tabulation, the results of which are in Table 6-33, was used to examine whether there were any differences in the responses given to the self-perceived exertion question, between the day types. The bar chart in Figure 6-23 graphically represents the responses.

Figure 6-23. Distribution of responses given to the self-perceived exertion question by day type



The results indicate that, on the whole, the children perceived that the physical activity they took part in did not require too much exertion, the majority of the responses are clustered in the three 'easy' response categories (90% of the total responses from the normal days, 88% of the total responses from the PE days and 71% of the total responses from the Forest School days). A Friedman test indicates that there is no significant variation in the responses between the day types (Chi-Square 0.007 $p=0.934$). The only other identifiable variation is that there is a slightly higher percentage of responses which indicated that the physical activity 'was starting to get hard' on the Forest School days (7%) in comparison to the other two day types (1.4% of responses from the PE days and 0% of the responses from the normal days). However this 7% represents just 5 individual responses out of a total of 69 for the day type.

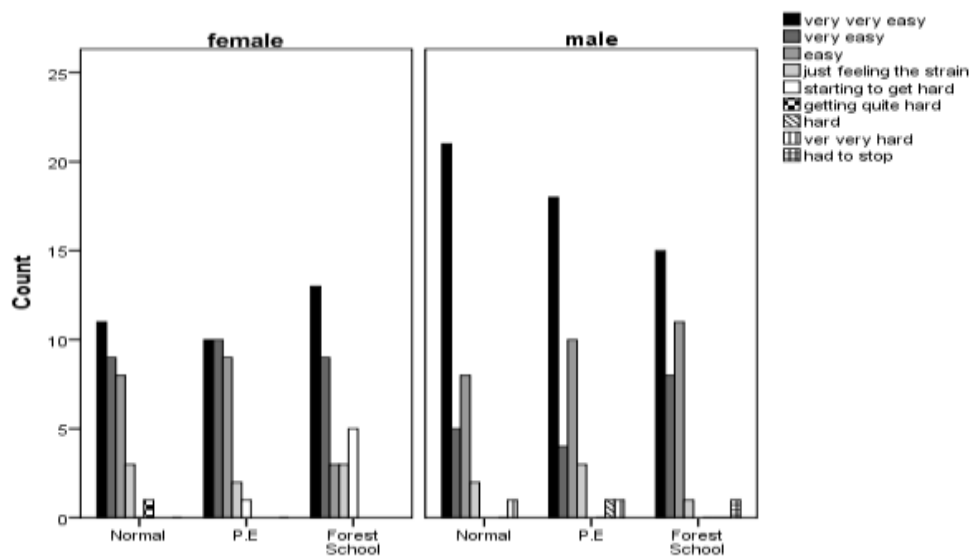
Table 6-33: Count and percentage of responses given to the self-perceived exertion questions by day type

		Very very easy	Very easy	Easy	Just feeling the strain	Starting to get hard	Getting quite hard	Hard	Very hard	Very very hard	Had to stop
Normal	Count	32	14	16	5	0	1	0	0	0	0
	%	46.4%	20.3%	23.2%	7.2%	0%	1.4%	0%	0%	0%	0%
PE	Count	28	14	19	5	1	0	1	0	0	0
	%	40.6%	20.3%	27.5%	7.2%	1.4%	0%	1.4%	0%	0%	0%
Forest School	Count	28	17	14	4	5	0	0	0	1	1
	%	40.6%	24.6%	5.8%	5.8%	7.2%	0%	0%	0%	1.4%	1.4%
Total	Count	88	45	14	14	6	1	1	0	1.	1
	%	42.5%	21.7%	6.8%	6.8%	2.9%	0.5%	0.5%	0%	0.5%	1.4%

Variation in response given by either gender between the day types

Again, further analysis was conducted in order to explore whether there was any variation in how either gender responded to the self-perceived exertion question. Figure 6-24 graphically represents the responses given by either gender, the count and percentages can be found in Table 6-34.

Figure 6-24. Distribution of responses given by the girls and the boys to the self-perceived exertion questions by day type



By comparing the graph of the girls' responses with the graph of the boys' responses one can immediately see that there is variation in the distribution of responses given by the boys and girls to the self-perceived exertion questions. A Friedman test suggests that the variation in responses given by the genders on the different day types is significant (Chi-Square 29.9 $p \leq 0.001$). The boys were more likely to report that they perceived the physical activity to be 'very very easy'. Across the day types 49% of the boys' responses were in this category in comparison to 35% of the girls' responses. While few boys responded that they had begun to feel the physical activity was getting hard, or was hard, on any day type, 24% of the girls on the Forest School days responded that they were 'just feeling the strain' or the activity was 'starting to get hard'. The percentage responding in these two 'harder' categories on the two typical school day types was much smaller, with just 9% of the total responses on both the normal and the PE days.

Table 6-34 Count and percentage of responses given to self-perceived exertion questions by gender and day type

			Very very easy	Very easy	easy	Just feeling the strain	Starting to get hard	Getting quite hard	hard	Very hard	Very very hard	Had to stop
Female	Normal	Count	11	9	8	3	0	1	0	0	0	0
		%	34.4%	28.1%	25.0%	9.4%	0%	3.1%	0%	0%	0%	0%
	PE	Count	10	10	9	2	1	0	0	0	0	0
		%	31.2%	31.2%	28.1%	6.2%	3.1%	0%	0%	0%	0%	0%
	Forest School	Count	13	9	3	3	5	0	0	0	0	0
		%	39.4%	27.3%	9.1%	9.1%	15.2%	0%	0%	0%	0%	0%
Total	Count	34	28	20	8	6	1	0	0	0	0	
	%	35.1%	28.9%	20.6%	8.2%	6.2%	1.0%	0%	0%	0%	0%	
Male	Normal	Count	21	5	8	2	0	0	0	0	1	0
		%	56.8%	13.5%	21.6%	5.4%	0%	0%	0%	0%	2.7%	0%
	PE	Count	18	4	10	3	0	0	1	0	1	0
		%	48.6%	10.8%	27.0%	8.1%	0%	0%	2.7%	0%	2.7%	0%
	Forest School	Count	15	8	11	1	0	0	0	0	0	1
		%	41.7%	22.2%	30.6%	2.8%	0%	0%	0%	0%	0%	2.8%

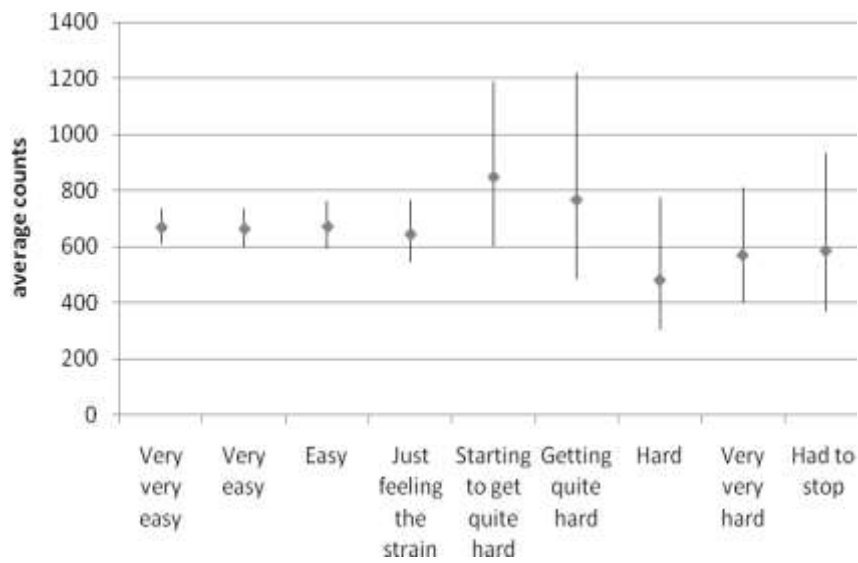
Relationships between the self-perceived exertion scores and the physical activity the children engaged in

As with the self-perceived enjoyment question, there appears to be no relationship between the self-perceived exertion responses and the physical activity (as measured by accelerometry) which the children engaged in. The mixed model analysis confirmed this, finding that the variation in total activity was not associated with the responses categories to the self-perceived exertion question ($p = 0.701$); Table 6-35 displays the means and 95% confidence intervals for the average intensity of physical activity for each response category. Figure 6-25 displays the results graphically.

Table 6-35. Total activity by response to the self-perceived exertion question

Response	Mean average count	95% Confidence Intervals	
		Lower bound	Upper bound
Very very easy	669.14	610.94	732.89
Very easy	663.81	598.24	735.83
Easy	671.83	594.66	759.00
Just feeling the strain	644.84	543.48	765.09
Starting to get quite hard	847.25	603.05	1189.16
Getting quite hard	766.63	482.03	1219.26
Hard	482.51	301.57	772.01
Very very hard	570.21	401.82	809.16
Had to stop	585.81	368.70	930.76

Figure 6-25: Total activity by response to self-perceived enjoyment question



The analysis was repeated using the collapsed answer scale for the self-perceived exertion question (see section 5.5.7 for more details). However, again, no relationship found ($p = 0.879$). The means and 95% confidence intervals are in Table 6-36.

Table 6-36. Mean average count by (collapsed) response to the self-perceived exertion question

Response	Mean average count	95% Confidence Intervals	
		Lower bound	Upper bound
Very easy	669.81	618.93	724.15
Easy	667.81	592.88	752.95
Getting hard	646.78	565.10	741.00

No significant association was found between the responses given to the self-perceived exertion question and any of the primary variables derived from the accelerometry data.

7 Phase two methods, data collection and analysis approach

The aim of the second phase of this evaluation was to understand more about the physical activity of Forest School from the participants' perspective; what did they enjoy, what did they dislike, did the boys hate the wet and mud and did the girls love climbing the trees and lighting the fire? These kinds of questions can only really be answered by asking the participants themselves. The intention was to situate the understanding of the children's perceptions of physical activity at Forest School against their perceptions of physical activity and the use of green spaces in a wider context. A better understanding of the physical activity at Forest School could be gained by understanding the children's reports of what physical activity the children did, with whom and where, but most importantly what they thought of it. This chapter briefly examines the theory and practice of interviews, the primary data collection method employed during the second phase of the evaluation. The data collection and analysis are also discussed.

7.1 *Interviewing as a method to gain understanding*

Qualitative or quantitative interviewing, either individually or in a group situation, was the logical choice of method of data collection for this phase of work. Interviewing is a common method within both qualitative and quantitative research and is an effective tool in evaluation work (Patton 1987). The interview has a ubiquitous presence in our society, found in so many institutions, from the mass-media to the social services. Some have gone as far to argue that we live in an 'interview society' (Denzin and Lincoln 2000; Holstein and Gubrium 1997). The interview is probably the most commonly employed qualitative method, used across a number of academic disciplines, though most associated with sociology, psychology and anthropology. Bryman (2001) suggested that the popularity of the interview as a qualitative method in social research may be due to its flexibility. Where other qualitative methods such as ethnographic work are both incredibly time and effort intensive, using interviews can provide a less disruptive yet effective approach. The interview is also popular

in some fields of quantitative research because of its efficiency and effectiveness in collecting reliable standardised data. Interviews allow the researcher to gain an understanding about the world of the interviewee. Patton (1987) argued that interviews (most specifically qualitative interviews) provided the researcher with a way to understand people's lives, their opinions, experiences, beliefs, memories, feelings, hopes and intentions. An interview gives the researcher an opportunity to understand events that happened at a previous point of time or to which the researcher has no access (Rubin and Rubin 1995). Kvale (1996) conceived of the (qualitative) interview as a 'conversation'. If one wants to know more about the world of another, why not ask them?; 'In an interview conversation, the researcher listens to what people themselves tell about their lived world, hears them express their views and opinions in their own words, learns about their views... The qualitative research interview attempts to understand the world from the subjects' point of view, to unfold the meaning of peoples' experiences, to uncover their lived world' (Kvale 1996 p1).

There are many types and approaches of the interview method. For instance Bryman (2001) identifies 14 major types of interview. The types differ according to many factors and there is much overlap. Interviews vary by how structured the interview is, the number of interviewees, and how the interview is conducted (for instance in person or over the telephone). The type of interview used is dictated by the type of information hoped to be garnered, the resources of both the researcher and interviewee and by the practicalities of the situation. The following section briefly details the most common interview types and approaches. Three factors are discussed; first, the level of structure and standardisation; second, the number of participants in each interview; and, third, whether there are any special considerations that are relevant to interviewing children.

7.1.1 The level of structure and standardisation applied to the interview

There is a continuum of structure and standardisation that can be imposed on the interview. At one end are the highly structured and standardised interviews commonly associated with positivistic research. At the other end are the unstructured un-standardised interviews which are associated with qualitative constructivist research. Between the two extremes there is any number of levels of structure and standardisation that can be applied to the

interview. However, in general, one can discern four major groups of interview approach which are differentiated according to the amount of structure and standardisation applied. Though in practice few researchers use a pure form of any of the approaches it is useful to understand the basic differences. The four groups, as shown in Figure 7-1, include the two extremes; the 'fully-structured' or 'standardised closed-ended' interview and the 'unstructured' or the 'informal conversation' interview. Between these two opposite interview approaches lie the other two major groups, the 'standardised open-ended' interview and the 'semi-structured' interview (Bryman 2001; Patton 1987).

Figure 7-1. The Continuum of structure and standardisation in interviews

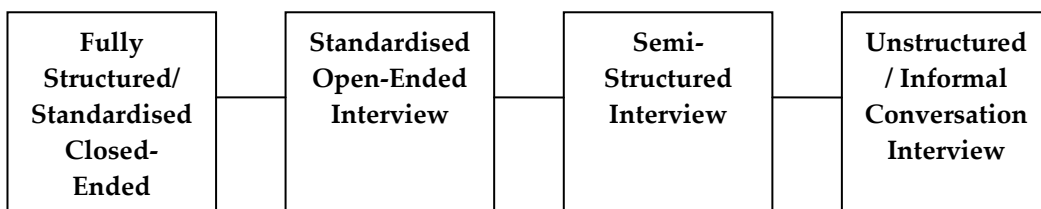


Figure devised by author.

The difference between the four approaches (which will hereafter be referred to by the terms used in Figure 7.1) rests, in practical terms, on the degree to which the interview questions are determined before the interview takes place, the level of standardisation between interviews and the role of the interviewer. The following details the distinctions between the four interview approaches and includes an explanation of why one approach was selected for the study and the rest rejected.

The standardised closed-ended interview approach is most commonly associated with quantitative, positivistic, research. The aim is to gather quantifiable standardised information from interviewees on the subject of interest which can then be aggregated and compared across subjects, looking for variability in response according to factors such as gender or age. The assumption is that, as with many positivistic research techniques, one can effectively use a set of 'controls' to standardise the process and create an objective data collection process. The attempt to standardise the procedure as far as possible reduces error and the results are argued to have greater validity and comparability between interviews (Bryman 2001).

The standardised open-ended interview approach is similar to the standardised closed-ended interview; the researcher uses a standardised set of carefully worded and ordered interview questions and is encouraged not to probe or elaborate. However the difference between the two approaches lies in the type of responses that can be given. As the name suggests the interviewee is not given a closed set of fixed responses. Rather the interviewee is free to respond how he or she feels is appropriate without being constrained by a predetermined set of responses (Patton 1987). This approach retains the strengths of the closed-ended interview, namely the attempted reduction of inter-interviewer and intra-interview variability. Any loss of standardisation by allowing the interviewee more freedom in response is offset by the greater depth of understanding that can be gained.

Both these interview approaches, the standardised closed-ended and standardised open-ended interview, rest on the assumption that there is the possibility of accessing the 'objective truth' of the social and personal worlds of individuals. Researchers using these approaches argue that one can test (and retest) hypotheses by using objective standardised methods. However the value of these methods within the social sciences is questioned on a number of levels. For instance, as Bryman (2001) noted, many argue that it is unrealistic to assume that one can create a standardised objective interview situation. Differences between personal characteristics (for example gender or race) of the interviewer and the interviewee can affect the interviewees' responses thereby reducing the objectivity of the interview. Furthermore the interviewees may not simply impart the 'truth', if there is such a thing, when asked a question. Interviewees may respond with a socially desirable answer which they deem to be the 'correct' response. A further problem is associated with 'meaning'. It is especially problematic for standardised closed-ended interviews which assume that interviewee and interviewer share the same understanding of concepts and words and there is little or no opportunity to clarify meanings. While it is acknowledged that much time and effort is taken to ensure that the meaning is as clear and unambiguous as possible, it is argued that meanings are not simply pre-given. Rather humans draw on commonly held meanings but also simultaneously create meanings (Bryman 2001).

The aim of this phase of the evaluation was to try to gain an understanding of the participants' perceptions of physical activity, particularly that of Forest School. The aim was not to test a hypothesis as it had been during phase one. As was argued in the section discussing the use of mixed methods research, it is this researcher's opinion that a method

should be chosen for its suitability for the effective investigation of the question. When the question is exploratory it makes little sense to use standardised interview techniques. These standardised interview techniques were, therefore, rejected for this part of the study as it was likely they would have led to a flawed and narrow understanding of the participants' perceptions. Certainly with the closed-ended approach there would be little opportunity for the participants to articulate their individual perceptions, and even with the open ended approach the participants could only respond to pre-determined questions. The interviewer would not have the flexibility to probe and ask supplementary questions.

The previous two interview approaches, the standardised closed- and open-ended, had the aim of uniformity in common. What is common between the next two approaches, the semi-structured and the unstructured interview, is flexibility and, to a certain extent, spontaneity. Importance and emphasis moves from the almost quantifiable positivistic reliability and validity of the structured approaches to the greater and deeper understanding of perspectives and beliefs of the semi- and unstructured approaches.

A researcher using a semi-structured interview approach will, as with the previous approaches, have a specific focus to his or her research. However unlike the structured approaches there is a far greater flexibility during the interview. The emphasis of this method is on balancing the need for certain specific information while allowing the interviewee the time and opportunity to give their opinion as they see it (Patton 1987). The semi-structured interviewer will have created a list of topics and possibly questions that should be covered (Dicicco-Bloom and Crabtree 2006). However the order is not rigidly adhered to, nor is it necessary that the questions are asked using the same terms or words between interviews. The topic guide is created to ensure that all of the points of interest are covered and allows for some comparability between interviewees. The interviewer often will have only topics of interest and is therefore required to word the questions during the interview in a way that is relevant to the interviewee and the situation. Unlike the standardised approaches, the interviewer will probe responses and further unplanned questions may be asked to elucidate the responses (Patton 1987).

At the far end of the continuum of the level of structure and standardisation that can be applied to the interview is the 'unstructured interview'. Despite being known as 'unstructured', as DiCiccio-Bloom and Crabtree pointed out (2006), no interview is ever entirely unstructured. It is more that this approach is relatively unstructured when

compared to the other interview approaches. The researcher will have some focus which 'guides' the interview. The interviewer may have a brief set of notes or points of interest that could be covered although some researchers feel that even the most basic topic guide can hinder the understanding of the interviewee's real world (Denzin and Lincoln 1998). In some cases the researcher asks a single question at the beginning of the interview and then lets the interview develop from that point (Bryman 2001). The interview tends to be an exploratory, in-depth conversation into the lives, perceptions and meanings of the interviewee. Using the unstructured interview approach provides data with the greatest depth and breadth as the interviewee is given the greatest freedom of the four approaches. No attempt is made to apply any standardisation to the situation and researchers are expected to acknowledge and be reflexive on their involvement in the process and on the data that are produced.

As mentioned at the beginning of this section, the intention of this phase of the research was to attempt to understand the participants' *own* articulations of their perceptions of physical activity and Forest School. This was a matter of finding a compromise between collecting the information that was required for a successful evaluation while giving the participants the space to discuss what was important and relevant to them. Unstructured interviewing was rejected as the research questions demanded certain topics and themes be covered. Furthermore time constraints meant that pursuing a large number of in-depth interviews was not feasible. The semi-structured approach offered the right balance between freedom and structure. The approach gave the participants the opportunity to construct and articulate their own meanings and opinions while ensuring that all the relevant topics and themes were adequately covered for the evaluation.

7.1.2 How many interviewees?

The qualitative interview is a meaning-making process between the interviewer and the interviewee. The individual characteristics of both the interviewer and the interviewee and the context of the interview affect both the interview process and the responses given. For instance it is easily understood that a gender difference between the interviewer and interviewee would be likely to affect the responses given to sensitive questions. A researcher using qualitative methods must be aware of how decisions, made regarding the collection of

data, will affect the nature of the data gathered. As Denzin and Lincoln (2000) noted, the interview is not a neutral tool and factors, such as the number of interviewees in each interview, are important considerations.

Within qualitative research, the 'interview' is typically perceived as taking place between one researcher and one interviewee. The individual interview is the most common interview format within qualitative research (Fontana and Frey 2000) and is a commonly used method when conducting research with children (Krahenbuhl and Blades 2005; Lewis 1992). It is a popular format due to the depth of information that can be gained. In a successful interview a relationship of trust will be built between the two participants; typically confidentiality of response and identity is promised by the interviewer. These factors can allow the interviewee the freedom to respond in way that is unchecked by the opinions of his or her family, friends or wider society (Fontana and Frey 2000). However there can be drawbacks to using the individual interview. As noted previously the interview is not a neutral tool; the responses given by the interviewee are 'grounded in the specific interactional episode' (Denzin and Lincoln 2000 p633) . While this is true of any interview no matter how many interviewees are present, and can be a positive factor, the negative implications must be considered. In the case of individual interviews the interviewer must consider how the relationship between the two participants, and thus the quality of the data, will be affected by factors such as gender, age, or power disparities. This was an important consideration for the present study. The researcher was in her mid-twenties and female whereas the participants were aged 10-11 and just under half were male. A good relationship had grown between researcher and participants; the participants appeared to trust the researcher and apparently did not consider her as an authority figure as such. It was, however, thought that it was quite likely that an interview between the researcher and individual males (and certain females) may not have been particularly successful. The time spent observing Forest School highlighted this gendered relationship, as it was very unusual for most of the males (there were exceptions) to individually engage in a conversation with the researcher. When engaged in a conversation with the researcher the males tended to be reticent and shy. Also although it was felt that the participants would have strong and easily articulated opinions regarding Forest School they may not have considered the rather abstract concept of physical activity in the same way or depth as Forest School. It was thought that questioning a single interviewee on these topics might be unsuccessful and damaging to the process as a whole.

An alternative to the individual interview is the group interview, where there is one (or occasionally more) interviewer and up to 10 (and occasionally more) participants. It can be carried out using a semi-structured or unstructured method. The group interview can also be known as the 'focus group' but this tends to refer to situations where there is a specific topic to be explored, while a group interview is used when there are broader topics or themes. For the remainder of this discussion both approaches will be referred to by the term the group interview. Both forms of the group interview have been successfully used in research with children since the early 1970's (Darbyshire, et al. 2005; Green and Hart 1998; Lewis 1992; Morgan, et al. 2002). One of the strongest reasons for using a group interview approach is that it is particularly effective at accessing consensus opinions and social norms. This is particularly important when, as Lewis notes, one reflects on the significance of the social context on opinions and beliefs. Use of the group interview approach can allow the researcher access to shared understandings of events and institutions. On a more practical level the presence of a number of interviewees can result in the challenging of responses and ideas by others in the group, the outcome of which may be a greater depth to the data gathered. As mentioned previously the topics that were discussed during this research were ones that may not have been considered in any great depth by the participants. The group interview can be an effective approach for researching topics such as these. The format allows participants to discuss meanings, enhancing ideas and broadening understandings.

In this strength also lies one of the most important drawbacks of the group interview. The group interview depends on the *collective* creation of meaning and beliefs. However all participants are not necessarily equal, in terms of status or in ability or desire to articulate their personal opinions. Fontana and Frey (1998) found that often there is not parity in contribution during the discussion. One or more individuals may dominate the discussion. A further point is that too much agreement can happen, resulting in what they term 'groupthink', where the emerging group culture inhibits personal opinions.

Group interviews were rejected as a method for the present study as although Forest School was clearly a collective activity, it was not the collective opinion that was sought. Despite this there were several features of the group interview that were considered to be valuable, just as there were features of the individual interview approach that also appeared useful. A compromise between the two approaches was found in paired interviewing.

Paired interviewing (or joint interviews as they are known elsewhere (Arksey 1996)) involves one interviewer and two interviewees. The method is distinct and, as Arksey (1996) noted, produces data that is qualitatively different from that of the individual and the group interview methods. It is not as common an approach as joint or individual interviewing, but there are a number of studies which have used this approach, some with children and young people (Arksey 1996; Highet 2003; Mauthner 1997). As with individual and group interviews, one can use either a semi- or unstructured approach when conducting a paired interview. The approach shares many of the benefits of group interviewing; for instance the process of negotiation and mediation between the two participants can produce a more representative and valid understanding of the issue. The participants are able to corroborate or challenge each other's accounts. The discussion between the participants can aid memory, the development of new ideas and the exploration of those ideas to a greater depth than may have been possible in an individual interview situation (Valentine 1999).

However, as with the group interviews, with these strengths come risks. For instance, it is likely that in some pairs one individual will dominate the other or individual opinion will be inhibited by the 'group' situation. Particularly where the individuals are known to each other (as is usually the case in paired interviewing) there is a real danger that one or both of the participants will feel unable to respond openly and confidently because of their continuing relationship post interview. If this can be avoided, and confidentiality and trust developed, then paired interviewing offers a valuable method particularly in research with children and young people. As Highet (2003 p109) noted the paired interview method can 'offset the inhibiting potential of the setting creating a supportive social context which enables participants to engage fully in conversation'. Having a partner in the interview can balance out the power disparity that is often found in individual interviews, especially where an adult interviews a child.

As the participants were children, extra care was taken in selecting an approach that would be least daunting and most enjoyable for them. The paired interview approach was selected for the present study as it offered a compromise between the depth of the individual interview and the mutual support of the group interview. A semi-structured paired interview also offered the researcher an opportunity to gather more complete data, as the format allows participants to discuss their responses, jog memories and elaborate on meanings, while the researcher can ensure that all relevant topics are covered.

7.1.3 Interviewing children

The UN convention on the rights of the child declare that member states should give 'the child who is capable of forming his or her own views the right to express those views freely in all matters affecting the child' (Davis 1998; United Nations 1990). This message has been adopted by many social researchers whose studies focus on the lives and experiences of children (Christensen and James 2000). This position influenced this evaluation and it was decided that in order to effectively evaluate Forest School, it was necessary to seek the opinions of the participants themselves. As Docherty and Sandelowski (1999) noted children are the best sources of information about themselves. Interviewing children, as it is with adults, is a common and effective research method. However children *are* different to adults and there are certain issues that should be addressed.

The involvement of children in the legal system has driven research that focuses on children's accuracy of recall and explanation. Docherty and Sandelowski's (1999 p178) review of the literature regarding children's competences as interview participants found that there were some who raised questions about 'the accuracy, suggestibility, consistency, and completeness' of the data. This research, they note, has shown that from the age of two, children have 'enough sophistication in the cognitive structures underlying memory to store, retrieve, and communicate past experiences to another person' (Docherty and Sandelowski 1999). From the age of 3-6 children also have accurate and stable autobiographical recall (autobiographical memory relates to information and events concerned with the self). Docherty and Sandelowski did however make the point that when an event occurs repeatedly; children have a tendency to store the memories as a 'script' (the memories of each event blend into one script, which they argue makes the memory more easily accessible and comprehensible). A further issue is, as Kortessluoma et al. (2003) argued, children who are up to and between the ages of 7-11 are limited in their ability to define abstract concepts. Despite this, Docherty and Sandelowski (1999 p180) argued that children even as young as three years old 'can give graphical descriptions and have excellent recall of experiences'.

As discussed above, children have been shown to be competent research participants. However that is not to say that adult-centred techniques should or can be used with

children. To be effective and suitable, techniques such as the interview should be adapted and time taken to consider certain factors. One of the key points relates to the relationship between the interviewer and the interviewee(s). Kortelsuoma et al. (2003) suggested that developing a good relationship with the participants prior to the interview is very important. Where the interviewer is an adult, and the interviewee a child, there is a greater likelihood of a power imbalance that could adversely affect the interview itself and the data collected (Mauthner 1997). The researcher must be aware of this and take steps to minimise the risk of this imbalance. Obtaining properly-informed consent, ensuring children understand that their participation is voluntary and that they have the right to withdraw is crucial to rebalancing this unequal relationship (Kortelsuoma, et al. 2003). This is especially pertinent for research that takes place in schools, where there is a greater likelihood of a power imbalance between the participants than research taking place in other settings. Differences in gender or ethnicity are further factors which have the potential to influence the interview process and which should, therefore, be considered. Williams and Heikes argue that these factors can 'impede understanding and rapport in the qualitative interview' (1993 p281). Whilst they note that women interviewing men is often thought to be beneficial (based on the presumption that men are more comfortable discussing more sensitive or abstract concepts with a woman than a fellow man) this may not be the case when one factors in age. The interview dynamics between an adult female and an adolescent boy are likely to be very different and, perhaps, not positive. While there is very little that the interviewer can do to reduce the impact of these factors it is important to acknowledge the potential influence on the both the process and data collected. A final point is that any child may feel uneasy or apprehensive about the interview, though as Kortelsuoma (2003) commented some children may relish the idea of having the undivided attention of an adult. Care should be taken to create a supportive and un-threatening situation.

There are a number of considerations regarding the actual process of interviewing children. Factors which may seem inconsequential have the potential to adversely influence the interview process and the data collected. As the controlled experiment by Almerigogna et al. (2008) suggested children respond quite differently to questioning depending on the approach and style of the interviewer. One of the most important points is that the researcher must make sure the process is suited to age and ability of the participants, particularly the researcher must use language that is suitable for the participants. Though as Kortelsuoma et al. (2003) noted the language must not be too simplistic otherwise the

children will feel patronised. The researcher should make sure that extra care is taken in explaining the research in a manner that is clear and understandable; this is important not only for properly informed consent but also for the collection of relevant data. Kortessuoma et al. (2003) suggested that long interviews should be avoided as children have a shorter concentration span than adults. Supplementary methods, such as drawing, discussing photographs or ranking games, are an effective method of keeping the child focused on the interview (Mauthner 1997). A number of reviews (Docherty and Sandelowski 1999; Krahenbuhl and Blades 2005) found that open-ended questions were the most effective question style for use with children. Open-ended questions, according to Krahenbuhl and Blades (2005), elicit the most accurate information and, as Docherty and Sandelowski (1999) noted, responses can be followed up with direct questions to fill in blanks.

Following the advice reviewed in the previous sections, it was decided that it was ethical and appropriate to use an interview technique to learn about the children's perceptions of their experiences of physical activity at Forest School. Particular attention was paid to the need to be flexible, that the researcher must be able to modify the process and the questions to suit both the participants and the situation (Darbyshire, et al. 2005; Davis 1998; Docherty and Sandelowski 1999; Kortessuoma, et al. 2003; Mauthner 1997). In order to make the process less arduous for the participants the interviews length would be kept short, furthermore supplementary methods were used.

7.2 *The data collection*

The following section details the data collection of phase two.

7.2.1 *The sample*

The sample was drawn from one primary seven class at a Scottish school which participated in the Forest School programme. The school was the same school that had participated in phase one of the study, and most of the participants in phase two had taken part in phase one (21 had participated and three not, this was because the year group had been split in

year six and had regrouped in year seven). The sample consisted of 24 children between the ages of 10 and 11. Fourteen were female and 10 male.

7.2.2 Ethical approval and consent

Ethical approval was sought and granted following the same procedure used for phase one and detailed in section 5.4.1.

Consent was obtained first from the head of the school and the class teacher. Information sheets detailing the aims and procedures of this phase of the research were prepared and, along with consent forms, were distributed to the parents, carers or guardians of the participants (these can be found in the appendices). Simple, age appropriate, information sheets and consent forms were given to the children (these can also be found in the appendices). Only children who returned both their and the parental consent forms took part in the research; of the 28 children who were invited to take part 24 consented.

Confidentiality was discussed with the participants prior to the commencement of the interviews. The children were assured that the recordings would be destroyed at the end of the research and that transcripts would be anonymised. The researcher also reminded the children that participation was voluntary and that it was their right to stop the interview at any point for any reason. Verbal agreement to participation was again sought before the interviews began.

7.2.3 Topic guides and supplementary method

The use of the semi-structured interview approach allows the researcher to create a topic guide prior to the interview. The topic guide is essentially an *aide memoire* for the researcher (Patton 1987). It is a flexible tool which helps the researcher ensure that all relevant topics and themes are covered during the interview. The topic guide can be as structured as the researcher sees fit. There is however no emphasis on asking the questions in the same order as they are on the topic guide and questions can be reformulated to suit the interviewee. The

topic guide can take a number of different forms, from a very simple list of the topic areas to be covered, to a guide which has carefully-worded questions and expanded topics and themes (Bryman 2001).

A topic guide (which can be found in appendix five) was developed that was suitable for use with children in a paired interview situation. The topic guide was structured to cover the six major themes that had been identified as relevant to the evaluation. The themes were identified influenced by the findings of the first phase, through participation and observation of Forest School, through informal conversations with the participants, teachers and leaders of Forest School and through discussion with research supervisors:

1. the experience of Forest School;
2. understanding and perceptions of physical activity;
3. physical activity in the outdoors and natural environment;
4. physical activity outside of school;
5. physical activity in school; and
6. perceptions of risk.

The theme of the experience of Forest School was obviously the most important to the evaluation. The guide had been devised with a section entirely devoted to questions on Forest School. In addition to this the theme could be brought up in other sections, such as the physical activity the participants do at school, or activity in the outdoors. The Forest School section was deliberately placed towards the end of the interview guide. This reason for this was to allow the children to bring up the theme of Forest School if it was important or relevant to them without them having been prompted by prior questions on Forest School.

Within each of the major themes one or more main questions were formulated, for instance, in the experience of physical activity at Forest School section, the question, 'Can you tell me some of the kinds of activity you do at Forest School?' was asked. As this question demonstrates some time was spent ensuring that these were open-ended and not leading. Care was taken to make sure that the wording used was suitable for the age group,

particularly for the questions on the more abstract terms such as 'physical activity' and 'risk'. Published guidance regarding question formulation was followed (Davis 1998; Docherty and Sandelowski 1999; Kortessluoma, et al. 2003; Krahenbuhl and Blades 2005; Morgan, et al. 2002). The topic guide was also reviewed by the class teacher who advised on the suitability of certain terms. These questions were not designed to be strictly adhered to, rather to be used as a safety net, if words or memory failed the researcher the topic guide could be relied upon. Beneath each question was a list of sub-questions or ideas that could be probed.

A supplementary method of understanding the children's opinions was also used in the interviews. Researchers working with children note that it is important to make the research process interactive and interesting for the children (Darbyshire, et al. 2005). Use of supplementary methods can also help children to focus on the research topic (Mauthner 1997). This method was also used to check for consistency in the responses given within the interview (Kortessluoma, et al. 2003). The method used was essentially a ranking exercise. A number of options, related to the topic of interest, were written on separate piece of paper and the children were then asked to rank the options. The exercise was used twice within the interviews with two different themes (copies can be found in Appendix five). The exercise was first used towards the start of the interview and related to enjoyment of physical activities the children do while at school. Five activities were selected (by the researcher and were informed by the time spent with the children during the first phase of the research) and included break time football, learning a dance routine and playing the active game 'capture the flag'. The children were asked to rank the activities in order of enjoyment. The second time the exercise was used was towards the end of the interview and focused on risk. Eight school-based activities were selected (again by the researcher; the options were designed to be relevant to the children, both geographically and experientially), including Forest School and other school trips, which the children were asked to rank according to how risky they perceived them to be. Each child was asked to do the ranking exercises individually, one after the other, though in reality the process often turned out to be a negotiated activity between the two interviewees.

7.2.4 Pilot work

Kortesluoma et al. (2003) argued that pilot work can add to the validity and reliability of qualitative work. Pilot interviews give the researcher the opportunity to refine the topic guide and to ensure that all questions are relevant and meaningful. New themes or topics may present themselves and some may be shown to be irrelevant. With this in mind two pilot interviews were conducted. As the sample was small it was felt that two pilots would be a compromise between ensuring reliability of the questions while not depleting the sample too greatly. The two pilots included a male pair (who chose to be paired together) and a mixed gender pair (who were selected by the teacher). The interviews were conducted exactly as they would be for the main interviews (see 'the interviews' section for details), except that the participants were asked for feedback on the process and questions. The pilots were transcribed and reviewed. This process indicated that the four children appeared to understand the intention of the interviews and of the research more broadly. In general the participants were able to articulate and discuss their understanding of the more abstract terms, such as risk or physical activity, used in the interviews. The paired interviewing format created a relaxed atmosphere, and the participants were able to argue and debate points between themselves but also to give and justify individual opinions. The supplementary exercises were also successful; the participants reported enjoying the exercise and the responses appeared to correspond to responses given elsewhere in the interview. It was concluded that semi-structured paired interviews would be suitable for use as the primary data collection method.

No major revisions were made to the questions already included on the topic guide. Some questions were re-worded, particularly the ones relating to abstract concepts such as the meaning of physical activity. For instance the very first question was changed from; 'can you define 'physical activity' for me?' to 'can you tell me what the words 'physical activity' mean to you?'. Using words such as 'define' confused the children and they tried to work out what the researcher wanted from them rather than describing what physical activity mean to them. Several questions and probes were added in light of participants' responses. Both sets of participants mentioned that the wording of the ranking exercises was a little confusing; with help from the participants the confusing terms were amended (the confusing term was 'break time football game' which one boy took to be the break during a televised football game).

7.2.5 The interviews

The data collection during phase one consisted of 12 paired interviews with 24 participants. There were six female pairs, four male pairs and two mixed gender pairs. The original intention was to allow the participants to select their partners for the interview themselves. However in practice this did not happen for all cases. Half were self-selected pairs, the other half were selected by the teacher (though with the consent of the participants). Only half were able to self-select for a number of reasons. The parental consent forms were returned over a number of weeks and stretched into the period of data collection, therefore in some cases where one participant had returned their forms their partner had not. Other reasons for non-self-selected pairs included one of the pair being unable to take part due to absence or prior school work commitments. These situations resulted in the participant having to choose another partner from those who had returned their forms. In one case (which incidentally demonstrated the power imbalances within this research both between the participants and adults, and, between the researcher and the school) the teacher intervened and would not allow a self-selected pair to be interviewed together. The six pairs that were not self-selected included one of the mixed gender pairs, three of the female and two of the male pairs. All of the pairs included at least one child who had participated in phase one (three of the 24 participants had not taken part in phase one).

The twelve interviews took place over four weeks of the autumn/winter term of 2006. No more than two interviews were conducted on any one day. Where two interviews were conducted on the same day a brief break was taken between interviews to write up notes and prepare for the next interview. The interviews took place during the school day, on the school premises and lasted for between 30 and 50 minutes. There was no room allocated for the interviews and the researcher was free to find a room that was suitable before the beginning of the first interview. Often the participants helped with the selection as they had a greater knowledge of the school and of the room's usage than the researcher did. In retrospect this was a positive factor as it helped even out the power imbalance between interviewer and interviewees. Most of the interviews took place in the music room; care was taken to set up a table and chairs so that the setting was not too formal and did not have the researcher sitting on one side of the table and the participants the other.

All interviews were recorded with a digital voice recorder (Olympus WS100). The researcher explained why this was desirable to the participants and sought their permission. In all cases permission was granted. A couple of pairs (female pairs) were reluctant but after assurances that no-one other than the researcher would hear the recordings and that they would be destroyed at the end of the research, permission was granted. For the most part the participants were very interested in the voice recorder, particularly the bars on the digital display that respond to noise. They would observe the effects of quiet voices and loud voices on the bars. This was positive in that it provided a distraction at the start of the interview, relaxing the participants and when, during one interview, the batteries died one of the participants mentioned the bars had stopped moving batteries were replaced and loss of data was averted.

At the beginning of each interview before the voice recorder was turned on the researcher spoke briefly to the participants about the research and the interviews. Many of the participants had taken part in the first phase of research so the researcher thanked them again for their help and described what had happened to that data (the researcher told the children about a recent presentation of the results, in the audience of which were members of the Scottish Government - this appeared to interest the children greatly and perhaps made them feel like they were taking part in something 'important'). To those who had not taken part, phase one was described. The researcher briefly described the kind of questions she would ask the participants. Confidentiality was discussed, as was the voluntary nature of participation. The participants were assured that if they did not want to answer any question or if they wanted to leave at any point then this was perfectly acceptable. As a further ice breaker the researcher explained that real names would not be able to be used in the reports and therefore pseudonyms would have to be chosen. Most participants found this a fun exercise and spent some time thinking up new names. Unfortunately some wanted to think about it during the interview, but by the end this had often been forgotten by both researcher and participant. For those who did not think up their own names a list of popular Scottish names was found and suitable names chosen by the researcher.

The interview proper began after the voice recorder was switched on. As mentioned above, the interest in the recorder helped diffuse any awkwardness at this point. The topic guide was used in all interviews and although it was intended to be flexible, all interviews followed the structure of the guide. The researcher probed responses where necessary and

asked supplementary questions if new topics arose. Using a flexible approach such as the semi-structured interview allowed for deviations from the topic guide. In some cases deviations were followed, even if they were not strictly relevant, in order to ease any awkwardness of the situation. Though, in general, the pairs that deviated the most tended to be the self-selected pairs or ones that felt comfortable with the researcher. The participants appeared to enjoy doing the ranking exercise, often arguing about who would do it first, or about differences between their answers. At the end of the interview the participants were thanked for their time. Some participants requested to hear their voices on the voice recorder, and a few minutes were spent doing this before the participants went back to their class.

Overall the researcher thought that for many of the interviews there was a good rapport between the participants and herself; it was felt that the time previously spent with the participants (during the observational work and the data collection of phase one) had contributed. The interviewees seemed motivated and interested in the subject and process. Two pairs volunteered to keep talking through their break time and another pair expressed a wish that they got to do this kind of thing more. However two interviews were felt by the researcher to be less successful than the others; in case this was due to a participant's bad cold. In the other interview the researcher had trouble keeping the participants focused on the interview. It has been acknowledged previously that the participants did not view the researcher as an authority figure; the researcher had taken part in activities at Forest School and on their normal school day during the first phase of data collection. For the most part this was positive, and it was felt that a more equal relationship had developed, however it meant that maintaining some semblance of discipline was sometimes difficult during this particular interview.

7.3 *Theoretical perspective and analytical approach*

This section details the theoretical perspective and the analysis of the data collected during phase two of the evaluation of the physical activity of Forest School.

7.3.1 Theoretical perspective

As Blaikie argued, the social researcher should acknowledged and make explicit the theoretical perspective which informs and influences their work (2004). Theoretical perspectives 'provide a particular language, a conceptual framework, or collection of 'theoretical' concepts and related propositions, within which society and social life can be described and explained' (Blakie 2004 p160). The analysis and interpretation of the data collected during the second phase of this evaluation was guided and informed by a phenomenological interactionist theoretical perspective. The main aim of a phenomenological interactionist approach is to describe and analyse the 'real' world (meaning the 'real world context' rather than in a positivistic sense), generating data which 'gives an authentic insight into people's worlds' (Silverman 2001 p87). Phenomenology is particularly appropriate when the emphasis of the research is on understanding the meaning and significance of events (Berger and Luckman 1991). The approach is based on the assumption that shared meanings, social context and social interaction enable the construction of subjective experience (Berger and Luckman 1991). Although social research cannot provide the mirror like reflection of social worlds, it can enable an understanding of the meanings people attribute to their experiences. However the researcher using an approach involving interactionism should recognise that the process of social research itself becomes part of this interaction based construction and articulation of experience and perception.

7.3.2 Analytical approach

Patton argued that analysis of qualitative data gathered for an evaluation takes on a 'special focus'. His point was that, 'evaluation is the systematic collection, analysis, and interpretation of information about the activities and outcomes of actual programmes in order for interested persons to make judgements about specific aspects of what the programme is doing and improve the programme' (1987 p145). Therefore the analysis of qualitative data that forms part of an evaluation is often more structured than it may otherwise be. Patton noted that the specific focus of the analysis of qualitative evaluation

data tends to be drawn from the research questions decided upon (often as part of a negotiation with funders) at the start of the evaluation. Other analysis approaches, such as grounded theory, use an inductive approach. Where the researcher allows themes and concepts to arise from the data gathered rather than being decided upon before hand by the researcher. A purely inductive approach was not thought to be suitable for this research; rather, as this research is an evaluation, the structured, focused approach advocated by Patton was deemed to be the most appropriate type of analysis. This evaluation as a whole was attempting to answer quite specific questions, yet on quite abstract concepts (especially so for 10-11 year old children) regarding the physical activity engaged in during Forest School. The interviews were designed in such a way that allowed the participants to express their opinions while ensuring certain topics were covered. The analysis approach needed to reflect and compliment the fact that the interviews were designed to gain quite specific information.

The analytical approach selected for use with the present study is known as the 'framework approach' (Pope, et al. 2000). Pope et al. described the framework approach as having been developed in Britain and specifically designed for applied or policy relevant research. They noted that where the 'objectives of the investigation are typically set in advance and shaped by the information requirements of the funding body... there is often a need to link the analysis with quantitative findings' (p116). It is essentially a deductive approach; the framework of the analysis is usually derived from research aims and questions. Pope et al. noted that although it is primarily deductive, the approach is flexible enough to allow for inductive analysis. There are generally five stages (much simplified) to data analysis using the framework approach (taken from Pope, et al. 2000 p116):

1. **Familiarisation or immersion in the raw data.** Usually by reading transcripts and research notes or by listening to recordings
2. **Identification of the thematic framework,** including key issues, concepts and themes (usually drawn from the requirements of the funders, aims and objectives of the study as well as any key points raised by the interviewees)
3. **Indexing,** (or coding) Pope et al. describe this as applying the thematic framework to the data. This is usually done by selecting the relevant pieces of the data and identifying as part of a certain theme.

4. **Charting.** Collecting together the data according to the theme to which they have been categorised.
5. **Mapping and interpretation.** Defining the concepts, mapping the range and nature of the phenomena and finding associations between concepts.

The framework approach was adapted slightly for use in this evaluation; this will be described in section 7.3.5. The discussion will turn briefly to ensuring reliability of data and validity of results in qualitative research.

7.3.3 Ensuring reliability of data and validity of results

Ensuring the reliability of data and validity of results is as crucial to qualitative research as it is to quantitative. As Morse et al. (2002 p2) stated, 'without rigor, research is useless, becomes fiction, and loses its utility'. While quantitative research can rely on measures such as re-testing, controls and *p* values to demonstrate reliability, validity, and 'significance', the process is less certain for qualitative work. Indeed some qualitative researchers have even gone as far as to reject notions of reliability. Arguing that as 'reliability issues concern measurement then it has no relevance to qualitative work' (Golafshani 2003 p601). Despite these arguments, issues of rigor, reliability, and validity are of great importance to many qualitative researchers. Morse et al. (2002) warned that 'by refusing to acknowledge the centrality of reliability and validity in qualitative methods, qualitative methodologists have inadvertently fostered the default notion that qualitative research must therefore be unreliable and invalid, lacking in rigor and unscientific' (p4).

Reliability and validity, while distinct aspects of qualitative research, are inextricably related concepts, for without reliable and rigorously collected data the validity of the analysis and the results would be compromised. Kvale (1996) stated that reliability relates to the consistency of research findings. Reliability is therefore pertinent to every stage of the research process; it should be considered during design, data collection and analysis. Validity relates to concepts of truth and knowledge. According to Kvale (1996) a 'valid

argument is sound, well grounded, justifiable, strong, and convincing'. Validity for Patton (1987) rests on how far one can trust the results of the analysis.

The reliability and validity of findings derived from interview data can and should be ensured through a number of processes. For instance Bryman (2001) argued that the process of recording and transcribing is an important factor in ensuring the reliability of interview data. He points out that by recording and transcribing one avoids the issues related to the natural limitation of our memories, allows a more thorough examination of what the interviewee said, and allows for the easier and repeated examination of the interviewees responses. However, as Perakyl (1997) pointed out, reliability could possibly be reduced by the over reliance on recordings and transcripts. He argues that there is more to human interaction than speech and words. Often a transcript can strip the interaction of meaning. People move around, gesture, or refer to items, all of which may not be registered by the recording device yet are crucial to understanding the meaning of the interviewee. Validity in qualitative research is often ensured through various processes of verification. Patton (1987) and Morse et al. (2002) advocated a system of verifying results by both the researcher themselves (internal verification) but also by allowing the data to be opened to other external researchers or even by returning to the interviewees to verify the results. Internal verification involves a number of processes through which the researcher can begin to ensure the validity of their results. These processes include searching for rival explanations or negative cases and possibly through the use of triangulation. By allowing external researchers to review the data and verify results a researcher can further ensure the validity of their claims, this is particularly useful in guarding against the threat of the researchers own biases and prejudices. The researcher must also be able to demonstrate the validity of their claims in final analyses and reports. Typically this is done by providing adequate and representative evidence, that is in context, to verify the claim being made and that is, therefore, open to the scrutiny of the reader (Patton 1987).

7.3.4 The data

The primary data collection method used during the second phase of the evaluation of Forest School was semi-structured paired interviewing. Therefore the majority of the data

collected took the form of digital recordings of the twelve interviews. As Patton (1987) notes, the most desirable method of dealing with this type of data is full transcription. Despite transcription being a hugely time consuming (and costly) process it is widely thought of as crucial for ensuring reliability of interview data (Bryman 2001). The transcription of interview data is also necessary if the researcher intends to use computer aided analysis techniques (as they were in the present study).

The transcription of each of the interviews collected for this evaluation was carried out by the researcher who conducted the interviews. Transcription was aided by Olympus' audio playback software that comes with the digital recorder (see section 7.2.5 for details of device). Transcription of the interview data began shortly after the pilot interviews were conducted. The two pilot interviews were transcribed fully before the commencement of the subsequent interviews. Transcription continued during the period that the main body of the interviews were conducted, though due to the time it takes to transcribe interview data, the vast majority were transcribed after the completion of data collection. The decision was taken that the interviews would be transcribed in full and as far as possible in *verbatim*. This was because there were a relatively small number of interviews and the researcher felt that full transcription was not only necessary but would also aid the analysis process (Kvale 1996). Standardisation between transcripts was ensured by following the same rules throughout the transcription process. The content of the interviews were transcribed following McLellan et al.'s advice; 'keep word forms... and the use of punctuation as close as possible to speech presentation and consistent with what is typically acceptable in written text' (2003 p65). The vernacular words used by the interviewees were transcribed as they were spoken. Punctuation was used to indicate aspects of speech patterns such as pauses. Laughter, reticence, and points of exclamation were also indicated. However the decision was taken that the researcher would not use more formal transcription rules as this was not necessary for the level and approach of analysis, furthermore it would have added significantly to the time taken for transcription. The transcripts were anonymised; pseudonyms replaced the participants' own names and relevant geographical features such as county and town names. After each interview was transcribed, the transcription was checked for accuracy by reviewing the transcript while listening to the recording.

7.3.5 The process of analysis

The analysis of the data collected during the 12 paired interviews followed, with some deviations, the five steps of framework approach detailed above. After the interviews had been transcribed, the researcher began the process of immersion in the raw data (though one could argue that transcription is a step in this process). Both the transcripts and the interview notes were carefully read through. Brief notes were made when a point of interest was found. Once the researcher felt comfortable with the data and felt a good knowledge of the transcripts had been gained, the second step of framework analysis was considered. The thematic framework, according to Pope et al. (2000), arises from two sources. The primary source is driven by the aims and research questions of the evaluation. The second source is inductively gained from the raw data itself. The thematic framework for this analysis was derived from both the research questions and through the ongoing process of analysis. Firstly though the research questions were reviewed and spider diagrams (essentially ways of aiding the thought process – central ideas are expanded in a very informal and unstructured manner) were used to expand and develop possible analysis themes which were relevant. Seven overarching themes were developed;

1. The experience of various aspects of Forest School
2. Use of green space/countryside
3. School physical activity
4. Out of school physical activity
5. Understandings of physical activity
6. Risk
7. Gender differences

These overarching themes were then expanded into approximately 45 themes and sub-themes (a list of these sub-themes can be found in appendix six). The next step involved the

laborious process of coding or 'indexing' (Pope, et al. 2000). Specialised software (QSR NVivo 6, QSR International Pty LTD) was used to aid this process.

NVivo is essentially a piece of software that facilitates the process of qualitative data analysis by allowing the researcher to 'mark segments of data by attaching code-words to those segments, and then search the data, retrieving and collecting all segments identified by the same code' (Coffey and Atkinson 1996 p170). There are a number of strengths associated with the use of programs, such as NVivo, for facilitating data analysis. Primarily the process of computer based data coding and retrieval is much quicker and more efficient than using manual paper based approaches. Bryman and Burgess suggest that it can 'enhance the transparency of the of the process of conducting qualitative data analysis' (1994 p180). They suggest that the approach forces researchers to be more explicit about the decisions taken regarding the codifying of the data which strengthens the reliability of the conclusions and findings. However, despite these positive aspects, a number of arguments have been made which suggest that computer aided analysis may be problematic. In particular the processes of coding and retrieving are thought to 'fragment' the data, stripping it of its context and thus its meaning (Bryman 2001) (though presumably this argument is not specific to computer aided analysis and relevant to any process of coding qualitative data which removes the original quote from its context). Finally there is a danger, as Bryman argues, of quantifying the data, of reducing the findings to mere counts of incidences (Bryman 2001).

Whilst the dangers of computer aided qualitative data analysis were acknowledged the author considered that the strengths of the approach meant that its use was justified. The use of NVivo involved setting up the 45 sub-themes, or as they are referred to in the program, nodes. The author then reviewed each transcript which had been imported into the program, and then coded, by highlighting, relevant sections of the script. As the coding progressed certain other relevant themes and sub-themes became apparent, these included the theme of 'dogs', the sub-theme of 'mediating risk' and a number of the gender sub-themes. Either these themes had not been previously identified ('dogs' was one of these themes) or because it became obvious that certain themes should be split to aid analysis (this was the case with the gender sub-themes). This brought the total number of themes and sub-themes to 52.

The next step of the analysis involved extracting code reports from NVivo (this a document that contains all the sections of each of the transcripts coded under one node). These reports were printed out and reviewed a number of times. The process of analysis deviated from

that of the 'framework approach' at this point. At this point researchers using the framework analysis approach typically distil the information and create charts to aid interpretation. However the researcher found that the visual representation of the data in charts did not work for her and instead, used a different approach called the OSOP (one sheet of paper) method (Ziebland and McPherson 2006). The OSOP method is basically a way of distilling the large amounts of information in code reports. The researcher read through the code reports and noted down the key points of each coded extract. The aim was to distil the information to such a degree that the key points of the theme, from each interview, are on one piece of paper (this obviously depends on how many interviews were conducted but was achievable with the number of interviews for the present study). This therefore allowed the researcher to begin to recognise and understand the relationships between responses and interviewees. This process took some time and for some themes several separate OSOP reports were made. The researcher was aware that this process involves certain risks. There is the danger of distilling the distillation and therefore stripping the real meaning from the extract. Furthermore there is the danger (as there is with all coding based analysis approaches) of losing the context of the extract. The researcher attempted to avoid these issues by constantly referring back to the full transcript or the recording to verify that the interpretation of the extract was not mistaken by over distillation or taken out of context. During this process the researcher ensured that she consciously searched for and included negative cases, that is cases which did not fit the general pattern (Patton 1987). It is important not to ignore or disregard explanations that do not 'fit' the general pattern for these can highlight subtle variations between interviewees. A common practice at this stage of the data analysis is to check the reliability and validity of the coding and analysis; this is typically done in one of two ways: firstly, a second researcher, either internal or external to the project, may be asked to consider the data and the suitability and justification of the coding structure and analysis. The second way in which the reliability may be ensured is by re-visiting the research participants to check that the interpretation of the data is consistent with the participant's perceptions (Morse, et al. 2002; Patton 1987). However, due to the nature of this research (doctoral research), there were not the funds to employ a second researcher for this process nor was the school likely to be willing to give up even more of their time for the latter process. Therefore the reliability of the analysis is acknowledged to be somewhat compromised.

The final stage of the analysis was primarily concerned with interpreting the evidence collected and analysed. At this point the researcher returned to the framework approach and focused on assessing the broad concepts, interpreting the phenomena and finding associations between themes.

The results of the analysis and interpretation of the data collected during the second phase of this research are detailed in the following two chapters.

8 Children's perceptions of Forest School and the physical activity they engaged in during sessions

This chapter, which details the results of the 12 paired interviews, explores the children's perceptions and experiences of Forest School and of the physical activity at Forest School.

8.1 *The children's perceptions of Forest School*

Of the twenty-four children who were interviewed, twenty gave enthusiastically positive responses to the question 'what do you think of Forest School?'. It had been expected that the children would give positive responses to this question, as the researcher had attended Forest School with the children on numerous occasions and had witnessed their enjoyment; however the nature of the responses had not quite been expected. An example of a representative (positive) response was given by Sean and Emma:

Interviewer: ...what do you think of Forest School?

Emma: Fun.

Sean: Brilliant.

Emma: Fun.

Sean: Fun fun fun!

The children expressed their enjoyment of Forest School in various ways. Often Forest School was described as 'excellent', 'fun', 'exciting', and 'adventurous'. Holly enjoyed the experience because 'You dinnae get bored at all'. Andrew, realising that not all children got the opportunity to participate in Forest School, thought that they were lucky to have the opportunity to take part and commented, 'Well it's just amazing how we got. Overall the children were overwhelmingly positive about their participation in Forest School.

While all the males were enthusiastic and positive in response to this direct question; the four responses which were not quite so positive or enthusiastic were given by females. Although none of the four girls stated that they did not enjoy Forest School, their responses

were noticeably less positive than the others. The issues included the lack of provision of toilets and the possibility of being hurt while at Forest School. Jackie implied that she did not enjoy Forest School hugely, '*Sometimes it is quite boring 'cos it depends on what we do, sometimes we play games over and over again and it gets quite boring*'. However it must be pointed out that this was the only negative comment Jackie made regarding Forest School, so may not be representative of her feelings or experiences. The other two girls, who gave negative responses to the first question, were from the same pair. Despite implying that they enjoyed certain aspects of Forest School, their responses to this question were somewhat indifferent:

Jessica: Its OK, but...

Erin: It's OK but it's no that fun.

Interviewer: No?

Jessica: Some things are alright but...

Erin and Jessica were the most negative of all the interviewees regarding their perceptions and experience of Forest School.

8.2 Why the majority of the children found Forest School enjoyable

The children, during their discussion of Forest School, mentioned a wide range of features which contributed to their enjoyment of Forest School. There was absolutely no indication that Forest School was valued or enjoyed because it was not ordinary 'school', and no indication that Forest School represented an opportunity to be doing something easier than school work. In fact a number of the children mentioned that Forest School represented a learning opportunity and this appeared to be a valuable aspect of their participation in Forest School. The children gave the impression that Forest School was an important part of their schooling and would be missed greatly after they moved to the high school the following summer. Towards the end of her interview Emma was asked about the move to the high school, one of her first comments was '*No Forest School...*'. She sounded truly sad at thought of the loss of this experience.

The analysis of the children's talk regarding their participation in Forest School indicated that the children found many aspects enjoyable, however five key reasons were identified: 1) Forest School was fun; 2) Forest School was a learning opportunity; 3) some children valued the experience of the natural world while participating in Forest School; 4) Forest School gave the children the opportunity to be sociable; and, 5) the freedom the children experienced while participating in Forest School. There is a sixth facet of Forest School which the children discussed at length, that of the physical activity they engaged in while at Forest School, this is discussed in a later section (8.4), though must be seen as inherently associated with what is reported in this section. The first five themes are explored in the following sections.

8.2.1 Forest School was fun

The children, on the whole, indicated that Forest School was an enjoyable and fun aspect of their schooling. The frequency of the use of the word 'fun' is indicative of these perceptions. As the first quote in this chapter, from Emma and Sean, shows, fun was often the first word that was used to describe their perceptions of Forest School; furthermore most of the Forest School activities, discussed by the children, were described as 'fun'. Jackie and Andrea used the word to describe why they enjoyed the game 'capture the flag':

Jackie: 'Cos its fun.

Andrea: It's really fun.

Interviewer: What do you like about it?

Jackie: 'Cos it's like, you get to run about up the forest and its quite funny the way we play it, you are allowed to swap jackets and that, and the other person has to guess who it is, 'cos, they got...

The impression that the children found Forest School enjoyable and fun went beyond their simple description of Forest School as being so. Several of the children recalled experiences they had had at Forest School, often from some time ago, and discussed them in way that indicated that they were both important and very enjoyable. Often these experiences involved attending Forest School after a snow fall or a hard frost: (unfortunately the tone of Jade's voice is lost in the transcription, but Jade spoke rapidly and very excitedly about her

experience of the ice); *'me and Louise we were having a game of ice skating right 'cos there was this big pond last year and it had all frozen up! And Louise was skating on the top of it and she goes 'Jade you come over' and I goes 'no' 'cos I will end up falling on my bum...'*

However it would be incorrect to give the impression that *all* the children enjoyed *all* aspects of Forest School. Not all the activities that the children mentioned were described as fun; there were aspects which the children did not enjoy. Some of the activities were described as boring, for instance Alex and Terry did not enjoy a particular art activity.

8.2.2 Forest School as a learning opportunity

Despite the children, on the whole, perceiving Forest School as a 'fun' activity some did appear to think of it as a more formal learning opportunity. While it was not as common a theme, it was mentioned by six of the children. Jack and Oliver frequently implied that they were learning at Forest School:

Jack: ... it teaches you a lot.

Interviewer: Teaches you a lot? What kind of thing?

Jack: Well it teaches you how to use knives and...

Oliver: An how you should chop some trees and how you shudnae...

Interviewer: So it's like practical, like how to do stuff?

Jack: Aye like stuff that you are actually gonna do.

Both Jack and Oliver perceived of the learning as an integral aspect of their enjoyment of Forest School, and valued Forest School more for its inclusion. Learning at Forest School was also mentioned in other interviews, for instance Emily mentioned that they had learnt how to measure the height of trees. A further example was mentioned in three of the interviews. The leader had instructed the children in the art of tying knots, while Jack and Oliver appeared to find this a 'boring' activity, Holly and Hannah were more enthusiastic:

Holly: Yeah on Wednesday I made a Christmas decoration.

Interviewer: Did you?

Holly: I made a star, and you had to, learn, is it called a square lash?

Hannah: Aye a square lash.

- Holly: A square lash and you had to do it around the two sticks and it looked a bit like Jesus' cross more than a star but erm,*
- All: Laughter.*
- Holly: Mrs Malus spray painted it gold so now it's above my main manger in the living room.*
- Interviewer: Oh how nice, was your mum proud when you take home things like that?*
- Both: Yes!*

As this extract shows, the learning experiences, which were a part of Forest School, could have quite an impact for the children. This child was very proud of what she had learnt, furthermore, the fact that she was able to take it home and show her mother, made it more important and memorable.

8.2.3 The experience of the natural world

A third factor which contributed to the children's enjoyment of Forest School was the opportunities it offered for contact with the 'natural world' (meaning more than the basic context of the programme, i.e. the forest). For the most part, the children who mentioned the natural world found this a positive experience. There were, however, three children who discussed this in a negative manner, though these children were discussing the *potential*, rather than experienced, risks of contact.

Contact with nature was described as one of the most enjoyable aspects of Forest School in three of the interviews. In response to the question 'what is the best thing about Forest School?' Megan answered: '*Oh we saw! ... We saw seven or eight green or gold finches yesterday! Green or gold finches feeding on the larch cones*'. Not only had Megan gained knowledge of the species of both bird and tree (when first attending Forest School few of the children had any knowledge of the natural world), Megan was excited about the encounter. Jade and Vicky also counted the experience of the natural world as one of the best things about Forest School:

- Vicky: The best thing that I have ever done up there is we had to find a quiet spot and er, we had this piece of string and were just fiddling*

with it and er, there was a log and I was sitting on it and maybe here too, about, maybe over here, there was a robin.

Interviewer: How nice,

Vicky: And all these other birds come and they were playing and all that and they dinnae even notice me.

Holly and Hannah appeared to use the experience of nature as a method of distraction from the arduousness of the walk up to the Forest School site. When asked whether she found the walk tiring Holly commented: '*... I usually just try to spot any certain birds or if I can see a new plant or...*' while Hannah remarked: '*...it's quite good 'cos you like see like different, like button mushrooms and everything, like things you have never seen before*'.

As mentioned earlier, not all the references to the natural world were positive, though the negative comments were made in reference to potential, not real, experience. When asked why teachers from other schools might think that Forest School was too risky, Alex and Terry thought certain aspects of nature might be responsible:

Interviewer: What kind of risks do you think those teachers might be worried about? At something like Forest School?

Terry: In case of badgers or something.

Interviewer: A what?

Terry: A badger or a fox.

Interviewer: A badger? What might happen to them?

Terry: Bite them or chase them.

Heather was another child who mentioned that there were potential risks associated with the contact with nature while at Forest School: '*Sometimes you worry about like getting ticks*'. She went on to say, however, that she had never got a tick while attending Forest School.

8.2.4 Forest School gave the children an opportunity to be sociable

In seven of the twelve interviews the children discussed enjoying being with, talking to, and engaging in activities with both their friends and the leaders, while at Forest School.

Four of the pairs discussed the fact that they enjoyed being with the leaders of the Forest School. The children, on the whole, appeared to enjoy being with the leaders; only one pair made a negative comment. Alex and Terry mentioned how much they enjoyed playing tig with the leaders. Harry stated that for him, one of the best things about Forest School was when he was allowed to help the leader light the camp fire. Leah and Megan were especially fond of the leader:

Interviewer: ...what do you think of Forest School?

Leah: It's really good.

Megan: It's good fun, its good exercise for you and Sandy is the best...

The children also discussed how much they enjoyed being with each other at Forest School; predominantly it was the boys who made reference to this aspect of their enjoyment of Forest School. Cameron for instance, when asked what he thought of Forest School:

Cameron: The best bit is when you can walk down, you can talk about everything with all your friends,

Interviewer: Yeah? What kind of things do you talk about?

Cameron: Like...

Andrew: Who won capture the flag and that.

Cameron: And building the dens.

Harry also enjoyed the sociable aspects of Forest School, *'Err just because, well we're just out for a good walk, you walk by different people every day and like they are just happy and that... brilliant'*. A number of the girls also made reference to talking to each other during the walk; Holly, for instance, *'I dinnae think it is too long 'cos all I do is talk to my pals'*.

Some children did, however, comment that not all the social interactions were positive. Vicky and Jade noted that, although making dens in groups was fun, it was occasionally difficult to negotiate within the group: *'Just sometimes like, when you are building your dens, 'cos some people might want it that way and then the others want it that way and it descends into an argument'*.

8.2.5 The freedom the children experienced while participating in Forest School

Finally, the experience of freedom appeared to have contributed to the children's enjoyment of Forest School. Although none of the children actually used the word 'freedom', often the way the children spoke of Forest School could be interpreted as alluding to an idea of freedom.

All the children indicated that their enjoyment of Forest School was associated with the freedom they experienced. The experience of freedom at Forest School was described in many ways and related to a number of the features of Forest School. Getting muddy and dirty was one of the commonest ways in which the children indicated that they enjoyed the freedom that participating in Forest School afforded. Six of the pairs discussed this freedom in terms of being 'allowed' to get muddy and dirty; this is discussed at greater length in sections 8.3 and 9.2.

The freedom to engage in adventurous and risky activities also featured in the children's discussion of Forest School. Emily declared that, '*It's really fun and it's exciting and it's adventurous*'. For some children the opportunity to be adventurous took the form of skating on ice, as described in a previous section. Other children described different adventurous and risky activities. Ethan reported enjoyed climbing trees at Forest School:

Ethan: I climb lots of trees.

Heather: Sometimes but, laughter, when they don't notice it you do it.

Ethan: I climb up in trees, up to...

Interviewer: Are you allowed to do it?

Heather: I dunno... but you don't climb really high because the trees are wobbly.

Ethan: I do.

Interviewer: You climb quite high?

Ethan: Aye, it was.

Heather: I climbed one that was really high but then one of the branches broke... so I came back down.

A further risky activity which the children reported enjoying was the use of tools, such as small saws and loppers. Whilst the children would have had little freedom during the

process of learning to use the tools; these children, however, had attended Forest School for some time. Over this time the children had learnt to use the tools safely and had earned the trust of the leaders and were now able to use the tools unsupervised. Therefore the children had the freedom to leave the direct supervision of the leaders and go, either in groups or individually, into the forest and use the tools for various activities such as art projects and den building. While discussing the use of tools Jack commented:

Jack: 'Cos we know how to use the tools and we work really carefully if we use them.

Interviewer: So you have been trusted to use them?

Jack: Aye.

Most of the children expressed enjoyment of using the tools. However the use of tools facilitated an activity the children seemed to enjoy even more, den building. All the children who participated in Forest School built dens; usually the dens were built in small groups and were fairly substantial in size. Both females and males reported great enjoyment of this activity (though as a previous quote from Vicky and Jade showed it did have the potential to cause conflict). Six of the females and seven of the males mentioned building dens as one of their favourite things about Forest School, (these figures may have been higher if the interviews had been single rather than paired; if one of the pair had mentioned a specific activity the other tended not to repeat it). The children enjoyed the freedom of being allowed to construct their dens, away from the direct supervision of the leaders, to a design of their own choosing.

The children enjoyed their freedom to such a degree that one of the most common complaints related to the loss of freedom at Forest School. As Luke and Harry mentioned:

Interviewer: Are there things that you don't like so much?

Harry: When you get called back (to the base by the leaders).

Interviewer: Cold? Oh called back...

Harry: Called back, when we are going to our dens and that.

The freedom to roam the forest at will, could, however, have negative consequences. For instance the leaders had had to devise a way for a child to indicate if it had got lost, which involved standing still and clapping hands until someone came. However, as this quote

from Holly shows, this strategy did not always work, *'Err, if, 'cos Sandy tells us to clap our hands if we are lost and that, I've been with Louise, Louise told me to go get some logs and I cudnae find my den or the forest camp and I tried to clap my hands but no one came, so it took me half an hour to get back, just wondering around'*. This experience did not however appear to have particularly disturbed Holly.

8.3 Barriers to the enjoyment of Forest School

It was expected that the children would report enjoyment of Forest School, knowledge influenced by the time the researcher spent participating in Forest School prior to the interviews. However there were a number of aspects of Forest School which could, potentially, have acted as barriers to enjoyment.

8.3.1 Did getting cold, wet, or dirty act as a barrier to the enjoyment of Forest School?

This Forest School took place throughout the year and the children were out in the open during the whole Forest School session. As this particular Forest School took place in Scotland, it was frequently cold and/or raining; it was thought that the children may report that this was a negative aspect of Forest School. While most of the participants agreed that they did often get cold while attending Forest School, very few considered that it affected their enjoyment. Certainly the impression gained is that, on the whole, getting cold was not a barrier to the enjoyment of Forest School. Only two of the children indicated that getting cold affected their direct enjoyment of the Forest School session, both of whom were female. Emma, after being asked whether there were any aspects of Forest School she did not like, responded, *'When it's really, really cold and you are sitting there, like, brrrrrr'*. Hannah highlighted the need to wear appropriate clothing at Forest School: *'Ah don't like it when its wet or raining because, when its very cold it's not very good because, some folk, some people wear jeans up the forest and it's like they get really really cold'*.

As Hannah's comment indicates, getting cold and wet had the potential to have a significant impact on the group's overall enjoyment of Forest School. Two of the pairs reported that if the children got very cold (and wet) Forest School could be cancelled and the children returned to school; this was not viewed positively. For instance Terry and Alex discussed this possibility:

- Interviewer:* ...when it is wet and muddy does that bother you at all?
- Terry:* Ah-ha 'cos if you fall you get all wet and then you have to go back down to school.
- Interviewer:* Have you had to go back to school 'cos you are wet?
- Alex:* An if you get cold, really cold.
- Interviewer:* Yeah?
- Terry:* If you get really, really cold and fall in the mud.

It is quite likely that the quote from Hannah (previous to the quote from Alex and Terry) relates to this eventuality, the children were certainly warned not to wear jeans because of the risk of getting so cold and wet they would be returned to school. If this is so, she is therefore not implying that getting cold and wet is the problem; rather it is the secondary results of getting cold and wet.

As indicated in a previous section the children often found a positive aspect of what was, or could have been, a negative event. On very cold frosty mornings the children reported finding iced over puddles upon which they would skate, an activity they greatly enjoyed. The children typically reported few negative feelings about attending Forest School in cold weather, possibly because the cold weather was associated with snow. Snowy days appeared to have been the children's favourite conditions in which to attend Forest School. Alex and Terry enjoyed the snow as it afforded a certain opportunity:

- Interviewer:* What about when it is snowing or when it is really cold?
- Terry:* That's good.
- Interviewer:* You like that?
- Terry:* 'Cos you get to, you go on bin bags and slide down the big hill.
- Interviewer:* Oh right... like sledging?
- Alex:* Aye, I like that.

The second potential barrier to the enjoyment of Forest School was associated with getting muddy and dirty. Prior to the interviews it was thought that, possibly, some of the children, especially the girls, may have had some problems with this aspect of Forest School. However, in general, as was discussed briefly in a previous section, there was little difference in response between the genders. All but three of the children appeared to appreciate this aspect of Forest School greatly, perceiving it as an opportunity rather than drawback. Rather than shying away from getting dirty and muddy, the children variously declared that they rolled in, jumped in, or splashed in muddy puddles. It was, as Ethan stated, difficult to avoid mud at Forest School:

Interviewer: What do you think of getting muddy and dirty at Forest School?

Ethan: It's fun.

Interviewer: You like that? Why do you like about that?

Ethan: 'Cos when all the mud gets hard you get to pull it off.

Interviewer: What do your mum and dad think of you getting muddy?

Ethan: Not bothered 'cos cannae not get mucky anyway.

The majority of the boys were unequivocally positive about getting muddy and dirty; as Sean put it, *'I know the best thing, the bestest ever... getting mucky!'* Almost all reservations were associated with the risk of having to return to normal school if they got too muddy and therefore cold and wet. The children got round this by waiting until the end of the day to fully immerse themselves in the mud:

Interviewer: So what's the best thing about Forest School?

Cameron: Errr,

Andrew: Aww! Going back down! If you get, 'cos no-body wants to get mucket (muddy) on the way up so they get it on the way back down.

Cameron: Just jump into puddles!

As indicated earlier many of the children considered it a favourite feature of Forest School. One child (Luke) indicated that getting muddy was a novel experience, *'First time I wisnae used to it... first time I dinnae like it 'cos I wisnae used to getting, to getting all mucky and that... well not as that... but then I started getting used to it so I don't mind'.*

Four of the children did, however, have limits, and expressed reservations about the amount or type of mud. Luke continued his explanation of his experience of getting muddy by saying, *'It's just, I hate it when I get muck splattered down my face'*. Apart from Luke, only girls expressed reservations about getting covered in mud during a Forest School session, though it should be stressed that the majority expressed enjoyment. Heather for instance stated that it was ok, but *'Depends how muddy you get'*. Emily had similar feelings, *'Ah I like getting dirty but I don't like getting wet, really wet mud on me'*. Only one child expressed a complete dislike of getting dirty. While discussing seating arrangements for lunch, Chloe and Emily discussed Chloe's dislike of getting dirty:

- Emily: That's just 'cos you don't want your pack to get dirty*
- Chloe: I know but, I don't like getting dirty.*
- Interviewer: You don't like getting dirty, that's a thing that's not so good about it?*
- Chloe: I don't like getting muddy; I am a really girly girl.*

This dislike was noticed by the other children in the class, Emma and Sean commented:

- Sean: There's some lasses in the class when they get a wee, like, a splash of muck on them they just go 'aaaaarrrrgggghhh'*
- Emma: Arrrgggghhhhh, I roll in the muck!*

Despite the fact that there were a small number of children who expressed reservations about getting too muddy, the majority did not see getting muddy as a barrier to their enjoyment of Forest School.

8.3.2 Lack of toilets

After carefully reviewing the interview data (again it should be noted that this section does not include the physical activity at Forest School data), the only barrier to enjoyment which was mentioned independently (i.e. the children were not questioned directly about) and by more than one child, was the issue of toilets. As was reported in the section regarding the children's enjoyment of Forest School, the children did mention certain negative aspects, such as the risk of badger attack or 'boring' activities; however these were not considered

(by the author) to be actual barriers to their enjoyment of Forest School. Each of these issues tended to be mentioned by a single child and although it was brought up there was no indication that its implications were serious enough to act as a real barrier to enjoyment. The issue of toilets, however, was mentioned in two of the interviews and was considered to be a real barrier to the enjoyment of Forest School for certain individuals. There were no toilets at the Forest School site and the site was too far from the school to return. The children had to go to the toilet in the outdoors; the boys appeared to have gone wherever they were, the girls, however, were taken to a quiet area away from the main site by the teacher. Chloe and Emily complained;

Chloe: I don't like going to the toilet, 'cos there isn't a toilet.

Emily: There should be like, do you know one of those wee cubicle things

Interviewer: Yeah, so that would be better would it?

Chloe: Yeah.

Emily: Yeah one for the boys and one for the girls.

Chloe: Naw, the boys just go outside anyway.

8.4 Physical activity at Forest School

Although the children's perceptions and experiences of the physical activity at Forest School were relevant to the topics discussed in many of those sections, physical activity is examined separately in this section. Primarily this is because the children's perceptions and experience of the physical activity which results from participation in Forest School is the key question for this phase of the research and is, therefore, examined in a greater depth than other aspects of Forest School. The reporting of the results begins with an examination of the children's understandings and perceptions of 'physical activity'.

8.4.1 The children's understanding of the term 'physical activity'

One of the first questions asked during the interviews related to the meaning of the term 'physical activity'. The researcher was aware that the term 'physical activity' is somewhat

abstract and this may have caused confusion for the interviewees; as Korttesluoma et al.(2003) argued children who are between the ages of 7-11 are limited in their ability to define abstract concepts. However the children, on the whole, did provide thoughtful and meaningful answers. All the children made an attempt to describe their understanding of the term, though it must be said that some had difficulty in articulating their meaning.

Two of the pair's understanding of the term reads as a somewhat simplified version of the definition used by the DoH (2004) (see section 2.1). These two pairs considered that 'physical activity' meant to be actually physically moving, for instance Ethan and Heather:

Interviewer: All right then, what do the words 'physical activity' mean to you?
Ethan: Moving about.
Heather: Getting active.

Beyond these two pairs the most common response to this question was that physical activity meant 'to exercise'. The official definition of the term exercise is; 'planned bouts of physical activity usually pursued for personal health and fitness goals. Exercise is a subset of physical activity, which is volitional, planned, structured, repetitive, and aimed at improvement or maintenance of any aspect of fitness or health' (DoH 2004 p79). However one could argue that the lay usage of the term 'exercise' means more than the somewhat rigid interpretation in the DoH's definition. It could be said that the common understanding of 'exercise' may be closer to the definition of 'physical activity'. A mother telling her child to 'go outside and get some exercise' is probably not suggesting the child pursue a planned bout of physical activity specifically for personal health gain. Rather the mother may be suggesting the child go and expend some energy by doing some physical activity.

Ten of the interviewees mentioned the term 'exercise' when asked what the term 'physical activity' meant. For most of the children the term 'exercise' was interchangeable with the term 'physical activity'. However four of the children differentiated between the two terms; with exercise used to imply physical activity for health benefit, for instance Harry and Luke:

Interviewer: Why is it [physical activity] good for you?
Luke: Because it will keep you fit.
Harry: Well if you are walking or on a bike it's like you are exercising.

When the children were asked to suggest activities which would count as physical activity, the children all listed a number of different activities. A typical response was given by Chloe and Emily:

*Interviewer: All right then what do the words 'physical activity' mean to you?
What pops into your mind?*

Emily: Exercise.

Interviewer: Exercise? What about you?

Chloe: Exercise.

Interviewer: Exercise as well? And when you are thinking of exercise what does that mean? What kinds of things would you be doing if you were doing exercise?

Chloe: Dance.

Emily: Football and ski-ing.

Chloe: Swimming.

The activities listed by the children ranged from formal competitive sports such as football and tennis, physically active hobbies, including dancing or Judo, and less formal activities such as walking and running. Almost all those mentioned were physical activities which one consciously does for the sake of doing. With the exception of walking, none of the children included what could be termed 'physically active lifestyle' activities. Though when questioned the children all thought that walking the dog, housework, and activities such as going to the shops would count as physical activity.

8.4.2 Is physical activity good for you?

Without exception, the children all thought that taking part in physical activity was good for you. There were a number of explanations given as to why physical activity was of benefit to health and wellbeing. Half of the children thought that physical activity would help you get, and stay fit. Physical activity, they thought, had a range of impacts on health and wellbeing; for instance one would be healthier, would lose weight and have more energy. The children also seemed to be aware that different activities would result in different levels of energy expenditure and were therefore more or less beneficial. In response to a question about

which physical activity might not be of much benefit to health, Oliver stated, *'Dancing, 'cos you are not using much energy'*. Eight of the children also considered that engaging in physical activity had a preventative effect, helping avoid issues such as heart disease. For instance Jade and Vicky thought physical activity was of benefit because:

Jade: Can it stop blood clots and all that if you keep exercising and all that

Interviewer: Yeah? ... like on a plane?

Vicky: Mnhmm...

Jade: Mnhmm... and like if you dinnae exercise and you are just like eating and, that can clog up the insides and then... like die

Interviewer: Oh like cholesterol?

Jade: Yeah.

Interviewer: In your veins?

Jade: Exercise can get rid of it.

The children were also asked whether they knew how physical activity resulted in these beneficial impacts. The explanations included physical activity causes one's heart to beat faster and can make one's muscles and bones stronger. Physical activity, according to five of the children, also has positive mental effects. For instance Leah thought that taking part in physical activity prevented you from becoming lazy. Jessica and Erin thought that it was psychologically good for you because it was fun. Jade and Vicky took the explanation further:

Jade: 'Cos after you have done it [physical activity] you feel better.

Interviewer: You feel better? What about you Vicky?

Vicky: Just 'cos, like, when you are finished its no as if you feel as if like you have been doing nothing and you just feel as if you are going to grow old and fat.

Hannah thought that the benefits of physical activity were wider; arguing that children and teenagers should engage in physical activity to avoid anti-social behaviour: *'Because they like, always like, vandalise things and they always, like, just walk about and that and they need to do more physical activity'*.

However certain children noted that there could be drawbacks to regular physical activity. Four of the children argued that physical activity could cause injury; Jack and Oliver's comments illustrate this point:

Interviewer: So do you think the harder you work the better it is for you?

Oliver: Aye.

Jack: It depends how fit you are yourself, 'cos if you strain yourself then you could hurt yourself.

There was a further interesting gendered response to this question; with a number of the girls discussing physical activity in terms of its potential to result in un-feminine body shapes. Two of the female pairs argued that although physical activity was good for you and could help you lose weight, physical activity also developed muscles and could, therefore, make you look bigger. In a discussion regarding the health benefits of dancing, Chloe argued that dancing resulted in *'Big fat thighs'*.

On a similar point Harry and Luke thought that doing too much physical activity could have serious negative effects. They made the point that an individual could take exercising too far: *'...cos they will go twenty four seven, 'cos they, like, get loads and loads and loads of muscles and be one of they people that just grow muscles and they'll end up taking steroids or something'*.

Of the children who were asked, none knew how much physical activity is recommended for good health.

This section has demonstrated that the children *did* understand the term 'physical activity' indicating that they had a relatively accurate and complete understanding of the concepts. It also contributes to the validity of subsequent analyses.

8.5 *The children's perceptions of physical activity at Forest School*

The rest of this chapter focuses on the children's perceptions and experiences of physical activity at Forest School. The children's general impressions of the physical activity at Forest

School are discussed first; this is followed by their opinions of specific Forest School activities.

8.5.1 Were the Forest School sessions physically active?

The children were asked whether they thought that they were physically active at Forest School. All the children, with the exception of one child, thought they did engage in physical activity during Forest School sessions. Apart from the one negative response, each child answered promptly and definitely; none of the children who gave positive responses were unsure or undecided, indicating that they were certain that they did engage in physical activity at Forest School. The one child who gave a negative response had, at an earlier point in the interview while discussing the physical activity the children did at school, stated, '*if you think about it Forest School is activity*'.

The children's discussion of Forest School as a place and time where they did physical activity were not limited to their response to the above direct question. Three-quarters of the children had mentioned Forest School when discussing the types of physical activity they did at school: for instance, Andrea, after listing activities such as the sports day and her PE lessons, included, '*And, err, the Forest School 'cos of walking up and down*'. Jessica and Erin considered Forest School to be one of their main sources of school physical activity:

Interviewer: Do you, erm, do you do lots of physical activity at school do you think?

Jessica: Not much.

Erin: No not much.

Interviewer: What do you do at school?

Erin: Only do gym.

Jessica: Gym and...

Erin: That's it.

Jessica: And Forest School.

Erin: Aye Forest School.

Jessica: Forest School we do every second Wednesday

Erin: Yeah.

The discussion focusing on the physical activity during typical school days came before any Forest School questions, indicating that these children independently considered Forest School to be a source of school based physical activity and were, therefore, not influenced by the Forest School questions.

Throughout the interviews the children's descriptions of their experiences at Forest School were full of references to being physically active. Typically these references were concerned with running about while taking part in various activities. There appeared to be, certainly for 13 of the children, a relationship between Forest School and the opportunity to run. Jackie, while describing a game they played quite regularly, stated '*Cos it's, like, you get to run about up the forest*'. Jade made a similar comment, '*Well 'cos you get to run about and you get to have fun and that*'. While discussing the walk to Forest School Sean mentioned, '*Aye 'cos most the time I just run and its fun*'. Even while constructing the dens the children reported running about, Vicky stated that, '*You run about collecting wood for the dens*'. Further references to being physically active at Forest School were in relation to the walk up and down, other aspects of den construction, going for walks around the site, and incidental activity associated with various other activities.

8.5.2 The amount of physical activity at Forest School

Of interest to this research are the children's perceptions of the volume and intensity of physical activity they engaged in during Forest School sessions. As the results from phase one indicated, the children did indeed engage in high volumes of physical activity during the Forest School day. The activity was also shown to be, at times, relatively intense. However it was thought that it may not have been obvious to the children that they were engaging in this level of physical activity. The activity was sporadic and intermittent; previous research has indicated that it is difficult to accurately recall these types of activity, with people tending to under estimate the total amount and average intensity (Pate 1993; Sallis and Saelens 2000). Typically the children thought that they did 'lots' of physical activity, as Holly confirmed, '*It's very active*'. A particularly emphatic response was given by Sean and Emma:

Interviewer: Erm do you think that you do much physical activity at forest school?

Emma: Aye.

...

Interviewer: So how much physical activity do you do at Forest School?

Sean: Lots.

Emma: Lots.

Interviewer: Lots?

Emma: Lots and lots and lots!

Interviewer: What do you think Sean?

Sean: Lots and lots and lots and lots!

While not all responses were quite as categorical as Sean and Emma's, it is representative in its meaning. The descriptive words used by the children indicated that they considered the volume of physical activity at Forest School to be quite high. The word 'lots' was used by the children to describe the volume of physical activity in over half the interviews, Cameron and Hannah (from separate pairs) both used the word 'loads'. Furthermore the children implied that they were physically active consistently through the day, Jackie and Andrea for instance:

Jackie: The only time that we sit down is when we are having lunch.

Andrea: Like when, generally, Mrs Malus or that's telling us something.

As this quote shows, the children considered the whole Forest School day to be physically active with only short interludes of non-activity, primarily consisting of the times they had to sit in the base. This contrasts with their perception of normal school where, in the children's opinion, they were physically active during specific periods, such as break time, lunchtime, or during a PE class.

The participants generally argued that Forest School involved considerably greater amounts of physical activity than normal school days. In four of the interviews the children discussed the amount of physical activity at Forest School in direct relation to what they did at normal school:

Interviewer: So do you think that you do much physical activity at the forest school?

Jack: *Aye, lots.*

Oliver: *More than you would usually do.*

This discussion continued with the interviewer asking whether they did more physical activity in a PE lesson or during an equivalent period of time at Forest School, both Jack and Oliver considered they did more at Forest School. Oliver thought that Forest School was more because, *'Forest School, 'cos you are doing heavier stuff'*. Terry also considered that Forest School gave the children more of an opportunity to be physically active than normal school. After being asked whether he thought they were more active in an hour of Forest School or an hour of PE lesson, Terry answered, *'Forest School, it's more'*. He went on to explain that, in his opinion, they were always running about and that Forest School gave them the opportunity to be competitive, such as racing up the hill, which resulted in high levels of physical activity.

8.6 *The physical activity and physically active activities of Forest School*

The analysis of the interviews showed that often the level and type of physical activity had a profound effect on the enjoyment of both the specific activities and of Forest School itself. Therefore physical activity is crucial to understanding the importance of Forest School to the children. This is explored in the following section.

After the children were asked whether Forest School provided them with the opportunity to be physically active, they were asked to describe the specific physical activities. Often the responses included generic activities, such as running, climbing and walking. Others, however, listed specific Forest School activities which they considered to be physically active. Chloe's response was representative, *'Walk up there, build our dens, run around, play capture the flag'*, or Emma who said, *'Jumping in puddles, carrying a big pair of heavy loppers about'*. The analysis of these responses showed that the most effective way to examine the impact of the physical activity of Forest School was to focus on the more commonly mentioned individual activities or aspects of Forest School. The activities examined in the following sections are: 1) the walk to and from the Forest School site; 2) active games; and 3) construction of the dens and use of the tools.

8.6.1 The walk to and from Forest School

The children's perceptions of the walk to and from Forest School were singled out for greater analysis for a number of reasons. First it is one of the most obvious sources of physical activity that Forest School provides. Second, it is a definite aspect of this Forest School, on each occasion the children walked to and from the Forest School site. Third, all the children mentioned the walk as a source of physical activity.

The Forest School day started with the walk to the Forest School site and ended with the walk back to school. The walk took about thirty to forty minutes depending on a variety of factors such as weather, the motivation of the children, or, the leaders could stop the children to talk to them or to point something out. At this Forest School the walk is uphill on the way to Forest School and downhill at the end of the day and is a walk of over one kilometre.

Prior to the interviews the researcher had identified the walk to and from the site as an important source of Forest School physical activity. As the accelerometer results from phase one had shown, the children did consistent and high intensity physical activity during the walks to and from the site. Furthermore informal observation of Forest School by the researcher showed that the children had mixed but often quite strong feelings about the walk.

All of the children thought that the walk did count as physical activity; this is despite the fact that around half had thought walking did not really count as physical activity during their discussions of the term 'physical activity'. The children thought the walk was quite long; they would often emphasis this during the interviews:

Andrea: And, err, the Forest School 'cos of walking up and down.

Jackie: 'Cos we need to walk up to it, it takes forty five minutes to walk up and...

Andrea: ...walk home.

That the walk was uphill on the way to Forest School was commented upon by seven of the children; Andrew for instance: *'It's just 'cos, it is quite a long walk up'*. Sean stated that: *'It's*

uphill and plus it's quite long'. As to whether the children actually enjoyed the walks, the group were split; some reported really enjoying the walk, while others appeared to have disliked it.

8.6.2 The position of the walk to the Forest School site in the ranking exercise

The children were asked to place in order of enjoyment five school based physical activities, one of which was the walk to Forest School. In retrospect this exercise should have been done differently. Instead of ranking the activities, the children should have been asked to indicate how much they enjoyed each activity perhaps grouping as 'enjoyable', 'ok', or 'not enjoyable'. Therefore these results can only indicate how much they enjoy each activity in relation to the others; it may be that one child enjoyed all activities a great deal, only some more than others, while another child may have disliked all the activities. Although the children were asked to explain why they ranked them in the particular order the results are limited as a result. However the results showed that a greater amount of the children enjoyed the other activities more than they did the walk to Forest School. Of the twenty-four interviewees only two of the children placed the walk to Forest School in the first place and four placed in second place. Although only four placed it in the bottom spot the greatest numbers placed it in position three and four (six and eight children respectively).

8.6.3 The walk as an enjoyable aspect of Forest School

All the boys reported, at some point during the interviews, enjoyment of either the walk to or from Forest School. This was not the case for the girls, for around only half of the girls expressed enjoyment of any aspect of either walk.

The majority of the children who reported enjoying the walk to or from Forest School spoke of how much fun it was. Jackie described the walk as, '*...Cos it is just fun, you get to laugh and...*'. Sean made a very similar comment, '*Aye 'cos most the time I just run and its fun*'. Words such as 'nice', 'like', 'good', 'brilliant', 'happy', 'fun', and 'laugh', were used by the children

to describe perceptions and experiences of the walk. Some of the other opinions echo the reasons why the children found Forest School enjoyable overall; including the chance to be sociable, the freedom it could afford and the opportunity to experience the natural world.

Harry and Luke were the two interviewees who appeared to value and enjoy the walk the most. Harry, who had placed the walk to Forest School as the most enjoyable school based physical activity in the ranking exercise, explained that:

Interviewer: So you like the walk to Forest School the best? Why is that?

Harry: Errr, just because well, were just out for a good walk, you walk by different people every day and they are just happy and that... brilliant!

Luke, who also placed it as his favourite physical activity, commented:

Interviewer: So why is the walk the best for you?

Luke: Just, like the walk, 'cos you like, instead of you just sitting about doing nothing at the camp fire or the school day working, you can get time for talking and just doing something and talking the same time. And you can talk to your pals.

As the two quotes from the Harry and Luke show, both these boys enjoyed the walk, neither made any comment about it being too far or it being hard; of greater importance was the opportunity it gave them to talk to their friends.

Children in eight of the pairs appreciated the walk for the freedom they experienced and for the opportunity to be adventurous. It was primarily the boys who raised this aspect of the walk to Forest School. Cameron and Andrew discussed why they enjoyed the walk down from Forest School:

Interviewer: So what is the best thing?

Cameron: Err...

Andrew: Aw going down... and you can, if you are right at the front you can jump out on folk.

Cameron: Oh aye!

As was reported in the previous section, the experience of the natural world was an important contributory factor in the children's enjoyment of Forest School. This was found to be the same for the walks; Vicky, for instance, stated, *'I don't mind the walk up 'cos you get to see loads of wildlife'*. Holly and Hannah also enjoyed this aspect of the walk. Both Jade and her interview partner, Vicky, mention the fresh air that they got during the walk, Jade commented that, *'...It's good and you get loads of fresh air'*. All these comments were made by females; none of the males made any reference to the experience of the natural world during the walk to the Forest School site.

8.6.4 The walk as an un-enjoyable aspect of Forest School

It was only during the discussion of the walk to and from the Forest School site that the children expressed truly negative opinions (that were consistent) regarding Forest School. In nine of the interviews negative comments were made by one or both of the interviewees regarding the walk to Forest School. Three of the interviewees mentioned the walk to the site as one of the worst aspects of Forest School. Some of the words that were used to indicate the lack of enjoyment of the walk included; 'sore', 'annoying', 'boring', 'exhausted', and 'fed-up'.

The most common complaint was that the walk was too long; Emma expressed this perception:

Interviewer: Erm, what do you think of the walk to the forest?

Emma: The walk? Oh, it's boring.

Sean: I like it.

Emma: It takes too long.

Frustration and boredom during the walk appears to have contributed towards the negative perceptions. Megan *'...It takes too long... and you get fed up, but I like walking! But you get fed up sometimes'*. Andrew appears to have found the walk up to Forest School frustrating:

Andrew: Its just 'cos it is quite a long walk up.

Interviewer: Yeah, do you not enjoy that so much?

Andrew: Mm, I just like getting up there, to the forest and doing stuff.

It seems that these children resented the walk because it reduced their time at Forest School proper; Heather, for instance, did not enjoy the walk because, *'you have to walk for ages and you don't play anything on the way up, so, you...'*. Jack and Oliver, while not disliking the walk itself, also found it frustrating:

Interviewer: All right then why is the walk to Forest School near the bottom there.

Jack: 'Cos you are only walking.

Interviewer: So it is just the walking?

Jack: If we were running it'd be better.

Interviewer: Sometimes you get to run don't you?

Oliver: Aye.

Jack: But we only get to run only...

Interviewer: Oh is it 'cos they make you stop don't they, like at the motor bike?

Jack: It'd be good if you could run all the way up.

In three of the interviews comments were made which indicated that the children found the walk tiring or physically hard. Jessica appears to have particularly disliked the walk to the site and justified it by stating: *'I hate that!! It just drives me nuts 'cos your legs get sore'*. Emily, who also did not enjoy the walk, commented *'...you get sore feet'*.

Interestingly the majority of the complaints were about the walk to the site (uphill) and few even mentioned the walk down from the site. Jessica, who stated she hated the walk up, went on to say, *'It's all right walking back 'cos it's not so bad...'*. Andrew, who was the boy who disliked the walk to the site because he would rather be at Forest School doing 'stuff', picked the walk back from Forest School as his favourite aspect of Forest School.

8.7 The active games played at Forest School

The second of the Forest School activities to be focused on in depth in this section are the physically active games. A large part of the children's time at Forest School was taken up by

playing various physically active games which tended to be variants of simple games such as tig or hide and seek. A common factor between the different games was that they appeared to have involved high levels of physical activity; conjecture which was confirmed by the results of phase one (see section 6.3).

8.7.1 The children's perception of the various games

The children often included one or other of the active games when asked what particular physical activities they did at Forest School. The children tended to talk about their enjoyment or dislike of these games rather than how physically active they happened to be. Leaving aside the game 'capture the flag' until a later point, the children had mixed opinions of the active games which were played at Forest School. For some, the active games were a very enjoyable aspect of Forest School:

Interviewer: Erm, what physical activity at Forest School do you really enjoy?...

Jackie: We have been playing new games that none of us knew.

Interviewer: Oh yes?

Andrea: We were playing this toothbrush and germ game.

Jackie: Aye it was funny and we played this one, giants, wizards and elves.

Andrea: That's good.

Interviewer: Do you like that one?

Andrea: Mhmm.

Jackie: And we played fox and rabbits.

Alex and Terry spoke at length about a particularly enjoyable game of tig where one of the leaders had been 'he'. The children who reported enjoyment of the active games typically described them as 'fun' or 'good'.

Not all the games were thought to be enjoyable. Alex and Terry expressed a dislike of playing certain games, in this case the complicated sounding 'Giants, Wizards and Elves' game:

Alex: I dinnae like playing wizards, giants and elves.

Terry: Aye there is the wizards, giants and elves game.

- Interviewer: I have not heard of that one, what do you do there?*
- Terry: Well there is two groups and you have to pick out wizards, giants and elves and if you are elves you scare the...is it the...*
- Alex: No elves can kill wizards, wizards can kill giants, and giants can kill elves.*

The children who indicated that they did not particularly enjoy the active games referred to being bored or wishing they could do something else, rather than outright dislike of the game. Jackie was one child who made this point, stating that, *'Sometimes it's quite boring 'cos it depends on what we do, sometimes we play games over and over again and it gets boring'*. None of the children justified their dislike of the particular game by saying it was (physically) hard or tiring. In fact few comments were made regarding how physically active the various games were.

Despite the mixed enjoyment and experiences of the active games in general, the children, did however, report universal enjoyment of one particular game, 'capture the flag' (CTF).

8.7.2 'Capture the flag'

Capture the flag (CTF), from the analysis of the interview data, can be described as the single most important aspect of Forest School for these children. CTF is a relatively simple game; the children were split into two groups, each was given a flag which were situated at opposing ends of the Forest School site and were guarded by two team members. The aim of the game was to grab the flag of the opposing team without being identified by name. If identified the child was sent back to the home flag to start again. Tactics include creeping up to the flag from behind, crawling through the undergrowth, making a dash for the flag or swapping clothes to hide ones identity. The games could last for a sustained period of time, though typically for thirty to fifty minutes.

8.7.3 The position of capture the flag in the ranking exercise

Capture the flag (CTF) was the second Forest School activity which was included in the ranking exercise, (when the children were asked to rate their enjoyment of various activities). CTF was placed in the number one position by fourteen of the twenty four children. Five more children placed it in the second highest position. Only one child placed in the last position; this child had, however, never played CTF.

8.7.4 Why the children enjoyed ‘capture the flag’

As with many of the activities already discussed, the children regularly used the word ‘fun’ while describing their experiences of CTF. It was used to describe CTF in almost all the interviews and tended to be the first descriptive word used. However some children went further and expressed stronger opinions:

Interviewer: So you have put...

Andrew: Capture the flag first.

Interviewer: That’s the difference isn’t it (referring to the difference between Andrew’s and his partners rankings), why is that better than football then?

Andrew: ‘Cos I just think it’s amazing that we do it,

Interviewer: You think it is amazing?

Andrew: Aye.

While few of the children mentioned CTF when asked what physical activity they did at Forest School, the children did appear to think that playing CTF resulted in physical activity. One of the few children to mention CTF as a source of physical activity was Hannah:

Interviewer: So which of the physical activities at Forest School do you really enjoy?

Hannah: Running probably, I like capture the flag, I like doing it ‘cos it involves like running and stuff.

Almost all of the children made reference to being physically active during games of CTF. Hannah, while describing her experiences of Forest School, stated, ‘Erm I think that’s good ‘cos it’s really energetic’. The majority of the comments related to the opportunity to run about

while playing CTF. Jackie and Andrea, while explaining their choices in the ranking exercise, explained, *'It's, 'cos you get to run about up the forest'*. Erin, explained why she enjoyed CTF, *'Cos it is fun you are like, I like running and trying to capture the flag'*. Alex justified his choice of CTF as his favourite activity in the ranking exercise by stating, *'Because I like running about and trying to hide under places'*. Jade explained her enjoyment of CTF, *'Well cos you get to run about and you get to have fun'*. As these quotes have shown, the children associated CTF with physical activity even though they did not explicitly count it as a particular example of Forest School physical activity.

References were also made to the amount of physical activity during a game of CTF; for instance Hannah's comment that CTF was *'really energetic'*, or Cameron who stated that *'...you have to be quick to get the flag'*, and Andrew, who mentioned sprinting to get to the flag. The children noted that they needed to employ a range of movements to be successful; Megan commented on the need to walk, run and crawl during a game, and Erin mentioned ducking into places to avoid being seen. Again none of the children made any reference to being tired or worn out during a game of CTF. The only negative comments were made in relation to having to stop playing or not being able to play as much as they would like. Sean complained about the amount of times they had the opportunity to play the game, *'Aye but we hardly play it now'*. While Jack and Oliver wished they could play particularly long games of CTF:

Interviewer: How long would you like to play it for?

Oliver: I would like to play it for the whole day!

Interviewer: For the whole day long!?

The children also appeared to appreciate the opportunity to engage in adventurous physical activity during CTF games. Both males and females made reference to this. Emily summed up her feelings regarding CTF as, *'It's really fun, and it's exciting and it's adventurous'*. Jack regarded the game as both physically active and *'exciting'*:

Interviewer: Why is capture the flag so good?

Jack: Erm, 'cos you get to run about an it's exciting... 'cos it's like sort of folk who are chasing you and they have to try and shout your name and...

Interviewer: Yeah?

Jack: It's like you are getting a chase.

The need to hide and be 'sneaky' was a factor which only added to their enjoyment of the game. The children also appeared to take pleasure in swapping of clothes and adorning twigs and bracken to outwit the flag guards. Holly, for instance, '*...I think it is fun and you get to go camouflage yourself and it's a really fun game*'.

There was no real difference in opinion between the two genders, with both expressing great enjoyment of the game. The only noticeable difference, and even this was slight, was that the boys talked more about the competitive element and tactics needed to win capture the flag:

Interviewer: What's the best thing about it? [CTF]

Andrew: Erm you can run about, hide, err, you can just sometimes, when people are not looking you can just sprint and get the flag, but if they say your name...

8.8 Constructing the dens and use of tools

The final type of Forest School physical activity, to be focused on in depth in this chapter, was that associated with construction of the dens and the use of the tools. Den construction and use of tools was chosen for greater examination as it was regularly mentioned as a physical activity by the children, but also because it represented a different type of physical activity. The physical activity associated with the den building contrasts with that of the walk and the active games; while the latter activities were focused on running or walking, the den construction primarily involved strength and certain motor skills (though it still involved running around collecting items). The children who attend this Forest School were all involved in building dens, usually in small friendship groups of two to five. The dens were built using the trees and wood at the site and any man made materials found lying around. Tools were supplied by the leaders and ranged from loppers to potato peelers. The dens were ongoing projects and many got quite large and sophisticated, with roofs and separate 'rooms'.

In eight of the twelve interviews dens and tools were mentioned as favourite aspects of Forest School. Enjoyment of den construction was mentioned equally by both males and females, while enjoyment of the use of tools was mentioned only by males.

The majority of the children mentioned construction of dens and/or the use of the forestry and woodwork tools as a source of physical activity while at Forest School. In four of the interviews the children justified why they included den construction and the use of tools as physical activity. For instance Terry and Alex:

Interviewer: So what physical activity do you really enjoy? [at Forest School]

Terry: Making our dens.

Interviewer: Making dens? That's physical activity is it? Why might that be physical activity?

Terry: 'Cos you are like walking and getting the loppers and pine and that.

Alex: The heavy stuff an running about trying to look for stuff to put in it.

Interviewer: Yeah?

Alex: To put in the den.

Jack also considered that they physically active while building their dens: *'Its hard work making your dens 'cos you need to pull down trees to tie them together and things'*.

These two quotes above show that these children certainly considered that they were physically active during den construction and could give justification for it being so. The children appreciated that the activity was different to that of the other aspects of Forest School, such as the active games. However they did not appear to think it was less physically active; rather that the physical activity was of a different sort. Likewise there were few references to den construction being 'fun'. This is not to imply that the children enjoyed it any less, rather the impression is given that den construction was a more serious aspect of Forest School.

The children's construction of the dens also appeared to have resulted in further physical activity. Terry mentioned that he and his friends had gone to the Forest School site in their own time *'And we look at the dens'*. The 'ownership' of a solid construction such as the den at the Forest School drew them back to the site, resulting in further physical activity. The

children's use of the forest outside of the Forest School session is discussed further in the following chapter.

9 Exploring aspects of the wider value of Forest School and the associated physical activity

The previous chapter detailed the results from the analysis of the interviews, focusing on the children's reported experiences and perceptions of Forest School and the physical activity they engaged in during the sessions. This chapter focuses on four key findings from the analysis of the interview data which suggest that the value of Forest School and the associated physical activity may be greater than merely the provision of an enjoyable experience.

9.1 *Forest School and the experience of physical activity in the outdoors*

One of the key reasons why Forest School may have value is that it provides children with an experience of physical activity in the outdoors. This was especially important to many of the children who were interviewed for this study, as it became apparent that few had had much, if any, experience of physical activity in the outdoors. In order to properly evaluate the importance of Forest School, the children's other opportunities to experience physical activity in the outdoors, and more specifically the countryside and more wild areas, were investigated.

9.1.1 **Outdoor activity at school**

The children considered that they had very little opportunity to engage in physical activity in the outdoors while at school. For instance, all the children stated that it was very rare for them to be taken outdoors during their PE lessons:

Interviewer: Do you ever go outside in PE?

Heather: Only...

Ethan: *Once.*
Heather: *Only on sports day.*

As this quote demonstrates, the children could recall only one instance a year; the school sports day, which was held in the village park. Despite this, the children indicated that they would like greater opportunities to be physically active in the outdoors as part of their schooling. Typically the children thought it would be better to be outside for their PE lessons if the weather was 'good'. However, not all the children thought that 'bad' weather would be a barrier to PE in the outdoors. Often the desire to do PE lessons in the outdoors was justified by the opportunities it afforded.

In retrospect it was realised that the children's break times, if the weather was good, were spent on a (paved) outdoor playground. However none of the children mentioned this nor did the researcher think to question the children about the location or context of the break times. It is possible that the playground was not thought of as being properly 'outdoors'. While technically being outside, the concrete playground which was so close to the school was perceived to be, by both the interviewees and the interviewer, an extension of the indoor school environment. The children may have (unconsciously) considered the 'outdoors' to be a place which was a significant distance away from their usual environments and was, perhaps, characterised by the presence of greenery (i.e. trees and plants). However it could be argued that the reasons why it was not considered are somewhat more subtle and complex. Perhaps the children understood the 'outdoors' to be places which were not only physically distant from their normal indoor spaces (e.g. the school or the home) but also culturally different.

It is possible that the behavioural and socio-cultural norms of the school were also dominant in the school playground. In particular the well defined power relations - between the children and the adults (e.g. the teachers and playground monitors), between younger and older children and between the genders - of the typical school setting (Cresswell 1996; Sibley 1995), carried over into the playground. The possibility that the term the 'outdoors' meant more than just 'not the indoors' to both the children and the researcher has implications for the interpretation of the children's talk regarding their use of the outdoors. This will be discussed in the following chapter.

Despite the uncertainty associated with the use of the term 'outdoors', the conclusion that can be drawn is that Forest School was likely to be a novel school-based experience for these children. However the school is not the only context where children may have had the opportunity to be physically active in the outdoors.

9.1.2 Outdoor activity outside of school

Outside of school the children had had similarly few opportunities to be physically active in either the countryside or more wild places. Most did, however, appear to use the various spaces around their village for physical activity. The following section reviews the children's responses to questions about their use of the outdoors for physical activity outside of school.

The children reported engaging in more outdoor activities in the village than outside of the village, which could, perhaps, be partly explained by the greater freedom they had around the village (see section 9.1.4). Within the village most, though not all, of the children reported taking part in various outdoor activities, such as football, games of tig, and dog walking. The games were played in the street, the local parks, the grassed centre of housing schemes, or in gardens. The children reported playing these games with similar-aged friends.

Eleven of the children mentioned occasionally going to either the Forest School site (located in the forest which borders the village) or into other parts of the forest close to the village, either individually or with friends. The other thirteen indicated they never used these places; Heather, for instance, was one child who reported that she never visited the forest, '*Noooo we go up to, only go up to it when we are going with the class*'. The eleven children who did use the forest, reported going into the forest with their friends to play games like football and tig, or up to the Forest School site to look at their dens. While few gave the impression that it was a regular occurrence they did imply that they had been more than once. Terry and Alex both reported visiting the Forest School site:

Interviewer: Do you ever go up to the forest?

Alex: Sometimes, not all the time.

Interviewer: What kinds of things do you when you go up?

Alex: We just walk about and play tig and that up there.

Interviewer: Yeah? So is that with your friends?

Terry: Aye, an we look at the dens.

The children also reported very little experience of physical activity in the outdoors (either within the village or further afield) with family members. In fact they gave the distinct impression that very few of them had experienced the 'countryside' or nature with their family in any meaningful way. Seven of the children could not recollect any experience they had had with their parents or family members in the countryside. Even those who had recalled experiences, all but two gave the impression that the event was unusual and certainly not regular. Jackie for instance:

Jackie: Me and my dad used to go for bike runs up the forest.

Interviewer: Do you not do it so much now?

Jackie: On Sundays, but we dinnae usually now because on Saturdays we usually go away into Livingstone or something, and then on Sunday we go up to my Nana's. So it is usually only school holidays that we do it now, 'cos it is still fun, 'cos I could... we went up on the bike next to this big pond and I nearly fell in it, and then me and my big cousin and my dad went up for a walk, up to the pond again, where we were feeding the tadpoles.

Dog walking appeared to be the single most important driver of these children's regular participation in physical activity in the outdoors. For some of the children walking the dog outside of the village appeared to be almost their only experience (other than Forest School) of the local natural world. Fifteen of the children reported regularly walking a dog in the outdoors. Three more had recently had dogs which they had also regularly walked. Even those children who had claimed to do very little physical activity outside of school, reported walking their dogs on a regular basis and for an extended period of time:

Interviewer: Do you walk dogs?

Ethan nods

Interviewer: Where do you walk the dog?

Ethan: Up the back (of the village).

Interviewer: Right... how long does it take you to walk the dog?

Ethan: I walk them about twenty minutes a day.

The children generally walked the dogs around their village. However, in four of the pairs children reported regularly walking their dogs outside of the village and a further three recalled specific occasions where they had taken the dog for a walk either in woodland or by a local lake. Other examples of walking a dog in the natural environment appeared to be more of a one off experience. Jade described walking her friend's dog during a camping holiday at a beach, *'But this year there was a big path at the back of it (a forest) and we took Louise's dog for a walk all the way along and it took us, it took us away along to the beach in Dunbar and we went on the beach'*. Emily described how she occasionally walked with her grandmother and her dog, *'...there is a, what do you call it, a big loch and a pathway...it's really big and we just walk that with my nana's dog'*. The impression that both Jade and Emily gave was that this was an unusual occurrence and they otherwise rarely went into the countryside or natural environment.

Dogs were not, however, necessarily always positive and for some children acted as a barrier to their enjoyment of physical activity in the outdoors. Jackie and Andrea discussed an incident which had occurred while they were in the local forest:

- Jackie: *There was three, erm, big white boxers running about.*
Andrea: *I dinnae know they were boxers.*
Jackie: *And they were running about the forest and nobody was with them.*
Interviewer: *Nobody was with them? They were just on their own?*
Andrea: *And we thought they might bite us and that.*

Chloe also recounted an experience with a dog while discussing why she did not really use the forest for physical activity, *'Aye 'cos some people walk their dogs and it's like a big dog and it goes grrr and growls at you, no, I was walking up one day and this dog jumped on me and I was terrified 'cos it tried to bite me'*.

Even within the village the presence of dogs could inhibit the children from being physically active. Megan described how for a long time she was too afraid to go out onto the street on her own after an encounter with a Staffordshire Bull Terrier, *'Oh it was huge! and it's huge and horrible and it seen me, and it scared me having to walk down (to her aunt's house a street away), and it was, it jumped, it ran, it started barking at me right, and it ran and it tried to bite my leg, and I ran round the house, and see the next day right, I wudnae go out without my mum...'*

In conclusion, other than Forest School, the children reported very little experience of using the surrounding countryside for physical activity, in particular the children could recall only the one occasion where they had done physical activity in the outdoors while at school. The overwhelming impression is that other than Forest School these children had had few experiences of using the countryside for physical activity.

9.1.3 Why the children had little experience of physical activity in the outdoors

The children indicated that there were two main reasons why they had had little experience of physical activity in the outdoors and, more particularly, in the countryside. Firstly, the children pointed out that their opportunities were limited by a lack of freedom to use certain environments. In many cases the children were prevented from using certain spaces, both inside and outside of the village, without adequate adult supervision or accompaniment. Secondly, a factor which is inextricably linked to the first reason, the children indicated that fear, either their own or their parents and guardians, restricted their use of these spaces.

9.1.4 Lack of freedom to use certain environments for physical activity or suitable people (or creatures) to be physically active with

One of the most important barriers to the children's physical activity in the outdoors was associated with access to certain environments. The children reported that their freedom to use certain local environments was restricted by parents or guardians. This meant that they needed to have a suitable adult or older person with them if they were to use these particular spaces. However the children indicated that they had few people with whom they could be physically active and, therefore, were unable to use these places.

The children who could not recollect any experience of physical activity with their parents in the outdoors often claimed this was because their parents couldn't or wouldn't take them. Parents were busy or got home late from work, or in Oliver's case were physically unable to participate in physical activity, ' *Nah my mum dusnae 'cos she has got an illness so she, and then*

my dad has got something wrong with his foot and his arms'. Other parents appeared to just not want to; Megan made the following statement:

Interviewer: Do you ever go for walks with your family, like up in the forest?

Megan: No 'cos my dad is too lazy.

Jade experienced a range of barriers to physical activity in the outdoors with her parents and family, *'I cannae really go with anybody 'cos my mum, hates activities, she doesn't like the outdoors... she doesn't do any exercise, she is a boring mum. Like so she dusnae do anything and so I cannae go with my mum and my wee brother is too young to go and my dad and he is, well, at work, an when he comes in he is absolutely black, and he goes and gets washed and that's him in for the night so...'*

It was not only the lack of suitable and motivated adults that acted as a barrier to the children's use of the countryside for physical activity. For two children the loss of a dog meant they no longer were able to use the natural environment for physical activity in the same way:

Cameron: I used to take my dog away up a long walk with my mum (up to the forest).

Interviewer: do you not go for walks so much now?

Cameron: no, 'cos I have no got one [a dog].

Without a suitable adult to accompany them the children were often restricted in the areas which they could use for physical activity. The children appeared to have limited freedom to be out on their own or with friends in the village. All the children reported some restrictions on their movement. Typically this included areas where they were not allowed to go or having to be back home before it got dark. This appeared to be the same for both males and females. Certain areas within the village were off-limits for all the children; the train station was one example. The girls reported that their parents were happier to let them out if they were accompanied by a friend, as Jade mentioned, *'She just says (her mum) like erm, I am allowed to go to the erm, park and that, as long as I am with somebody else'*.

The children were also questioned about their freedom to explore the countryside immediately surrounding the village. Their responses showed an interesting split. Six of the boys reported being allowed into these areas, two were not allowed and the final two were unsure. The girls, on the whole, did not have such freedom; ten stated they were not allowed

into the surrounding countryside and four were unsure. The boys, who said they were allowed outside of the village, did, however, say that there were certain restrictions, such as needing to be with somebody else or having boundaries beyond which they were not to go.

9.1.5 The impact of fear; of places or strangers on physical activity in the outdoors

Fear, of people and places, according to the children, also acted as a real barrier to physical activity in the outdoors. The children described how they felt fear both inside and outside of their village and that this negatively impacted on how physically active they were.

The children did not give the impression that they viewed the village to be a particularly safe place. Almost all the children mentioned incidents which had affected their sense of security and therefore their willingness to use the spaces. The village had experienced a range of anti-social behaviour, some of which was quite serious. The children commented upon these incidents while describing their freedom around the village. Harry and Luke described why they were prevented from going to the train station:

- Interviewer:* *Lots of people say they are not allowed down to the train station, is there a reason why?*
- Harry:* *'Cos loads of drug dealers go down there.*
- Luke:* *Aye drug dealers and the drunks, and there is thuggies and all that.*

All but two of the children mentioned certain incidents or threats which had had a negative impact on their sense of safety in the village. Whether or not these are 'urban legends' cannot be commented upon, however, the children appeared sincere and there is a definite commonality between the stories. Whether or not the stories are based in fact is somewhat irrelevant as almost all the children thought it serious and real enough to mention. One of these stories involved a man who was apparently trying to pick up children in his car and which further explained why the children were not allowed to go near the train station. This incident was mentioned by three of the pairs. Harry and Luke continued their explanation of why the station was off limits:

- Harry:* *And this guy...*

- Luke: And there is this guy pretends, pretends he is a taxi guy and he goes up to children and that and says 'do you want a lift?'*
- Harry: We know somebody it happened to, and he's down in the class, Joe, his two wee cousins a couple of days ago.*

The children also mentioned a man who had been seen with a weapon and who was known to attack people including children; Andrea reported, 'Well I wisnae allowed to go anywhere for a couple of days because on, I cannae remember what date it was but it was a Wednesday, one of my wee cousins got jumped out on... with a knife'. Even though not directly affected, the threat impacted on the freedom of other children, 'A couple of weeks ago there was a boy running about with a bow and arrow, and I was no allowed to go anywhere, so I didn't go anywhere without anybody for the rest of that week'. For those who did not mention a specific incident, such as the ones above, there was still an unspecific threat of the anti-social behaviour. Holly, for instance described how she was often scared of being in the village because of the 'hooligans'. While Jessica saw the threat as coming from 'perverts'. Even while in the relatively protected environment of the school the children still saw potential danger. Emily mentioned feeling vulnerable while in the playground, 'Cos you see at St John's school (the other primary school in their village), it is all closed in and at our school it is not and people could come in and you could be round a bit of it and they could take you away...'

The children, both males and females, also reported that they did not feel particularly safe outside of the village in the surrounding countryside and forests (these responses do not relate to how the children felt while at Forest School – the questions asked how they felt while on their own or with family members). A number of the females, though not all, emphasised the potential danger of the forest:

- Interviewer: What about up to the forest [are you allowed to go...]?*
- Emma: No.*
- Interviewer: Why are you not allowed up there on your own?*
- Emma: 'Cos there are too many weirdos up there.*

Fear of the forest was rooted in actual experience; unsurprisingly Jade and Vicky found the forest a scary place:

Vicky: Well err, I am actually quite scared to go up even in the daylight to the forest 'cos like one time we were building our dens and we seen a cat that had been hung.

Interviewer: A cat that had been hung?

Vicky: In a tree...

Most of the children admitted finding the forest a scary place, even the boys:

Interviewer: What about, if you're in the forest and its getting a bit dark, is that scary?

Alex: Mmhmm.

Interviewer: Is that more scary than... (being in Corden)

Alex: Aye.

Interviewer: Why is it more scary do you think?

Terry: 'Cos you hear a noise tweeting and that.

Alex: And noise and branches...

Terry: Aye twigs and branches.

Alex: ...breaking

One well-publicised incident could have influenced the children's feelings of fear in the local forest. In 2003 a man was convicted of killing and dumping his friend in the forests close to the Forest School site. The children were well aware of this and a number mentioned it in the interviews. Emma for instance said, *'See how that guy got killed in Corden and got put up the forest? That's, I feel really scared when we are walking from the school along that road and up that hill, I'm really scared... there's a wee river thing and he got chucked in there, I always stay on the furthest away side 'cos it's scary'.*

Despite these often negative experiences and perceptions the children had positive opinions of physical activity in the outdoors. These are explored in the following sections.

9.1.6 Physical activity in the outdoors

All the children perceived there to be at least some difference between physical activity in the outdoors and that indoors; typically the children thought that it was 'better' to do

physical activity outside; indicating that they thought outdoor physical activity is more beneficial and enjoyable.

The explanations given as to why physical activity in the outdoors was different to that indoors tended to fall into one of three categories: 1) it is 'nicer' outside and therefore outdoor physical activity is more enjoyable; 2) physical activity in the outdoors is better for you; and 3) the outdoors provided the children with a greater sense of freedom and space for physical activity. These three themes are explored in the following section.

9.1.7 Outdoor physical activity is better for you

The strongest reason according to the children, for being physically active outdoors over the indoors, was that it was of greater benefit to one's health. This idea was mentioned by the majority of the children who were asked. The most common justification for it being healthier was that one got fresh air when taking part in physical activity outdoors. Jackie and Andrea explained why they thought physical activity in the outdoors was better for health:

Interviewer: ... do you think it is better for your health to do it indoors or outdoors?

Andrea: Outdoors.

Jackie: Outdoors 'cos then you get fresh air.

Interviewer: Is fresh air good for you?

Jackie: Aye.

Ethan stated '*Cos when you are in the gym hall you are breathing the same air and outside you get fresh air*'. The idea that the air indoors was stuffy was mentioned by several of the interviewees; for instance Emily explained why she thought physical activity outdoors was more beneficial; '*Aye 'cos outside you are breathing loads of fresh air and inside its just all stuffy and you don't... you get all hot and you cannae do it, outside you keep nice and cool and you play more*'. Similarly to Emily other children perceived that the fresh air helped reduce the feelings of physical exhaustion after exercising, '*Cos the air is fresher, you get fresh air, that makes you, like for all your exercising you feel better and like breathing...*'. The children considered

that the 'fresh air' has the further benefit, as Emily's quote above demonstrated, of keeping one cool, and keeping cool allows one to be active for longer. Cameron and Andrew made this point:

Interviewer: Is there a difference between doing physical activity inside and outside? Do you think there is any difference in that?

Cameron: Aye a wee bit, 'cos if you are running outside you can keep cool.

...

Interviewer: Do you think it is better for you to do it outside or inside?

Andrew: Outside, more energy.

Cameron: Outside better.

It is possible that the implication of Cameron and Andrews' explanation is that the coolness outside allows them to keep going for longer, which they interpret as 'more energy'. Inside they get hotter quicker and this intensified their feelings of exhaustion. A point which Leah alluded to, *'In the hall you get, you burn up, well inside you get all hot and it's a small place but when you go outside its fresh air and breeze and its more better outside than it is inside...'*

Despite the overwhelming opinion that physical activity in the outdoors was a healthy thing to do, four of the children did, however, mention potential negative effects to health. Two of the children were concerned with being physically hurt while engaging physical activity in the outdoors; a concern which did not appear to be relevant to physical activity indoors. Heather, for instance, perceived the difference between physical activity indoors and outdoors as one of risk:

Interviewer: Do you think there is a difference Heather?

Heather: Errm, I don't, well I only think there is a difference 'cos, erm, the only difference is that if you are inside you don't hurt yourself as much.

Interviewer: So you think it is more dangerous outside?

Heather: I think it is more dangerous outside because there is glass and that on the ground.

Sarah, who was also concerned about the risk of hurting herself while engaging in physical activity in the outdoors, stated, *'Cos if we done PE outside and you fall, it would be sore-er... more sore'*. Another issue was raised solely by Harry, who, while discussing the idea that physical

activity in the outdoors was probably more beneficial to health, decided that the air may not be as fresh as it appeared: *'Saying that there, this world is getting more pollution...'*. He went on to conclude that the polluted air may detract from the other health benefits of outdoor physical activity. Despite these negative opinions the majority of the children did think that physical activity in the outdoors was beneficial to health.

9.1.8 Greater enjoyment from being outdoors

Most of the children thought physical activity in the outdoors was better than that indoors because they preferred to be outside in the first place; that the outdoors was a nicer environment, particularly as a context for physical activity. All but two of the children, when asked whether they would like to do physical activity outdoors, agreed and, taking account of the weather, stated that if it was nice they thought that they would prefer to do physical activity outdoors.

Jack and Oliver discussed their preference for physical activity in the outdoors during the ranking exercise:

- Interviewer:* What about, erm, why is PE. in the middle there?
- Oliver:* 'Cos it is funner playing football and capture the flag (these two activities had been placed higher in their ranking).
- Jack:* 'Cos PE. is in the hall and they two, are like, outside an...
- Interviewer:* So being outside is...
- Jack:* It's better being in the fresh air.
- Interviewer:* The fresh air? Is that the same even if it is really wet and windy, will you still prefer to be outside?
- Oliver:* Err probably.
- Jack:* Probably!
- Interviewer:* So it is pretty much always better to be outside?
- Oliver:* Aye .

During Cameron's explanation of why he preferred physical activity in the outdoors he included the justification that, *'You can get different scenery'*, suggesting that he valued the varied environments the outdoors provided for physical activity.

9.1.9 The outdoors provided the children with a greater sense of freedom and space

Finally, the children indicated that the greater sense of space and freedom they had in the outdoors made physical activity in the outdoors preferable. Several of the children mentioned the greater space; Jessica identified the difference between outdoors and indoors as, 'Well you can actual, 'cos you have got more space outside', Megan made a similar point, 'Outside you have more room'. They considered that the greater space in the outdoors offered them greater opportunities to be more physically active. For instance Jackie justified her argument, that there is a difference between physical activity indoors and that outdoors, with, 'Cos you cannae always run in the house and that', Jackie's interview partner Andrea continued, 'And like outdoors there is more space to...'. Andrew also made a similar point, 'And if you are running outside, then inside you can bump into things and outside there's hardly anything to bump into'. Hannah and Holly also recognised the greater opportunity to be more physically active in the outdoors:

Interviewer: Do you think, um, do you think there is a difference in doing physical activity indoors and doing it outdoors? ...

Holly: Like you can do more, erm, more outdoors than indoors 'cos you can like play baseball and you cudnae play in 'cos you could smash a window.

Interviewer: Mmm it is quite small your hall isn't it?

Hannah: Mmm indoors you cannae really do a lot, you can only play like, just if you, there's not a lot of room, 'cos in this group you can't really, it's better to go outside and do more than indoors, 'cos you cannae really play a lot of football in the gym hall or...

For these children the outdoors greater space and freedom afforded greater opportunities; allowing the children to engage in a greater range of activities and sports than they would be able to do indoors.

9.1.10 Forest School and physical activity in the outdoors

As this section has demonstrated the children had had little experience of physical activity in the outdoors outside of their village, in fact they had had little experience for any reason. Certain factors were identified which were likely to be key causes of this situation; these included restrictions on the children's freedom to use these spaces without supervision, reluctance of adults and guardians to accompany the children and real fears surrounding anti-social behaviour. Despite the lack of opportunity and negative experiences the children were still highly motivated to be physically active in the outdoors. The value of Forest School in providing these children with a regular structured and enjoyable experience of physical activity in the outdoors and in local greenspace is clear.

9.2 *Forest School overcame certain barriers to physical activity in the outdoors*

The second finding to be explored in this chapter was that Forest School appeared to overcome two key barriers to the children's participation in physical activity in the outdoors; firstly the impact of 'bad' weather and dirt, and, secondly, their generally negative perceptions of the local forest.

9.2.1 *Forest School and the freedom to be active despite the conditions*

This Forest School took place whatever the weather (though not in very high winds as there may have been a danger of falling trees and branches), throughout the year. This meant that the participants of Forest School experienced many different environmental and atmospheric conditions, from heavy rain and its consequence, mud, to glorious sunshine. Forest School leaders actively promote the use of the natural environment in all conditions with some version of the following, 'there is no such thing as bad weather, only bad clothing' (Forest Schools East Accessed December 2005). This positive attitude appeared to have influenced the children, though only in relation to Forest School.

An interesting point to come out of the discussion about general physical activity in the outdoors was that of the influence of the weather. The weather was the most common determining factor mentioned by the children in relation to preferring to be inside or outside. Just over half of those who indicated that they would prefer to be outside when doing physical activity, either in school or out of school, qualified the statement by referring to the weather or temperature. Erin considered that physical activity in the outdoors was only better if, *'Well if it's hot it would be nice to be outside, but if it is cold it would be better to be inside'*. Chloe echoed Erin by stating, *'I dinnae want to do it when it's cold'*, and Jade, who said she would prefer to do her PE lesson outside, though only *'When it's nice'*. The general sentiment appeared to be that if the weather is 'good' (i.e. sunny, warm and dry) then it's better to be outside, as Hannah stated, *'Yeah, if there's, well the hall would be good if it is raining, but if it is sunny it would be better to go outside'*.

However these opinions were at odds with the majority of those expressed about Forest School. As was reported in a previous section only two negative comments were made by children regarding the impact of the weather on their enjoyment of Forest School (these related to getting cold while sitting in the base and the problems of wearing inappropriate clothing on wet and cold days). The majority of the children made, either, no reference to the impact of the weather or positive comments regarding the results of different kinds of weather. For instance the children spoke animatedly about the days when it had snowed or ice had formed on puddles. Even the result of rain, mud, did not put a dampener on the children's opinions; with many stating that it was one of the best aspects of Forest School. Erin, who made the comment above about preferring physical activity indoors if it was cold, discussed enjoying jumping in puddles and getting muddy at Forest School. Jade also discussed enjoying getting muddy at Forest School. Hannah indicated that the impact of bad weather was perhaps a more cultural and social barrier, *'...at school you don't, you are not allowed to get mucky, but like at Forest School you are...'*.

The children's comments indicate that at Forest School they were 'allowed', by both the teachers and psychologically, to get wet and muddy, whereas in more controlled situations, such as the school playground, the children were prevented from doing so. Furthermore, the children indicated that the weather was not a barrier to enjoyment or participation at Forest School, rather it offered opportunities such as snow to sledge on or a puddle to jump in. Whereas for many of the children's other sources of physical activity, such as at normal

school, the threat of bad weather was seen as a barrier, which prevented them from being outside or heightened the possibility that they might get muddy.

9.2.2 Forest School and the transformation of the perception and experience of place

The second barrier to the children's use of the outdoors as a context for physical activity which was, to some extent, overcome by Forest School, was related to their negative perceptions of their local forests and green spaces.

As reported in section 9.1.5, fear appeared to act as a true barrier to the children's physical activity, especially outside of the village. Either their parents prevented them from using certain places or the children themselves felt such fear that they just did not use them. Since Forest School took place in the same forest as the children reported feeling frightened in, it was expected that the children would report similar feelings about their time at Forest School. However this was, in general, not true. The children reported feeling relatively safe while at Forest School even though it was in the same forest as they reported feeling scared in otherwise. Jack, for instance, when asked if he ever felt frightened at Forest School, stated, *'No up there in the Forest School... but sometimes I have in the forest'*. It seems there was a perceptual difference about being in the forest for Forest School than at other times; at Forest School most of the children felt protected and safe. The following illustrates why the children felt safer at Forest School:

Interviewer: Do you feel more safe in like the forest or Corden?

Emily: The forests (meaning Forest School), 'cos you have got boundaries and you know...

Chloe: I know but somebody could come in.

Emily: And they know that, where you are not allowed out of boundaries and that...

It seems that the behavioural and physical boundaries gave the children a greater sense of security. Cameron stated that he felt safe at Forest School because, *'Nah if you go by the rules you will be safe'*. Other children mentioned how certain safeguards had been put in place which further enhanced their feelings of safety. For instance both Heather and Emily

mentioned that when they got lost they had been instructed to stand still and clap their hands until someone came to find them. A further reason why they felt less vulnerable in the forest while at Forest School was due to the leaders. Almost all of the children indicated that they felt protected by Sandy, the main Forest School leader. The children described how Sandy, who was variously described as big and strong, would be able to protect them from any threats, particularly other people. One of the dangers the children described in the forest were quad bikers, however at Forest School they did not feel threatened:

Interviewer: What about the other people in the forest, like you said there were quad bike people, do they ever worry you? [While at Forest School]

Jack: No 'cos we know Sandy is there.

The boundaries, rules, and presence of reliable adults at Forest School appeared to create an environment where the children, on the whole, felt safe and protected, despite feeling scared and vulnerable, in the same space, at other times.

Although Forest School appeared to have overcome these two barriers to the children's use of the outdoors for physical activity it is clear that it was temporary and contextual. There was no evidence to suggest that the experience of Forest School changed the children's overall perceptions; in the school setting mud was still to be avoided and outside of Forest School the forest was still a scary place. This is understandable as the children's participation in Forest School did nothing to alter other people's (such as the school cleaner's) perceptions of dirt, or to make the forest (in any significant way) a safer place. However, despite the apparent lack of a wider impact, the two barriers to the children's physical activity in the outdoors, the impact of bad weather or mud and their negative perceptions of their local forests, were in general, overcome during the Forest School sessions.

9.3 Equality of experience of physical activity at Forest School

The third finding explored in this chapter relates to gender and the experience of physical activity. Within this section it will be argued that participation in Forest School resulted in an experience of physical activity which was relatively equal between the sexes: that the

physical activity was not gendered and both sexes were able to take part equally. These findings are put in context by examining, firstly, the children's opinions on the general differences in physical activity ability and choice, between males and females, and, secondly, by their discussion of the differences in amount and types of physical activity they did outside of Forest School.

9.3.1 General differences in physical activity between males and females

Three of the pairs considered there to be physical differences between males and females which led to differences in ability at physical activity. Harry and Luke made a quite convincing argument:

Interviewer: Do you think there is a difference between what boys and girls do?

Luke: Aye 'cos you get men competitions and lasses competitions, 'cos men sometimes...

Harry: Men get all dirty and women stay all clean.

(Laughter)

Harry: That's the one thing and they take ages to get dressed!

Interviewer: So you were saying there were girls' and boys' competitions, is this because...

Harry: Aye like in athletics.

Interviewer: They can do different things?

Luke: Aye 'cos they are like in different classes 'cos like... no all men... but a lot of men... the majority... are stronger than women, so they have to do the other things, but there...

The majority did not consider there to be any important physiological differences which had an impact on physical activity ability between males and females. However, all the children thought that males and females make different choices regarding physical activity and that this results in the different levels of ability or fitness. In six of the pairs children argued that males, in general, are stronger or fitter than females, though this was only due to the fact that males, in their opinion, did more physical activity than females:

Andrea: And boys are like more active than girls.

- Interviewer:* Are they more active than girls?
- Andrea:* Mmhmm.
- Interviewer:* How do you know that?
- Jackie:* 'Cos girls, err, boys are usually playing football and that and everyone else is at the shop.
- Interviewer:* Yeah? Do you think there is a difference in what boys and girls can do, like do you think boys are stronger or can do sport for longer, or do you think that there is no difference really?
- Jackie:* I dinnae think there is really any difference it just depends on how much exercise you do.

The idea that boys were more active than girls and their higher level of activity, and therefore fitness, meant they were able to do more, was common with around half of the pairs making the point. This opinion was held by both males and females. However, four of the girls did not consider boys to be more active or fit than girls. Chloe appeared to find this idea, that boys were more active than girls, almost insulting:

- Chloe:* Mrs Malus says boys are physically more active than girls! Which is nae true!
- Interviewer:* Not true?
- Emily:* Not true 'cos even I am more active than some boys.

By far the most common opinion was that males and females made very different choices regarding physical activity. Typically boys liked football and girls liked other activities including dancing and gymnastics. Ethan for instance was not of the opinion that there was any real significant difference between boys and girls, rather it was just that, '*Girls do like dancing and all that, and boys like playing football*'. The children's perceptions of the activities which either gender engaged in conformed to stereotypical 'gendered' activities; football was discussed in terms of being a boys' activity, even though five of the girls reported playing the game, and dancing was a girl's activity despite instances of boys dancing. While the children acknowledged that the girls also played football, this choice was remarked upon, the implication being that by playing football they, as girls, were deviating from the norm. Emma was one child who made several comments in this vein, the first while discussing why she ranked the break time football game in the last position during the ranking exercise: '*That's too boyish!*'. She later made the following comment while discussing her male interview partner's low ranking of learning a dance routine:

Interviewer: What is it about the dancing that you don't like?
Sean: Just dinnae like it.
Emma: 'Cos it's girly!

Chloe made a similar comment about her interview partner:

Emily: I play football and I run about the street.
Chloe: That's for boys.
...
Interviewer: Do you think there is a difference between what boys and girls are doing at break time and lunchtime then?
Emily: Yup.
Chloe: Aye 'cos girls are...
Emily: Girls are lazy!
Interviewer: Girls are lazy?
Emily: Yes.
Chloe: No we are not!
Emily: Yes you's are, just sitting round or walking round.
Chloe: I dunno why you are saying 'yes you's are' 'cos you's a girl!
Emily: But I'm not...
Chloe: You's a tomboy.

A similar episode occurred between Harry and Luke. Luke was describing why he had placed learning a dance routine in a low position in the ranking exercise and had just admitted enjoying dancing at parties:

Luke: If it wisnae learning a dance routine I would put it somewhere else but,
Interviewer: So if I had put dancing at a party where would you put that then?
Luke: If it was dancing at a party it would be at the top.
Interviewer: At the top?
Luke: Aye.
Harry: Just imagine Luke dancing at a party!
Luke: No I would only do it for a dare or a laugh or something.

These children appeared to be implying that the participation in, and enjoyment of, a strongly gendered activity, such as dancing or football, negatively affected the gender identity of the individual. The extract from the interview with Harry and Luke illustrates this, when Luke realises that his masculine identity has been undermined by his professed enjoyment of dancing, he backtracks and tries to reassert his masculinity by implying that he would only do it for 'a laugh'.

Furthermore, as the quotes from Sean and Emma and from Emily and Chloe indicated, certain traits were associated with either gender; for instance girls are 'lazy' or reluctant to get muddy (a further example includes Chloe's explanation of why she did not like the mud at Forest School; *'I don't like getting muddy; I am a really girly girl'*). Some of the children, of which Emily was one example, felt the need to distance themselves from these negative connotations of their gender. Though as the quote indicates this distancing could be misinterpreted or perceived of as a negative action; often the girls who professed they weren't lazy and enjoyed sport would be branded by some term such as a tomboy.

As this section has shown, typically, the children did consider there to be real differences in the physical activity choices and ability between males and females. Furthermore they 'gendered' certain physical activities (and traits or behaviours) and commented, and sometimes ridiculed, when the 'wrong' gender took part in the other genders activity. However not all the types of activity which the children discussed were associated with a particular gender, the most relevant and interesting of these were the Forest School activities.

9.3.2 Forest School and gendered physical activities

It was expected that there would be at least some comments which indicated the children thought that Forest School was most appropriate for, and, perhaps, most enjoyed by the boys. As described in the previous section, the children did hold gendered opinions and perceptions of other types of activities; with some activities, such as football, being for 'boys', or dancing being 'girly'. However no comments were made regarding the Forest School physical activity which could be described as gendered. None of the children appeared to think that any of the activities were masculine and therefore either unsuitable

for girls, or a challenge for a girl to do this 'male' activity (as was seen for other physical activities). Although many of the physical activities could traditionally be thought of as more 'appropriate' for boys, such as using tools and building dens, this just did not appear to be relevant to the children.

9.3.3 Forest School and either genders engagement in physical activity

None of the children made any comments which indicated that either males or females were more or less physically active at Forest School than the other. Nor did they imply that either gender was better at certain activities such as capture the flag, using the tools, or building dens. Both genders appeared to feel that they were capable of the physical activity they engaged in during Forest School and, when they had a choice, indicated that they would choose similar types of physical activity. There were also similar levels of reported enjoyment of the various different physical activities they took part in during Forest School sessions. The only real difference between the boys' and girls' reported enjoyment of any particular Forest School activities were in reference to the walks.

The Forest School results are similar to the children's discussions of their PE lessons; where there was also very little discussion about any differences in ability or engagement of either gender in specific activities during the PE lessons. There were, however, a number of contexts in which the children indicated there was a considerable disparity, between the genders, in the levels of engagement in physical activity; these included physical activity during break and lunch times and physical activity outside of school. The most relevant to this study is the physical activity during the school break times and lunchtimes. A clear split was identified, by the children, between the types of activities engaged in by either gender during the break and lunchtimes. The differences are perhaps typical and predictable, with the boys reporting playing football and the girls reporting talking or taking on roles of responsibility. Jackie and Andrea described how many of the girls chose activities such as walking or talking : *'...Some of the girls just play with their toys,'* or the girls, *'Watch them (the boys) playing football, or they just talk at the door where we come out and go back in, there's this wee corner so people sit up there'*. The boys reported playing a lot of football; take, for instance, Harry's response to a question asking him what he did during break time, *'Well we do*

football, always football'. Although there were exceptions, with a small number of the girls reporting occasionally playing football and the odd boy stating he did not play football, the pattern was definite.

The disparity was also observable in the children's responses to questions regarding the amount of physical activity they did, regardless of what activities they took part in. The majority of the girls (there were of course exceptions) thought that they did not really do that much physical activity during either their break or lunch times. Although most the girls indicated that they thought that they *could* do physical activity during the break times, they explained that they did not and gave various reasons for this; including a lack of anything to do, a lack of space, and the reluctance of the boys to let them join in football games.

Furthermore over half of the girls had chosen to take part in an anti-bullying scheme which resulted in restricted opportunities to be physically active. The boys, however, gave a wholly different impression of the physical activity they reported engaging in during their break times. The picture they drew was of near constant physical activity, as Jack commented, '*We are always running around*'. Although, again there were exceptions, with two of the boys claiming to do little physical activity during break time, the majority reported engaging in, what they described as, continuous high intensity physical activity. The results of the accelerometry of phase one support the children's perceptions. On the Forest School days there was no significant difference in the levels of physical activity between the genders; the difference was significant on the two typical school days.

This section has attempted to demonstrate that the experience of physical activity at Forest School appeared to be relatively equal between the boys and the girls. The children's perceptions of either genders activity, both in general and in other contexts, were explored in order to put the Forest School findings in context. This highlighted the point that the children did hold gendered opinions of physical activity in these other contexts. Somehow Forest School promoted a physical activity environment in which the levels and perceptions of the activity were similar between the boys and the girls, certainly more equitable than in other school situations.

9.4 *The children were motivated to be physically active at Forest School*

The final finding which is discussed in this chapter relates to the children's motivation to be active at Forest School, this is put in context by the children's reported lack of motivation to be active in certain other contexts.

All the children who were interviewed gave the impression that they were highly motivated to take part in Forest School and the physical activity. Enjoyment of the experience, and in particular of the types of physical activities, appeared to have been the primary reason for this motivation. Although there were certain children who did not enjoy certain activities - for instance the walk up to Forest School was described as 'long', 'boring' and 'tiring' - these comments were, however, certainly outweighed by the amount of positive comments. Activities such as the game capture the flag (CTF) were universally enjoyed and the only negative comments it drew were related to not being able to play it enough. Motivation to play CTF was certainly not lacking:

Interviewer: So why do you like CTF?

Oliver: 'Cos when you run you get to hide, and then when you are hiding and if they try to see you, you can run on.

Interviewer: Yeah?

Oliver: Its fun.

Interviewer: How long would you like to play it for?

Oliver: I would like to play it for the whole day!

Interviewer: For the whole day long!?

Forest School provided the children with a varied and enjoyable experience of physical activity. Even the high intensity of the activities did not appear to have too great an impact on the children's motivation to be active. Very few of the children made any reference to feeling tired or exhausted during any of the Forest School activities. In fact the opposite was true:

Interviewer: What do you think of the physical activity you do at Forest School?

Andrew: Really good.

Interviewer: It's really good?

Andrew: You dinnae even think about it, you dinnae even get tired.

Interviewer: You don't get tired?

Andrew: You just want to do something.

Cameron: Till you have to stop.

Interviewer: Till you have to stop?

Cameron: You have to stop when the whistle goes.

In five of the interviews boys made references to wanting to do more physical activity while at Forest School. Overall, motivation to participate in Forest School appeared to be very high, as did motivation to take part in the various physical activities.

Lack of motivation was, however, a barrier to physical activity in other contexts, particularly for the girls. Apparent lack of motivation was particularly relevant when the girls had the choice to be active, such as at home or during school break and lunchtimes. The majority of the girls reported very little physical activity during their break and lunchtimes. It seems they were just not motivated to be physically active; either there was nothing for them to do or they just did not want to be active. Erin and Jessica stated:

Interviewer: So what do you actually do at break time?

Erin: We just stand there.

Jessica: Stand somewhere.

Interviewer: And chat?

Jessica: Mm 'cos there is nothing else for us to do.

Other girls were more interested in taking part in the anti-bullying scheme which apparently reduced their opportunity to be physically active. When asked whether she did much physical activity during break time Andrea answered, *'Well no, at break time, at break time, I'm an RP and RP means responsible person...'*

Outside of school eight of the children indicated that they were not particularly motivated to take part in physical activity; five went as far as stating that they rarely did any and three, that they did no physical activity at all. Jessica and Erin discussed how, apart from dog walking, they did very little physical activity outside of school tending to watch TV or play on their computers. Megan indicated that she had very little motivation to be physically active outside of school time:

Interviewer: All right so let's talk about what you do outside of school, do you so much physical activity at like, um, in the evenings or at the weekends?

Megan: No I like to be lazy and lie on my bed.

For other children the opportunities they had to be physically active were not interesting, enjoyable, or engaging enough to maintain motivation. For instance 12 of the children mentioned that they either did or had attended afterschool clubs that involved physical activity, such as dance classes or football teams. Attendance at these clubs appeared to be waning, with many of the children stating that they had either already given up or were going to give up attendance; Jack and Oliver for instance:

Oliver: Err I used to badminton as well.

Interviewer: Badminton? Why did you stop that?

Oliver: 'Cos it was boring.

Interviewer: Boring?

Oliver: 'Cos it was too easy as well.

It was not so much that these boys were not motivated to be physically active, rather the physical activity on offer was neither challenging nor engaging and therefore their motivation to attend had decreased.

The point that this section has tried to make is that the children's discussion indicates that Forest School may be effective in promoting high levels of physical activity and enjoyment of that physical activity because, overall, the children enjoyed the whole experience, found it challenging and were interested and stimulated by the activities, meaning that they were therefore motivated to take part. Although the children all stated that, in general, they enjoyed physical activity, they were often not physically active when they had the opportunity. This was demonstrated by the low levels of physical activity during the break times and by the children's reports of ceasing to attend physically active clubs and classes.

In the final chapter the research which has been detailed in this thesis is discussed. The chapter is structured into four major sections; first, the research questions are examined; second, the findings and results are discussed; in the third section the conclusions are stated; and in the fourth and final section, the design, methods and the implications of the findings are discussed.

10.1 *Has this research provided answers to the original research questions?*

As an introduction to the discussion of the findings and as a reminder of the primary results from both phases of the research, the original research questions are examined.

Question 1: What are the amounts, levels and intensities of the children's physical activity during Forest School sessions?

As reported in chapter 6 the children were shown to be physically active at Forest School; during the sessions, the children, on average, accumulated the recommended amount of daily physical activity and had the opportunity to engage in bouts of moderate and vigorous activity (MVPA) for prolonged periods of time. Both the males and the females were shown to be active at Forest School and the differences in the levels of activity between the sexes were relatively low.

It is argued that this research has provided an accurate assessment of the amount of physical activity the children engaged in during the Forest School sessions. The use of an objective tool, which has been validated in a number of previous studies and is one of the most commonly used tools in academic research of this type, and the use of repeated measurement mean that the findings are valid and reliable.

Question 2: How do the amounts, levels and intensities of the physical activity during Forest School sessions compare to those during typical school days?

As detailed in chapter 6, the children were shown to be significantly more active on the Forest School days than they were on either of the two conventional school days (the day with a PE lesson, and the day with no timetabled physical activity). For instance the children accumulated significantly more minutes of moderate and vigorous physical activity on the Forest School days than during the typical school days. The results highlighted the low levels of physical activity during the two conventional school day types, and indicated the need to increase children's opportunities to be active in the school setting. The use of two control days not only placed the findings relating to the levels of physical activity on the Forest School days in context, but also increased the rigour, relevancy and impact of the findings.

Question 3: How do the children perceive of Forest School and more specifically of the physical activity they engaged in during the Forest School sessions?

The study found that the children had, in general, very positive perceptions of both Forest School and the physical activity they engaged in during the sessions. It appeared to be a highly valued part of their schooling. The experience was appreciated for a number of reasons; these included, the opportunity to be in and to use local green space, the experience of the natural world, the opportunity to be physically active, the freedom Forest School offered to play, get muddy, to run, and to have fun, and the opportunity be with friends and work with the leaders. Few of the children had many problems with Forest School. The children perceived Forest School to be quite different to their normal schooling, in particular in reference to the greater opportunities to be physically active.

Question 4: Does Forest School have any particular value as a source of school based physical activity?

The findings suggest, and this argument will be developed in the following chapter, that Forest School does have value as a source of physical activity. At the most basic level Forest School greatly increased the children's opportunity to be physically active during the school day. However, as will be argued in this chapter, its value is greater than simply increasing opportunities for physical activity; it gave the children a regular experience of physical activity in their local natural environment, something which many of the children reported having little experience of. Forest School may have the additional benefit of altering gender inequalities in physical activity which persist in other environments.

10.2 *Discussion of the findings*

In the following sections the results of the two phases of research are brought together to provide a coherent interpretation of the findings.

10.3 *Forest School and physical activity*

One of the key findings of this research is that the children engaged in a greater quantity of higher intensity physical activity at Forest School than they otherwise did during their typical school days. Furthermore the differences in physical activity between the girls and boys were insignificant at Forest School.

Although there are conflicting reports on children's physical activity levels, there appears to be a consensus that many children are not sufficiently physically active. Increasing children's levels of physical activity is a key aspect of UK governments public health strategies (Chief Medical Officer 2004; Scottish Executive 2003). As Waring et al. (2007) commented, the school is an ideal setting in which to both promote and provide quality physical activity. The report from the Review Group on Physical Education stated, schools 'have a key role in encouraging pupils to have positive attitudes to... physical activity and active lifestyles' (Scottish Executive 2004 p14). Finding ways for children to increase their levels of physical activity during their time at school, for what is the majority of their waking hours, seems to be one key way of increasing the number of children reaching the

recommended amount of daily physical activity. The results of the current study suggest that programmes such as Forest School could be of benefit in the effort to increase children's levels of physical activity. The evidence to support this assertion is discussed in the following sections.

10.3.1 High levels of physical activity during Forest School days, low levels during normal school days

It is currently recommended that children should accumulate 60 minutes of at least moderate intensity physical activity every day (Chief Medical Officer 2004; Scottish Executive 2003; WHO Accessed 2008). The present study found that on Forest School days the children, on average, easily reached and passed the recommended 60 minutes. This finding is put into context by the fact that the children were not sufficiently active to meet the recommendation on either of the two control days. During these control days the children did not, typically, achieve half the recommended amount, even on the days which included a 30 minute PE lesson; during their conventional school days the children, who attend this school, were relatively inactive. There is evidence to suggest that these low levels of physical activity during the school day were far from exceptional. For instance Waring et al. (2007) found that, on average, primary aged children were active, at a moderate and vigorous level (MVPA), for just 15 minutes during the total time they were at school. Waring et al.'s findings are similar to the findings of the present study (though they reported a lower average amount of time spent in moderate or vigorous activity). The consequences of low levels of physical activity during the school day, which, as Waring et al. commented, constitutes a significant proportion of the child's day, are that the child must be physically active for prolonged periods of time before or after the conventional school day to reach the recommended amount of physical activity.

Whether or not the children were active enough to achieve the recommended amount of physical activity outside of the school, on days other than Forest School days, cannot, unfortunately, be commented upon (see limitations – section 10.11.2). However, recent research indicates low levels of physical activity during the school day do *not* appear to result in children increasing their physical activity after school to 'compensate' (Dale, et al. 2000). Conversely, high levels of physical activity during the school day, according to Dale et

al. *did* result in higher levels of physical activity after school. It is therefore possible that these children did not increase their levels of physical activity after the days during which they had been inactive but that after Forest School days, which were characterised by the high levels of physical activity, the children were more active outside of school.

Forest School was shown to have further benefits for physical activity. Firstly, it provided the children with an opportunity to be physically active for prolonged and sustained periods of time at a moderate to vigorous intensity. The children accumulated a high number of bouts of continuous moderate and vigorous physical activity on the Forest School days, some of which were in excess of twenty minutes in duration (section 6.1.11). This is an important finding as it is suggested that physical activity should be accumulated in continuous bouts of ten minutes or more to be of benefit to health (Chief Medical Officer 2004). The value of Forest School in providing this opportunity was highlighted by the finding that during the typical school day the children rarely achieved many, if any, bouts of continuous activity of any length, meaning that the value of the accumulated activity is questionable.

Secondly, this research showed that the children were often highly sedentary during the typical school day. However, at Forest School the children were sedentary for significantly less time. Recent research into sedentary behaviours suggests that prolonged periods of sedentary time (in particular sitting down) without breaks has negative health consequences (particularly to the risk of overweight and obesity), independent of the impact of low rates of higher intensity activity (Healy, et al. 2008). If these findings are found to be applicable to children (it is, though, possible that they are not as children's metabolisms react differently to physical activity) then this may suggest that the long periods of sedentary time during the school day, where the children were observed to be sitting down for the majority of the time, *may* be harmful to their health. If so this further strengthens the need to incorporate greater amounts of physical activity into the school day.

It is perhaps unsurprising that the children were shown to be relatively inactive during their time at conventional school. The realities of timetabling, the limited opportunities the children had to be physically active, the culture and norms of the classroom and some of the children's distinct lack of motivation to be active, all contributed to the low levels of higher intensity physical activity and greater amounts of low intensity and sedentary activity during the normal school days. While the purpose of this research was not to investigate the

amount of activity the children engaged in during conventional school days, but rather to use the results as a bench-mark against which the results from the Forest School days could be compared, it is a matter of concern that the children were so inactive during their normal school day. It is argued that the results of this research - as well as assessing the effects of Forest School - highlight the need for greater opportunities to be active during the 'normal' school day.

10.3.2 Surprisingly low levels of physical activity during the Forest School days?

Although the children did engage in considerably and significantly more physical activity on the Forest School days than they did on either of the two control days, it was surprising that they did not engage in greater amounts than were recorded. For instance the children spent an average of just 10% of their time at Forest School at a vigorous intensity of physical activity. A similar point could be made about the proportion of time the children were sedentary. It was not anticipated that during a day where the children rarely sat down and were (informally) observed to be constantly on the move, over 40% of the children's activity was classified as sedentary.

One way in which the potential benefits of Forest School could be enhanced would be to focus on reducing the amount of time the children were engaging in lower intensity physical activity and increasing the time the children were active at the higher intensities. This would be particularly relevant to Forest Schools which take place over a half day as children attending Forest School for a half day would accumulate less activity. Though it must be pointed out that even if the children had attended this Forest School for just a half day instead of the whole school day they would still have participated in significant levels of physical activity. As the walk to and from the site is inherent, regardless of the length of the visit, and assuming an active game was played for 25 minutes, it is likely that the children would accumulate at least 45 minutes of MVPA. This amount is considerably, and likely to be significantly, more than they would accumulate on a typical school day. Therefore, even if the children attended for just a half day, Forest School would still have value as a source of physical activity.

10.3.3 Insignificant differences in the levels of physical activity between the boys and the girls on Forest School days

Studies which have focused on children's physical activity consistently show that girls engage in less physical activity than boys (Biddle, et al. 2005; Sallis, et al. 2000). This research found similar patterns of physical activity on the two control school days. The girls consistently engaged in significantly lower levels of physical activity than the boys. However the pattern did not occur on the Forest School days, the girls were *not* significantly less active than the boys. Analysis of the phase one results shows that the girls increased their levels of physical activity at Forest School, when compared to the two control days, to a greater degree than the boys. It was not that the boys were less physically active at Forest School. For instance, while the girls accumulated nearly five times (464%) more minutes of MVPA on the Forest School days in comparison to the normal days, the boys' percentage increase was almost half that of the girls (238%).

These findings are noteworthy and important because, as stated earlier, girls are generally less active than boys (Inchley, et al. 2005). This inequality in activity is recognised by the Scottish Government, and as a result, one of the key aims of the physical activity strategy is to find ways to increase girls' participation in physical activity (Scottish Executive 2003). However, research, undertaken by Biddle et al. (2005), indicates that it is particularly difficult to encourage girls to be more active. In particular girls, as they age, are less interested in sport. Although this decreasing interest in sport is acknowledged, encouraging participation in sport is still one of the main ways physical activity is promoted to girls. The results from the present study suggest that Forest School may represent an alternative approach to increasing girls' levels of physical activity and to reducing the gender inequality in physical activity. Forest School somehow provided an opportunity for the girls to be physically active to a significantly higher level than during typical school days and to a level that was insignificantly different to that of the boys.

10.4 Exploring factors behind these findings

The results of both phases of this research indicated that a number of factors were related to the patterns of activity detailed in the previous sections; the four factors, detailed below, form the structure for the rest of this discussion section:

- opportunities to be active;
- motivation to be active;
- the impact of place, space and context;
- the relationship between gender and physical activity at Forest School.

Although they are discussed separately it should be noted that there is a great deal of interaction between the various factors; physical activity behaviours and motivations are complex and multi-factorial (Kohl and Hobbs 1998). Whilst this multidimensionality is recognised, for clarity's sake the various factors are examined separately and the complexity of understanding physical activity behaviours and motivations is discussed in section 10.10.4.

10.5 *Opportunities to be active*

There is a simple and obvious explanation for the greater levels of physical activity which were observed at Forest School in comparison to the typical school days; while at Forest School the children spent the majority of the whole day on their feet, unlike during their typical school day when they spent the vast majority of the time sitting. At Forest School the children had many *opportunities* to be physically active, whereas during the normal school days the children had very limited opportunity to be active; typically they were restricted to the twice daily break times and the once weekly PE lesson. Furthermore, at Forest School the children were not constrained by timetables, lesson plans or the fairly strict regime of morning and lunch breaks. Forest School also provided the children with the (physical) space to be physically active (a point which was particularly relevant for the girl's physical activity (this is discussed in section 10.7.1); in contrast the spaces of the typical school were restrictive and controlled – factors which reduced the children's opportunities for physical activity. It could also be argued that the children were, to a degree, compelled to engage in a

certain quantity of physical activity at Forest School. For instance the children had no choice about walking to and from Forest School; they had to walk to get there and to get back to school.

Nevertheless there does appear to be something 'special' about Forest School; this was highlighted by the comparison of children's activity during specific Forest School activities (the walks up to and down from Forest School and the active games) and typical school activities (the morning break and the PE lesson – see section 6.3). Despite the similar duration of these activities, the greatest intensities and proportion of time spent at these higher intensities were typically recorded during the Forest School activities. These results indicate that there are likely to be further contributory factors, other than just opportunity and compulsion, which resulted in higher levels of physical activity at Forest School.

10.6 *Motivation to be active*

The results of this evaluation suggest that the children were highly motivated at Forest School and that this may be related to the children physical activity patterns.

10.6.1 *Enjoyment and motivation*

The children, on the whole, greatly enjoyed Forest School and one can speculate that this enjoyment was part of the reason why greater levels of physical activity were recorded during Forest School sessions than during the typical school days. Enjoyment of a physical activity has previously been shown to be positively related to higher levels of physical activity in children (Heitzler, et al. 2006; Sallis, et al. 1999). However what is not clear is the (potentially causal) direction of this factor; were the children's physical activity levels higher at Forest School because they had the opportunity to take part in activities (which happened to involve higher levels of physical activity) which they enjoyed, or, did the children enjoy Forest School because they had the opportunity to be highly physically active?

The children reported that they were rarely bored at Forest School; this suggests that the various activities, in addition to being enjoyable, were stimulating enough to maintain motivation and, therefore, the high levels of physical activity. It has previously been recognised that providing children with stimulating and engaging activities results in greater participation (Allender, et al. 2006). The children's enjoyment of the active games supports this argument. Forest School gave the children the opportunity to play particular games (i.e. capture the flag) which, it appears, they did not have the chance to play during a typical school day. For many of the children a number of these games were a highlight of the Forest School day and, as Oliver indicated, they would, if they had had the chance, have played the game for hours. Their motivation to play the (physically active) games for prolonged periods of time is likely to have contributed to the high levels of physical activity on the Forest School days. The children indicated that in certain other contexts low motivation and a lack of stimulating opportunities did result in low levels of physical activity. For example a number of the children linked the lack 'of things to do' in the playground with their low levels of activity, others suggested that boredom had resulted in their ceasing to attend various out-of-school sport and activity clubs.

Alternatively, as was argued in chapter 8, there is evidence to suggest that the sheer quantity of opportunities to be active at Forest School was directly related to the children's enjoyment. When asked what they enjoyed about Forest School the children would often refer to a particular physical activity or include a quantification of the amount of activity in their response. For instance a particularly popular aspect of Forest School was that the children regularly had the opportunity to run around. Statements, such Hannah's, which was given in response to questioning regarding her favourite aspect of Forest School, '*cos you get to run about up the forest*' were common ways of expressing why they enjoyed Forest School.

As the evidence discussed above indicates, it is the author's opinion that the relationship between the children's enjoyment of Forest School, and therefore motivation, and the levels of physical activity is multi-directional and not a linear relationship. Firstly, the children enjoyed Forest School because they had the opportunity to be physically active and, secondly, their enjoyment of certain activities resulted in high levels of physical activity. Jade enjoyed Forest School because she had the opportunity to play Capture the Flag; she explained her enjoyment, '*It's really fun... 'cos you get to run about and have fun and that*'. This

quote indicates that the children's motivation and physical activity patterns are (partly) the result of a complex interaction between the type of activity, the quantity of physical activity and the children's enjoyment.

10.6.2 Gender and motivation

Motivation to be active may also be related to the insignificant differences in the levels of physical activity between the boys and the girls at Forest School. It has been previously recognised that girls often have less motivation to be physically active than boys; for many girls physical activity has a low priority and they have other, 'better', things to be doing with their time (Biddle, et al. 2005; Rees, et al. 2001). Despite the recognition of the inequality in physical activity behaviours between males and females, the origins or causes of this lack of motivation are not clear (Kohl and Hobbs 1998). It may be that the lower motivation to be physically active is a product of the socio-cultural environment, girls are 'expected' to be less active, and the girls may, therefore, be socialised into reducing their levels of physical activity to a gender appropriate degree (Penny 2002). Alternatively, as a study by Ridgers et al. (2007) indicated, girls' preferences, for example in the playground where the researchers found that girls prefer to be in small groups playing verbal games and socialising, are less likely to result in physical activity. The boys, in comparison, preferred to be in larger groups which, according to Ridgers et al., lend themselves to participation in more active games. Whilst this research cannot comment on the origins of the variation in motivation to be physically active, it did become clear that the girls, participating in this study, indicated that in certain situations they lacked the motivation to be physically active.

In the conventional school or home environment many of the girls indicated that they either 'couldn't be bothered' to be active or, echoing the findings of Ridgers et al. (2007), that other (non-physical) pursuits took precedence over physical activity. For instance, outside of school a small number of the girls indicated that they were rarely physically active and this was due to competing priorities, either the desire to watch TV, play on their computers or because of family commitments.

Lack of motivation was not, however, an issue at Forest School, where, in general, the girls appeared to be, and reported being, highly motivated to be physically active. Although the

children could choose, to a certain extent, how active they wished to be, few of the girls indicated that they chose to be inactive. The girls' enjoyment of Forest School appears to be part of the reason why the girls' levels of physical activity were relatively high during the sessions. Furthermore the girls were able to incorporate some of the competing priorities (e.g. the desire to talk to friends) into the physical activity. Forest School offers an experience where physical activity and socialising or learning can be incorporated into single activities.

Further reasons why the girls may have been more motivated to be active at Forest School are related to their perceptions of both their physical selves and of their competence at certain activities.

Perceived physical competence is associated with girls' motivation to be physically active (Crocker, et al. 2000; Sallis, et al. 2000). Girls who perceive of themselves to be 'bad' at physical activity and sport are less likely to take part (Mulvihill, et al. 2000). There was some evidence to suggest that the girls' self-perceived physical activity competence was less of an issue at Forest School. The girls interviewed during the present study appeared to have positive self-perceived competence in relation to the Forest School activities. None of the girls (or indeed any of the boys) made any comments which indicated that they felt they could not do, or were not good at any of the activities. These findings may be related to the types of activities incorporated into the Forest School sessions; activities which are fun, engaging and which are quite different to the types of activities the children would have experienced in the typical school setting. The emphasis on sport and the mastering of physical skills during the PE lesson, which previous research has shown turns girls off physical activity contrasts with the typical Forest School activities which are often described as small, achievable and are designed to promote enjoyment (Daalen 2005; Fairclough, et al. 2002; O'Brien and Murray 2006).

Physical self-perception has also been shown to be related to girls' levels of physical activity participation (Crocker, et al. 2000; Dwyer, et al. 2006). Negative physical self-perceptions did appear to be emerging as a barrier to some of the girls' physical activity in contexts other than Forest School. As other studies have identified (Biddle, et al. 2005; Dwyer, et al. 2006), girls' perceptions of their bodies and of the clothing they have to wear during physical activity, particularly in the school setting, contributed to their negative perceptions of physical activity. A number of the girls participating in the present study argued that they should be allowed to wear tracksuit bottoms (instead of shorts) during their PE lessons

because they thought their legs were 'big' or 'fat'. They were also uncomfortable getting changed and being active around the boys. These issues were avoided at Forest School because the children did not have to wear (or change into) distinctive, revealing or uncomfortable physical activity clothes. The children attended Forest School in normal, everyday clothing (to an extent – wearing wellingtons was a novel experience for many of the children) of trousers, jumpers and coats; therefore, the girls' bodies were not on show and, it seems, were not an issue affecting either their enjoyment or willingness to take part in the physical activity.

10.6.3 Outdoor activity and motivation

The final motivational factor discussed in this section is associated with the environment in which Forest School took place. The children who participated in this research were, on the whole, highly motivated to be active in the outdoors and in particular in more natural green spaces; these motivations were reflected in their perceptions of Forest School and the observed levels of physical activity.

The children's positive perceptions of physical activity in the outdoors contrast with the findings of recent studies which have indicated that the changing nature of modern childhood has meant that play in more natural green space is no longer as attractive as it might have once been (Travlou 2006). A report from Natural England (Henley Centre HeadlightVision 2005) questions whether modern children are interested in outdoor play in green space. It argues that for many people outdoor recreation is a 'dated activity' and children are more interested in modern theme parks and attractions (p34). This, they argue, is further compounded by the 'urban, indoors focused and sedentary' lifestyles of contemporary children and young people (p35). In contrast, all the children interviewed during the present study expressed a desire to be able to use the outdoors and in particular those outside of the village for play and physical activity. These results are in line with other research which has concluded that modern children *do* value green space. Researchers such as Lester and Maudsley (2006) and Whewey and Millward (1997) have argued that green spaces, including grassy fields, parks, nature reserves and even wastelands, are children's preferred places to play. These types of environments offer children a sense of freedom, an

opportunity to explore, both the environment and their own skills and abilities, and a sense of privacy, of being away from the adult gaze (Ward Thompson, et al. 2006).

Far from perceiving outdoor activities as being 'out-of-date' and old-fashioned (Henley Centre HeadlightVision 2005), the children who were interviewed for the present study thought that, in general, being outdoors was 'better' and more enjoyable than being indoors and that it provided them with the opportunity to take part in a greater quantity and a greater range of activities. This is despite the children's self-reported lack of experience of using such environments for physical activity; a situation which may be common for many children in modern society (Travlou 2006). It seems that relatively few children have the opportunity to regularly use more natural and wild green spaces; the majority of primary aged children are increasingly restricted to their 'backyards, basements, playrooms and bedrooms' (Ward Thompson, et al. 2008 p112).

While there is little published evidence which suggests that the type of environment has a direct effect on physical activity behaviours or motivations in children, there is evidence which suggests that certain types of environments, in particular green spaces, are associated with greater levels of physical activity (Giles-Corti, et al. 2005; Neuvonena, et al. 2007; Roemmich, et al. 2006). It has been suggested that the natural environment encourages exploration and this in turn results in greater level of physical activity (van den Berg, et al. 2007). Others have argued that natural environments 'afford' more opportunities for physical activity and creative play (Gibson 1982; Heft 1988) (the concept of affordances is discussed in greater detail in a following section (10.7.1). Pennebaker and Lightner (1980 p171) argued that the stimulating outdoor environment distracts individuals from 'internal sensations' of fatigue which allows the individual to maintain motivation to be active for a greater length of time or at a higher intensity than they would have been able in a less stimulating indoor environment. Certainly very few comments were made about feeling tired or exhausted at Forest School, despite the duration and high intensity of much of the physical activity.

The children's enjoyment of, and motivation to take part in the various physical activities at Forest School may be one of the strongest reasons to recommend the programme as a means of increasing levels of physical activity; surely if one wishes to encourage children to be physically active then the activities which the children enjoy and are motivated to take part in should be identified and promoted?

10.7 *Impacts of space, place and context*

To fully understand, firstly, the children's perceptions of Forest School and, secondly, their patterns of physical activity in the different settings one must consider the impacts of place, space and context (Holloway and Valentine 2000). Taylor (1999) noted that while both 'space' and 'place' are fundamental concepts their definition and use is complex and often indistinct. Therefore these terms 'place' and 'space' are briefly defined to clarify the following discussion.

Place

Gieryn argues that there are three aspects of 'place'; first, place has 'geographic location', it is the distinction 'between here and there' (2000 p464). Second, place has 'material form', it consists of the objects (be they natural or manmade, large (a building or mountain) or small (a window sill or plant)) which are found in the geographic location. Third, place is invested with 'meaning and value'. Place is not an objective concept which exists outside of our experience; we develop relationships with the places in which we exist and those places are defined by those relationships. Gieryn argued that place is space which is 'interpreted, narrated, perceived, understood, felt and imagined' (2000 p465).

Space

'Space 'is inherently related to 'place', yet as Gieryn stated place is not space. Space has been defined, and this definition will guide the following discussion, as the geographic location and material forms which are viewed in isolation of any meaning and value which may have been ascribed by humans (Hillier and Hanson 1984).

10.7.1 The impact of space

The primary impact of the spaces on the participant's physical activity, and on the perceptions of that physical activity, can be argued to be related to the concept of 'affordances'.

Affordances

Heft (1988), building on the theoretical work of Gibson (1982), suggested that features of the outdoor environment have 'functional significance'; that the spaces, surfaces, objects, structures and so on, provide opportunities for children's actions, both physical and social. Kaarby (2004), fittingly, explained the concept using the example of a tree; a tree which has low branches provides a child with the opportunity to climb, further if that tree has strong low branches it could also provide the child with an opportunity to create a base for play. Therefore the tree *affords* the child the opportunity to be active and social. However it is important to note that the concept is relational to the individual, if the child is small it may not be able to reach the branches; the tree would therefore not afford the opportunity for such activity, instead it could represent a structure under which the child could play or construct a den.

10.7.2 Physical affordances of the Forest School spaces

Results from both phases of the evaluation support the suggestion that there was a relationship between the physical characteristics of the various environments and the children's patterns and levels of physical activity. Previous research has indicated that for children the forest environment affords many opportunities for physical activity and play (Crowe and Bowen 1997). This present research confirmed this; to the relatively large group of children the Forest School site, with its (physical) space, the climbable trees, ditches to crawl through and open areas to race around appeared to allow for a greater amount of physical activity. This compares with the cramped and restrictive school environment of

hard flat surfaces and sheer brick walls, which, whilst being a favourable environment for activities such as games of football, appeared to offer fewer opportunities for a wider range of physical activities.

The physical space of the particular environment appears to have been related to both the levels and perceptions of the physical activity. The objectively measured levels of physical activity were greater when the children had the use of a greater space (i.e. the playground in comparison to the classroom, the forest in comparison to the playground and so on).

The relationship between space and the children's physical activity is highlighted when considering the use of the school playground for physical activity. The children reported that there was a split between either gender's physical activities during the break times; typically the girls were inactive, they sat and talked to their friends, while the boys were highly active, with the majority playing football. These reports were supported by the results of the accelerometry which showed a significant difference in the quantity and intensity of physical activity between the boys and the girls (see chapter 8). Whilst other factors are acknowledged to have also had an impact on the children's physical activity (these are discussed elsewhere in this chapter) the use of space is a key factor. In the playground there were clear gendered socio-cultural divisions in the use of space; the boys' football games dominated the limited space, meaning that the girls were pushed to the margins; they were unable to play their games for fear of being trampled by the boys. Instead they had resorted to sitting on the walls and by the doors, well away from the boisterous football games. Gendered inequalities in the ability to use space, in particular in environments such as the school playground, and the subsequent impacts on levels of physical activity has been recognised by previous researchers (Karsten 2003; Ridgers, et al. 2007). Such issues were not, however, relevant in the forest where there was plenty of space which could accommodate all the children even during even the most energetic of the activities. Unlike the playground, the space had not been delineated by previous and well-established socio-cultural norms. None of the children made any comments which indicated that the action of other individuals or groups (other than teachers and leaders) affected their opportunity to be active. This meant that the children, and the girls especially, had a greater opportunity to be active than in the more restricted contexts such as the playground.

While this consideration of the physical affordances of the Forest School spaces is valuable, the explanation is functional and mechanistic and does not take into account an important

aspect of the concept of affordances: that the affordances of a particular environment are interpreted and perceived (Gibson 1982).

10.7.3 Interpreted affordances of the Forest School spaces

Gibson (1982) argued that an individual's perceptual experience of a space focuses, firstly, on the presence and structure of the features of that space and, secondly, on the *perceived* 'functional significance' of the space and its features (i.e. interpretations of how they can be used). As was pointed out in the definition earlier, these functions are relational to the individual (Gibson 1982; Heft 1988). This is an important point for this discussion, whilst the author may have considered the forest environment to afford many opportunities for physical activity this may not have been the case for the children. It was entirely possible the these children, who had had little experience of more natural green spaces would not perceive of the woods and scrub land as providing much opportunity for play or physical activity. Likewise the author may have considered that the playground offered fewer opportunities for physical activity. Conversely the children may well have considered the school playground with its familiar smooth surface, basketball hoops and football nets to offer greater opportunities. This did not, however, appear to be the case; the children argued that the outdoors and, in particular the environment in which Forest School took place, provided them with greater opportunities for physical activity and play.

Particularly relevant were the children's perceptions of greater freedom in the outdoor environments in comparison to the indoors and certain other spaces such as the school playground; a point which has been discussed by other researchers (Jones 2000). This sense of freedom is complex and cannot be attributed simply to the perception of the greater physical (and visual) space. Whilst the children did consider that the outdoors provides a greater physical space in which one can be active, as was discussed above, they also indicated that particular environments such as the forest offered opportunities which other environments did not. The children held the perception that in such an environment many types of physical activities, which they were otherwise prevented from taking part in (by certain socio-cultural norms, behavioural regulation, or even just by a lack of space or opportunity), were possible; activities such as tree climbing or crawling through mud. The

children also considered that they were able to engage in a greater *range* of activities; they mentioned the opportunity to run, walk, jump, leap, roll, creep, climb, crawl, balance and to build while at Forest School.

A particularly important example of the interpreted affordances of the forest environment was that the children appeared to perceive of it as a space where they could build dens. The children reported building dens both at Forest School and (some) independently in their free time in the forest environment. Though it is conceivable that they could have done so, the children did not indicate that they built dens in the school environment. It has previously been noted that children tend to build dens in more natural spaces, preferring environments with trees and bushes (Lindblad (1993); Lindholm (1995) both cited in Kylin 2003). The forest environment provided the materials and the flexibility of space which stimulated the children's construction of dens.

10.7.4 The relationship between place and physical activity

Places are more than simple spatial locations, they are, as Gieryn (2000) stated, interpreted, invested with meaning and are subject to constant revision. Our responses to and relationships with different places are the result of complex interactions of factors which include past experiences, the socio-cultural context and a range of individual characteristics including gender, ethnicity or age. The interpretation of a place's meaning is relational and contextual; for instance the pupil's understandings and expectations of places within the school are highly likely to be very different to those of the teacher.

The results of this research suggest that the children's perceptions of the various 'places' of this study are related to their physical activity patterns and that an understanding of the meanings is essential for the interpretation of the wider results. The impact of place is explored in the following section: firstly, by comparing Forest School with the normal school. Secondly, the impact of place on certain barriers to physical activity is discussed. The section concludes by examining the children's contextual experiences of a particular place, the forest.

10.7.5 Forest School relative to the school

Different places

Fundamentally Forest School was different to the typical school; one was outdoors the other, predominantly, indoors. Moore and Young (1978) argued that children perceive of indoor and outdoor places quite differently. They suggest that whilst the indoors is a private domain providing a sense of security and shelter, it is also the 'locus of adult dominance and the limiting effects of "family" and "school"' (1978 p88). Conversely the outdoors presents the child with greater freedoms, with opportunities to explore and possibly to subvert power relationships. This present research appeared to confirm Moore and Young's suggestion; the evidence is examined by focusing on the differences between behavioural expectations, permitted activities and finally the adult/child relationship in the different places.

Behavioural regulation

Our interpretation of the meaning of certain 'places' affects not only our behaviour but also our expectations of other's behaviour (Jones 2000). This research suggests that behavioural expectations were quite different at Forest School to those in other places and that this had an impact on the children's physical activity.

The school, it has been argued, is 'dedicated to the control and regulation of the child's body and mind' (James, et al. 1998 p38), the space is dominated by adult centric power structures. Within the school (and in its associated spaces such as the playground) there are very clear expectations of children's behaviour; children have little freedom or autonomy. In the school they are expected to be active only when it is appropriate (e.g. at break times or during PE lessons); even during those particular times the children's physical activity is monitored and regulated. It is likely that the children are rarely far from the adult gaze (Smith and Barker 2000). Similarly the children's use of space is equally as controlled and regulated; certain spaces are temporally restricted (e.g. the playground) other spaces are defined by status (e.g. the staff room or, again, the playground, take for instance the boys psychical domination of the space).

Behavioural expectations and the regulation of space were quite different at Forest School. The Forest School represented a place (spatially, temporally and perceptually) in which the children had far greater freedom. Although there were clear and defined behavioural rules and expectations, they were fundamentally different, relating more to managing risk and preventing injury than modifying and regulating physical activity. The supervision of the children was also quite different; for prolonged periods of time the children would be out of sight of the teachers and leaders. This gave the children the opportunity (and freedom) to engage in the quantity and type of activity they wished. Furthermore, as will be discussed in the following section, behaviours and activities which were prohibited in the typical school setting were permitted at Forest School. There was also evidence to suggest that the children's expectations of their own and each other's behaviours were different at Forest School. For instance it seems that engaging in what could be construed or perceived as masculine activities or behaviours while at Forest School did not threaten the girl's gendered identities. The different perceptions of what was acceptable behaviourally at Forest School in comparison to the typical school environment may have contributed towards the equitable levels of physical activity between the boys and the girls at Forest School.

Activities

A further fundamental difference between the school and Forest School relates to the activities which were permitted. The children had the opportunity to take part in a range of activities which they were unlikely to experience in the typical school setting or, indeed, outside of school. As has been stated previously Forest School represented a place where the children were encouraged to take part in significantly greater quantities of physical activity than within the typical school context. The emphasis shifted from control and stillness of the school setting to the dynamism and activity at Forest School. Further, activities which were prohibited in the school were encouraged at Forest School; an example of this would be tree climbing. At Forest School the children were allowed to climb the trees, however the climbing of the trees close to the school, was, according to the children, expressly forbidden. Although there is, presumably, little difference in the potentially negative consequences of tree climbing (i.e. falling out of the tree) in either place, the activity was only acceptable (in particular to the teachers) at Forest School. This greater sense of permissiveness and

freedom to engage in variety of physical activities at Forest School had a clear impact on the children's physical activity.

Adult/child relationships and place

The children indicated that the adult/child dynamic was quite different at Forest School in comparison to the normal school. As was noted earlier the school is a place which is very much regulated and controlled by adults with clearly defined and easily recognised roles and authority (James, et al. 1998). Whilst the adult leaders of Forest School (Forestry Commission rangers) clearly had authority over the children and regulated their behaviour, their relationship with the children was less defined than that of the pupil/teacher.

The children perceived that Forest School was a place where the adults (specifically the leaders) had a protective role rather than the authoritative role of adults within the school. The children associated the leaders with fun and enjoyment, with the freedom to run around in the outdoors; conversely they associated the teachers with the control, regulation and restrictions of the school. Interestingly and indicatively no positive comments were made regarding the teachers in the Forest School setting (the children did however make positive comments when discussing normal school). It seems that while in the Forest School setting the teachers continued to represent control and authority over the children's behaviour and freedoms.

Furthermore the leaders' participation in many of the activities (for instance being 'he' in a game of tag) appeared to have created a more equitable relationship with the children. This contrasts with the children's experience of physical activity with an adult in other contexts; for instance the PE teacher who stood to the edge of the hall and directed the children's physical activity or the parents who 'could not be bothered' to accompany their children to the local greenspace.

Finally the Forest School practice of 'child-led activities' may have further contributed to the more equitable and participatory relationship between the adults and children. The children were able to influence the leaders as to the activities; in particular they regularly managed to persuade the leaders to find extra time to play the active games. From the children's reports

it seems that they rarely achieved this in the school setting; for example a number complained that they had little input in the activities during the PE lessons

It is possible that the differences in the relationships between adults and children in the different places of this research contributed to the variation in both the perceptions and the participation in physical activity.

10.7.6 Forest School was a place where bad weather, dirt and mud did not prevent physical activity

It seems that Forest School was a 'place' where the children could get dirty and muddy and where bad weather was not a barrier to being active.

The children's discussion of their general use of the outdoors for physical activity highlighted the point that bad weather and the threat of dirt and mud acted as real barriers to their use of such spaces. Most of the children stated that physical activity in the outdoors (during the typical school day or outside of school) was only better if the weather was 'good' (i.e. dry and sunny) and there was little risk of them getting dirty. Bad weather has previously been shown to reduce people's motivation and ability to be physically active (Keenan 2006; Tucker and Gilliland 2007). Reflecting the points made in the previous section, the restrictions on the use of the outdoors for these reasons appear to have come both from the children themselves as well as from those who had authority over the children's physical activity; their parents and teachers.

Forest School takes place throughout the year, regardless of the weather (Forest Education Initiative Accessed November 2007; Forest Schools East Accessed December 2005). Therefore the participants may get cold, wet or muddy (they could, equally, get hot and sunburnt, though, as this research took place in Scotland and during the winter months, these issues were not so relevant). However at Forest School the state of the weather did not appear to be a barrier to the children's enjoyment or participation, and, in fact, could be said to be the opposite; certain types of weather, which would typically be described as 'bad', e.g. rain or hard frosts, resulted in opportunities for fun. Similarly getting muddy and dirty was not problematic at Forest School, the children relished getting muddy and appeared to have no qualms about doing so. Whilst the Forest School ethos that 'there is no such thing as bad

weather, only bad clothing' (Green Light Trust Accessed March 2009) is likely to have contributed, it is argued that the children perceived of Forest School as a time and place where they were 'allowed' to be wet or muddy. In a literal sense they were allowed by their teachers (and by their parents) to get muddy at Forest School. During the normal school day the teachers actively prevented the children from getting wet or muddy and outside of school many of the children did not want to make extra washing for their parents. However this sense of being allowed ran deeper, the children appeared to psychologically permit themselves to get dirty, wet and cold at Forest School; the internalised negative perceptions of bad weather, mud and dirt were, temporarily, no longer a perceived barrier to physical activity and enjoyment.

10.7.7 Contextual perceptions of the forest

As is suggested in the previous section, the results of this research suggests that the interpretation and experience of place is variable depending on the circumstances of use; that certain spaces can be interpreted in different ways at different times depending on a number of factors, including the activity being undertaken or by the company with which the individual uses the particular place. This variability was demonstrated during the children's discussion of their perceptions of the forest.

The children indicated that they had contextualised perceptions of the forest which bordered the village (and of which the Forest School site was a part). These perceptions, which were related to the different types of use, were dualistic and in some senses contradictory. A single forest was, on the one hand, a scary place, associated with drug use and a murder, and was out of bounds for many of the children in their free time. But, on the other hand, the forest was also a place of fun, enjoyment and creativity, a place in which they could run, build dens and play with their friends. Similar contradictory perceptions of forests and woodlands were identified and discussed by Hart (1979).

The children had good reason to feel afraid in the forest. Rather than the imagined 'bogey man', a murder, hung cats, drug use and other serious anti-social behaviours were associated with the forest and the area around it. It could also be argued that the children's relative lack of experience and knowledge also contributed towards their negative

perceptions. Take, for example, Terry's concern that the children were vulnerable to attack by badgers or foxes while in the forest. Furthermore woods and forests are widely perceived to be 'places of fear'. Jones and Cloke (2002) suggest that these fears are associated with what the forest or wood might conceal, such as criminals or, reflecting Terry's concerns, dangerous animals. The forest, according to Jones and Cloke, invokes the deeper, almost primeval fear of getting lost. Bell (1997) argued that perceptions of the forest or wood as a frightening place are reflected in cultural traditions; evident across time and cultural genre, and are manifest in centuries old folk tales to modern horror films. Considering these cultural and social influences with the serious anti-social behaviour it is unsurprising that the children reported feeling afraid in the forest. However, many stated that they *did not* feel afraid during Forest School sessions. The forest, during the Forest School sessions, was typically no longer the dark, scary and often threatening place it otherwise was.

The children indicated that there were several reasons why they did not feel scared during the Forest School sessions. The actions of, and the children's relationships with the leaders of Forest School, who they trusted and thought would be able to protect them (from various threats including other users and physical dangers (e.g. discarded drug paraphernalia)), were contributory factors. Forest School processes, in particular the regular reinforcement of the boundaries of the site (both physically and conceptually) appeared to have also contributed to the children's greater sense of security in the forests during the Forest School sessions.

One could also argue that the sustained and regular nature of Forest School promoted these more positive perceptions of the forest. As the children became more knowledgeable about their local environment they became more confident. The forest of eerily snapping twigs and dark impenetrable thickets became the place where they had hid during hide and seek or found materials for an art work. The children may have also developed a sense of ownership of the environment; they had, after all, spent considerable amounts of time in the forest and were partly responsible for its transformation from a small forgotten piece of plantation forest to a site with a base and numerous dens and permanent pieces of art. It is argued that the development of a sense of ownership of a particular environment may reduce the likelihood of anti-social behaviour as people naturally want to protect and use what they own (National Centre for Injury Prevention and Control 1993). The transformation of the forest appears to have had wider impacts; anecdotal evidence (personal communication with

Forest School leaders) suggests that the rates of antisocial behaviours in the forest had decreased since Forest School had begun.

Finally one could also speculate that the children felt more comfortable and confident in the forest because of the clearly defined, both conceptually and physically, nature of Forest School. As mentioned earlier, physically, the site was well defined and these boundaries were reinforced regularly. The children may also have felt that their presence in and use of the forest was clearly defined and importantly, 'legitimate', they were protected, perceptually, by their status as Forest School participants and, physically, by the Forest School leaders. Previous research has suggested that children and young people are often considered to be 'illegitimate' users of green spaces; their presence and activities are considered by various other groups within society (including young people) to be problematic (Bell, et al. 2003; Jones 2000). Through the development of their 'ownership' of the site and the legitimacy of their use, other users (for example the quad bikers and dog walkers) became to be seen as illegitimate and contested. However outside of the Forest School sessions the children lost this status of legitimate and primary users; the result of which was that the forest reverted back to being the frightening, risky and uncertain place.

10.7.8 Positive experience of using woodlands and forests in childhood promotes adult use

This research has indicated that Forest School provided the children with a regular, enjoyable and positive experience of the outdoors which was inherently physically active. Positive experiences of green space in childhood and adolescence are argued to have a bearing on perceptions and usage in adulthood (Lohr, et al. 2000). Frequency and quality of childhood visits to woodland and forests has been shown to be significantly associated with adult perceptions and usage (Bingley and Milligan 2004; Ward Thompson, et al. 2008).

While it is not possible to comment on whether Forest School has had any lasting impact on the children who took part in this study, they did develop more positive perceptions of the forest environment. The children also indicated that they used the forest more frequently since beginning the Forest School programme. While the link maybe entirely spurious, and related more to their increasing age and greater freedom to use their local environment, it is

possible that Forest School increased their confidence and desire to visit and use the forest. Perhaps these positive experiences will have an impact on their perceptions and use of forests as they mature and become adults. The need to investigate the long term impacts of participation in Forest School is discussed in a later section 10.11.3.

10.8 *The relationship between gender and the physical activity at Forest School*

The relationship between gender and the patterns of physical activity in the various contexts of this study has been noted throughout this discussion.

The results of the first phase of this research showed that the girls were significantly less active than the boys during their typical school days; conversely, on the Forest School days there was no significant difference. It was suggested, in section 10.7.1, that the greater space in the forest environment may be related to this finding and, in section 10.6.2, that the girl's apparent greater motivation to be active at Forest School may also be a factor. Furthermore there was evidence that the often negative impacts of self-perceptions of the girls were not as relevant at Forest School in comparison to other contexts (see section 10.6.2). However the findings of phase two suggested that a further important contributory factor may be that the Forest School activities had not been 'gendered' (i.e. they had not become commonly associated with one or other of the genders). This is discussed in the following section.

10.8.1 *Forest School and gendered activities*

It was expected that there may have been some gender-based differences in the way that the children experienced Forest School. Outdoor environments are, after all, often perceived to be 'male domains' (Culp 1998; Humberstone 1993). The types of activities which people typically do in the outdoors may also be described as relatively masculine (Neill 1997). These activities often involve dirt, danger or daring, attributes which, rightly or wrongly, are more commonly associated with the male gender. The author herself, on reflection, also held these gendered perceptions (both in relation to outdoor activity as well as physical activity more

broadly), she expected certain responses from either gender and was surprised and commented when findings were contrary to her presumptions. This highlights the point that must be acknowledged, that the results discussed in this chapter are the interpretations of the author herself, they are, therefore, influenced by her preconceptions, personal assumptions and by wider factors, not least her own gender and status as a researcher interested in 'gender related issues'.

The association of certain physical activities with a particular gender can have negative impacts. Biddle et al. (2005), in both a systematic review and primary research, found that children (and presumably adults) are conscious of the relationship between certain sports and physical activities and concepts of masculinity and femininity. The authors suggested that girls are often reluctant to take part in 'masculine' activities, partly because they feared being identified as masculine. For some girls, participation in masculine activities could theoretically threaten their, or others', perceptions of their gender identity as 'feminine'. Girls' reluctance to take part in 'masculine' activities was also found to be relevant in the field of outdoor education (Rickinson, et al. 2004). As Rickinson et al.'s review found (2004), elements of feminine culture can affect girls' ability to enjoy outdoor education and activities. Many girls, and it could be argued wider society, appear to have the perception that to maintain their gendered identity they are supposed to avoid dirt and to stay clean; an aim which is difficult to achieve during many types of outdoor education and in particular during Forest School (Biddle, et al. 2005 p100).

In general both the girls and the boys who participated in the present study did appear to have gendered opinions of certain sports and activities which were in line with the findings of the research discussed above. Gender was associated with ability, physical activity choices, and the perceptions of certain physical activities and the people who took part in them.

Taking this into account it had seemed likely that the children would have considered Forest School to be 'masculine' or that there would have been some gender based differences in the children's perceptions of Forest School. This was not the case; almost none of the children made any comments which indicated that they thought that Forest School, or any of the activities they did there were 'masculine'. Forest School appeared to be enjoyed in a similar way by both the males and the females. Both the boys and the girls appeared to think that they were capable of the various activities; furthermore, no comments were made by

members of either sex as to the abilities of the other gender during Forest School. There was very little indication that the girls were reluctant to take part in the types of activities which others may call masculine or, for the most part, to get dirty. The only notable comment was made by Chloe who explained her reluctance to get dirty by stating this was because she was a 'girly girl'. This suggests that she associated getting dirty with masculinity and staying clean with femininity.

10.8.2 Why were the Forest School activities not gendered?

Again, there are likely to be many, complex, multi-factorial reasons why Forest School had not been gendered by the children. The data collected during the present study suggests that the following factors may have contributed.

Few of the children reported that they had had much experience of physical activity in the outdoors. It is possible that this lack of experience meant that the children had not associated the Forest School activities with either masculinity or femininity in the way that they had for more common activities, such as those of the playground. However this is not thought to be particularly likely; as it is not only through direct experience that people develop gendered perceptions. Gender refers to the *social* and *cultural* interpretation of sex and the roles and expectations associated (Macionis and Plummer 1997). Inherent within these interpretations are stereotypical associations of certain characteristics, behaviours, desires and states that are commonly associated with either gender. For instance, as has been suggested earlier, the outdoor environment and the types of activities undertaken there are often associated (in our western culture) with masculinity (Culp 1998; Humberstone 1993). It is therefore unlikely that these children were wholly unaware of such associations, a suggestion which is supported by Chloe's comment (detailed in the previous section) regarding her dislike of mud due to her 'girly' status.

As argued elsewhere the greater space, time and freedom at Forest School may have reduced the likelihood of the conflict between the genders. The Forest School spaces were not defined by pre-existing gendered socio-cultural 'rules' or expectations. Neither gender dominated the space, similarly the children were unable to play the heavily gendered games (for instance football) while at Forest School. Further, the activities and games at Forest School

appeared to be somewhat gender neutral; they had not been appropriated by one or other gender.

One could also argue that the competitiveness which the children displayed during many of the activities may have affected the implications of gender at Forest School. From the researcher's understanding of the Forest School movement, competitiveness is not an inherent or particularly welcome aspect of participation. However, the researchers observation of, and participation in Forest School indicated that the children would, in general, find some way of competing against their fellow participants during many, if not all, the activities at Forest School. This competitiveness was obvious and overt during the active games such as capture the flag, but was relatively subtle during activities such as creation of the sculptures. The children would compete to build the biggest, the best or the most complex sculpture. It is possible that girls, not wanting to be seen to 'fail', or be 'girly', or to lose out to the boys, threw themselves into the activities, regardless of (or perhaps because of) the possible masculine associations, or the threat of getting dirty or wet, in their efforts to compete. Neill (1997) discussed similar motivations amongst females during other forms of outdoor education, suggesting that triumph in such situations may represent a greater sense of achievement than it would for males.

10.8.3 Might the explanation lie with the boys?

The previous sections have attempted to begin to find explanations for the relatively equal levels of physical activity between the boys and the girls on the Forest School days. This discussion has tended to focus on the girls, on the reasons why they increased their levels of physical activity or had more positive perceptions. This perhaps reflects the broader 'problematising' of girl's physical activity and presence in the outdoors (Culp 1998; Humberstone 1993).

However, it is possible that the reasons may lie with the boys; it would be erroneous not to consider, in greater detail, the boy's physical activity and perceptions. One could ask why did the boys not increase their level of physical activity to a similar degree as the girls? It may be that the children could only be active to a certain degree at Forest School, and as the boys were significantly more active than the girls during the typical school days, their

percentage increase was less than that of the girls. Or perhaps it is possible that the boys were prevented from being as active as they may have wished in some situations at Forest School, this may therefore have contributed to the more equal levels of physical activity. A number of the boys did comment that one of the worst aspects of Forest School was when they were prevented from being physically active. However observation (by the researcher) of the Forest School days indicates that it is likely this explanation played a very minor part in the relatively equal levels of physical activity. No other explanations relating to the boys activity emerged from the data. This suggests that the greater focus on the girls and their perceptions is justified in the attempt to understand the results.

10.9 *Placing these results into the wider literature*

The final section in the discussion of the results attempts to situate the current research against previous relevant literature.

It proved almost impossible to find studies against which the results of this research could be directly and meaningfully compared. Few outdoor education programmes have been evaluated in this manner; it seems that the potential outdoor education has to contribute to the health agenda has, possibly, been somewhat overlooked (Rickinson, et al. 2004). Just one comparable study was found. A research note which detailed the results of study of outdoor education in Denmark (Mygind 2007). The author reports that the students' levels of activity (which were also objectively measured using accelerometers) were greater during the outdoor education sessions in comparison to the activity during their normal school days. Mygind's results certainly correlate with the results of the present study. Suggesting that education in the outdoors, in its various forms, does indeed result in increased opportunities for physical activity. However the comparability of the study is limited by a number of factors; first, it took place in Denmark, a context which may not be comparable; second, the author did not examine the children's perceptions of the physical activity; and third, Mygind did not explore the potential factors behind the increased levels of physical activity.

It also proved to be difficult to draw firm conclusions as to whether the levels of physical activity, of the children who participated in this study, were comparable to the wider population of 9-11 year olds. This was due to differences in the measurement protocol

during the first phase and that of other studies. A further complicating factor was related to the interpretation of the accelerometry data, this is discussed in more detail in the 'limitations' section (10.11.2). However the indications are that these children's general levels of physical activity were similar to those of other children of their age. For instance the results of Ridger et al.'s (2005) research into levels of physical activity amongst British school children (of a similar age range) during break times correlated closely with the results of this study. Furthermore the children's levels of physical activity during the PE lessons were found to be similar to those reported in two previous studies (Fairclough and Stratton 2005; Waring, et al. 2007). It is therefore concluded, with as much confidence is possible, that these children's levels of physical activity on the typical school days were 'normal'.

10.9.1 Do these findings corroborate or contradict the findings of previous evaluations Forest School?

Few of the previous evaluations of Forest School had any real focus on the physical activity the participants engaged in during the sessions, furthermore there was no focus on the perceptions of that activity (see section 3.2). Despite this a small number did comment upon the levels of physical activity during Forest School.

Davis and Waite (2005) commented that children who participated in Forest School were 'very active'. They did not, however, present any evidence to support their comment. Borradaile (2006 p25) also stated that the children were active 'for a lot of the time' during Forest School sessions and, more specifically, active for 'over 75% of the time' (there is, again, no evidence to support these findings and no suggestion of how these findings were arrived at other than informal observation). Whilst this research agrees with the finding that the children were active for 'a lot of the time', the results of this research do not support Borradaile's assertion that they were active for at least 75% of the time. The children who participated in this research (who attended one of the Forest Schools which Borradaile evaluated) were active (to at least a light intensity), on average, for 60% of their time at Forest School. This is considerably less than the 75% suggested by Borradaile. The disagreement between Borradaile's conclusions and the results of the present study, highlight the need for rigorous and objective measurement of the phenomenon under consideration during evaluations.

Just one of the previous evaluations had objectively measured participants' physical activity during Forest School sessions (Maynard 2003). Despite the differences between the studies (see section 3.2 for a description of Maynard's evaluation), Maynard's results will be discussed in relation to the results of this current study.

The researchers, who carried out the assessment of the physical activity for Maynard's evaluation (Kingsley and Dietzig 2003), concluded:

- the majority of the physical activity during the Forest School sessions was intermittent and the children sustained physical activity at a moderate and vigorous intensity for only short periods of time;
- the majority of the physical activity on the Forest School days was of a low intensity; and
- the average energy expenditure was similar on the Forest School days to the normal school days.

The results of the present study (which can be found in chapter 6) confirm the first of Maynard's findings, as do numerous other studies of children's physical activity (Bailey, et al. 1995). The children's activity was sporadic and although the children did achieve some bouts of continuous MVPA, these accounted for an insignificant proportion of the day.

As heart rate monitors were used to assess the intensity of the physical activity in the Maynard evaluation it is inappropriate to directly compare Maynard's results with the results of the present study, which used average accelerometer count to indicate intensity. However the results do seem to correlate with Maynard's second finding. The present study found that, on average, for 75% of the time the children were at Forest School their physical activity could be described as either light or sedentary intensity (41% sedentary intensity; 34% light intensity). This appears to confirm Maynard's second finding; that the majority of the children's physical activity on the Forest School day was of a low intensity.

Finally, the findings of the present study do not agree with the third conclusion drawn by Maynard. It was quite clear, and was confirmed by statistical tests, that the children who participated in the present study, engaged in significantly more physical activity, at a higher intensity, on the Forest School days than they did during the two typical school day types. The differences were considerable. For instance the children accumulated 3.1 times more

minutes of MVPA on Forest School days in comparison to the PE days, and 4.4 times more than during the normal days. This finding clearly indicates the scale of the difference in the levels of physical activity between the Forest School days and typical school days.

There are likely to be numerous reasons why the present study did not confirm Maynard's third finding. The difference may be due to the fact that the children in Maynard's study were in the early years of their schooling (four to five years old). It is possible that children of this age are more active during their normal school day than older children, who are expected to sit still at their desks for a greater proportion of their time. One could also argue that Maynard's results may not be reliable; in particular it appears that no repeated measures were taken to ensure that the results were representative of the children's levels of physical activity in either context. It is possible that the days on which the physical activity was measured were not representative of the children's *normal* levels of physical activity. A simple factor such as the state of the weather may have resulted in significantly different levels of activity than was usual. Finally, it is likely that much of the variation is due to differences between the respective Forest Schools and the activities and the environment in which they took place.

The differences in the results between this and the other previous evaluations of Forest School (Borradaile 2006; Davis and Waite 2005; Eastwood and Mitchell 2003; Massey 2005; Maynard 2003; Murray 2004; Murray and O'Brien 2005; Swarbrick, et al. 2004) have retrospectively justified the need for the present study and the approaches used. It has also highlighted the value of using reliable tools and rigorous research methods to enable one to draw reliable conclusions regarding the phenomenon in question.

The variation in results between this and Maynard's study indicates that there is likely to be variation between other individual Forest Schools. This has two implications, firstly, that this further evaluation of the physical activity at Forest School was justified. Secondly, it has implications for the generalisability of the present study – if there is such a variation in the levels of physical activity between these two Forest Schools then there is likely to be further variation between these and other Forest Schools. However, it was valuable to recognise that there are likely to be variations in the levels of physical activity at individual Forest Schools. Perhaps if individual Forest School leaders are interested in increasing the health benefits of their Forest School they could identify Forest Schools, such as the school in the present

study, which resulted in relatively high levels of physical activity, and draw on their techniques.

10.10 Conclusions

In this chapter it has been argued that Forest School is a valuable source of school based physical activity insofar as the children engaged in significantly higher levels of physical activity than they did during typical school days. Furthermore, despite significant differences in the levels of physical activity between the genders on both the two control day types, there was no significant difference on the Forest School days. The reasons why the children were more active were explored; greater opportunity, higher motivation and the impact of the forest environment, in particular the physical space and the children's' conceptions of place, were argued to be key factors.

It was also argued that Forest School provided the children with a regular and safe experience of physical activity in local green space; an experience which avoided many of the existing barriers to children's use of such places. Outside of Forest School few of the children had many opportunities to use these places. It was suggested that Forest School may have far-reaching impacts; by promoting the enjoyable use of the outdoors in childhood, these children may grow to become confident users in adulthood.

10.10.1 What this study contributes to the current understanding of the impacts of participating in Forest School

Prior to this research there was no previous rigorous or detailed examination of the physical activity which results from participation in Forest School. While one previous evaluator (Maynard 2003) did use objective measures to evaluate the levels of physical activity during Forest School sessions, the subject numbers were small and little statistical analysis was carried out. Other evaluations merely commented, without any evidence other than casual observation to support the claims, that the participants were 'very active' at Forest School. The present study, therefore, is the first to rigorously investigate the actual amounts,

intensity and duration of participants' physical activity during Forest School sessions. This research is also the first to investigate, in depth, the experience of the physical activity at Forest School from the participants' perspective. Finally this research has highlighted the need for the use of appropriate methods during an evaluation, particularly when the aim is to make judgements regarding the benefits of programmes such as Forest School.

10.10.2 What this study contributes to the understanding of the benefits of outdoor education

It is also argued that this study contributes to the understanding of the benefits of outdoor education. Although the potential for educational, behavioural, social and psychological benefits of outdoor education are widely accepted, few researchers have considered the potential benefits to health and wellbeing (Rickinson, et al. 2004). In particular few studies were identified which had sought to assess the value of outdoor education to physical wellbeing and development or which had assessed the levels of physical activity amongst those who participate. This is one of the first studies, therefore, to rigorously quantify the levels of physical activity and to explore the perceptions of that activity during an outdoor education programme. The results of this study may be helpful in the promotion of education outside of the classroom.

10.10.3 Contribution to theory

Mason argued that research should not be a-theoretical; any social research should have wider relevance to an explanatory body of knowledge or social interpretation (1996). The development of theory represents an attempt to develop a systematic understanding of the particular aspect of the world which has been investigated (Hondriech 2004). Rather than creating predictive models, social theories can be seen as 'integrated clusters' of explanations or concepts (Layder 2005 p15). Following Mason's argument, the following section details the contribution of this research to various theoretical understandings of children's physical activity, their use of space and perceptions of place.

The complexity of children's physical activity

As has been noted previously (and will be discussed further in section 10.10.4) children's physical activity behaviours are complex (Kohl, et al. 2000). They are the result of a complex interplay of various determinates, typically these are argued to include physiological, environmental, and psychosocial/socio-demographic factors, which each have varying degrees of influence (Lindquist, et al. 1999).

This research, which has focused in some detail on the physical activity behaviours, patterns and perceptions of a small group of Scottish children, supports the argument that determinates of children's physical activity are complex. In particular the results showed that the children's physical activity was influenced by psychological factors (for example perceptions of 'bad weather'), socio-cultural factors (for example the gendered use of space), and certain ecological factors (for example local crime levels). However the results suggest that these factors must not be considered in isolation of each other and that the influence of the various factors is contextual. In certain contexts certain factors were more or less influential than in other contexts. While perceived 'bad weather' was a barrier to activity in many situations it was not at Forest School; conversely, in that context, it could be argued to have been a motivator of the children's physical activity. Similarly the influence of the local crime levels on the children's physical activity was dependant on context. Certain aspects of Forest School, including the clear boundaries to the Forest School site, the protective role of the leaders and the children's perceptions that they were the 'primary' users of the site (and, therefore, other users were contested), lessened the impact of crime levels on the children's physical activity in that particular context.

Understanding the concept of 'place'

It is argued that this research also contributes to the theoretical understanding of the concept of 'place'. In section 10.7 'place' was defined as physical space which is interpreted, invested with meaning and which is subject to constant revision (Gieryn 2000).

It is suggested that Forest School is itself a 'place'; it is both a physical place, situated in a forest with physical boundaries and structures, but it is also a space which is defined by the children's experiences, perceptions and expectations, it is a place with a distinct social and cultural meaning. The results of this research suggest that Forest School was distinct from the forest it inhabited; indicating that single spaces can simultaneously be different 'places', or, to put it another way, a single space can have multiple, contextual 'layers' of interpretation and meaning. The children's seemingly contradictory perceptions of the forest support this suggestion. For these children the forest was a forbidding, dangerous place where they felt threatened by other users and scared of the sound of snapping twigs, yet it was also a place of fun, where they ran around and climbed trees, a place where they felt protected and safe.

Bound into the individual's interpretation of a place are assumptions about expected behaviours; what is acceptable in one place may not be in another. For instance Forest School was interpreted to be a place where the children could be physically active (by both the children and by the teachers and Forest School leaders). As was described in section 10.7.2 the physical space it occupied afforded many opportunities for physical activity. The children had the space and opportunity to run, climb, build or jump in a puddle. However Forest School was also a place where the children were not bound by the socio-cultural behaviour norms which were evident in certain other places, such as the school playground. This point was especially relevant for the girls. Factors which limited the girls' activity in other places and at other times, such as their marginalisation in the playground, were either avoided or were not as relevant or influential at Forest School. Furthermore there was evidence to suggest that Forest School was a place where the girls were less concerned with maintaining a stereotypically feminine gender identity. Whereas in other places, for instance the PE hall, the girls were conscious of the impact physical activity would have on their gendered identities. It is argued that the interpretations and meanings of 'place' are crucial to understanding these patterns of physical activity, as other factors, which may also have influenced the children's activity, such as the wider socio-cultural context and the peer group, were constant between the various places of this research.

Affordances

Finally this research is argued to contribute to the further understanding of the concept of the 'affordances' of the natural environment (Gibson 1982; Heft 1988). Comparison of the two key environments of this research (first, the forest, and second, the school) suggests that certain environments do afford greater opportunities for physical activity and play than others.

As was discussed in section 10.7.2 the spaces in which the children could be active in the school setting were cramped and restrictive, limiting the rates of participation and the range of activities. Furthermore certain children interpreted these environments to offer little opportunity for physical activity. Conversely the forest environment afforded greater opportunities for physical activity. Physically the space and the characteristics of the site (the small trees, open spaces, ditches and mounds) provided an environment in which higher levels of physical activity and a greater range of different types of activities were possible. However, in contrast to the typical school environments, the children also interpreted the forest environment as providing opportunities for physical activity. The children discussed the Forest School site in terms of the opportunities it offered, for example the small trees which could be bent over to make a roof for a den or the larger trees which could be climbed.

Towards a theoretical understanding of the relationship between Forest School and physical activity

As the previous discussion has indicated those factors discussed above (the complexity and interaction of the determinants of children's physical activity, concepts of place and the affordances of the natural environment) should not be viewed in isolation, instead, it is the authors opinion that they should be considered to be complimentary and to interact with each other.

It is suggested that using the discussion detailed above one can begin to build an understanding of the multi-factorial relationship between Forest School and physical activity:

1. The physical environment in which Forest School took place appeared to be related to the children's physical activity; the forest afforded many opportunities for activity.

2. The social and cultural environment of Forest School also contributed to the patterns of physical activity; factors which limited the children's activity in other contexts, for example the threat of bad weather or mud or the dominance of certain spaces by a particular gender, were not relevant at Forest School.
3. The practices and policies of Forest School contributed to the patterns of activity; the emphasis on enjoyable activities, on including the child in the decision making processes and the, arguably, more equitable relationship between the adults and children promoted the greater participation and more positive perceptions of the activity.
4. The interpretation of the Forest School as a place where the children could be active also contributed to the patterns of activity; this was particularly evident amongst the girls, who appeared to feel that participation in the Forest School activities would not negatively affect their gendered identities.

It should be noted that it was not the intention of the author to attempt to develop a predictive theory of the impact Forest School has on physical activity perceptions and participation; as Strauss and Corbin suggested, theories built from small scale studies, and especially those with qualitative methodologies, can be specific to a setting and difficult to apply elsewhere (Strauss and Corbin 1994). It is acknowledged that the small size of this study and the nature of Forest School limit the wider applicability of the argument. A particular issue relates to the variability of Forest School (between the setting, ethos and practices of individual examples) and the (likely) variability of experience of those participating. Furthermore factors such as the age of participants, their geographical location (e.g., rural/urban), their prior experience of the natural world, or the wider socio-cultural contexts, are likely to have an impact on the results of participation in Forest School. Therefore one should be very cautious in applying the theoretical argument developed above to another situation, or indeed to a different group of children participating in the same Forest School.

10.10.4 Why this study cannot draw stronger conclusions

Although this research has come to a number of conclusions regarding the impacts and outcomes, and therefore the value, of participating in Forest School it has been stated that the causal mechanisms behind these conclusions cannot be teased apart. This caution in coming to more definitive conclusions as to the consequences of participating in Forest School is due to three factors; first, the study design used in this research; second, the attempt to maintain good research practice; and third, the nature of the phenomena under investigation.

Study design

As will be discussed in the section detailing the limitations and strengths, this study was small scale and cross sectional. The use of this approach means that the research cannot investigate causal mechanisms or comment on long term impacts (Bryman 2001). Therefore, while reliable conclusions can be drawn regarding the patterns and perceptions of activity at this particular Forest School, because factors such as a longitudinal design or a greater number of (ideally randomised) participants were not employed, the author cannot comment on whether participation will result in *changes* to physical activity behaviours or attitudes. Likewise it cannot definitively indicate *why* the children increased their levels of physical activity at Forest School.

Good research practice

This point is inherently associated with the comments made in the preceding section; that one must ensure that the research design and methods are appropriate and adequate to support the conclusions one has made (Blaikie 2004). Whilst the author has strengthened the reliability of the conclusions by providing clear description of the design, methods, sampling and analyses, and through this process, acknowledging the limitations (in a literal sense – acknowledging what can and cannot be concluded from the results) of the study, she has

been cautious not to draw any conclusions which are not supported by the findings (Denzin and Lincoln 2000).

Nature of the phenomenon being studied

The final point is one which has been made throughout this thesis; more definitive conclusions could not be drawn because the phenomenon under investigation, children's physical activity behaviours, are notoriously complex, multi-dimensional and multi-factorial (Lindquist, et al. 1999).

The motivations and determinates of human behaviour have long been recognised to be complex, influenced by numerous inter-related and interacting factors (Young 2007). Children's physical activity behaviours are similarly complex (Lindquist, et al. 1999 p305). The complexity of children's activity was highlighted by the authors (Kohl and Hobbs 1998) of an influential meta-analysis of the correlates and determinates of children's physical activity. Kohl and Hobbs (1998 p553) concluded, 'a variety of factors are potentially determinates of physical activity behaviours in children... physiological, environmental, and psychosocial/socio-demographic factors play a role in influencing physical activity behaviours...'. Further studies (Broderson, et al. 2005; Lindquist, et al. 1999) have built on the findings of Kohl and Hobbs' meta-analysis, and have developed a four category model of the determinants and correlates of children's physical activity: first, physiological factors (including health and development) have been shown to be associated with children's physical activity. In particular pubertal stage and physical health have repeatedly been shown to be related to physical activity behaviours (Kohl and Hobbs 1998; Lindquist, et al. 1999). The second set of factors are psychological; children's motivation, self-perceptions and self-efficacy are associated with participation in physical activity (Lindquist, et al. 1999). Third, relationships have been identified between certain socio-cultural and socio-demographical factors, including family characteristics, economic status and peer influences, and physical activity attitudes and behaviours (Kohl and Hobbs 1998). Finally, a wide variety of ecological and environmental factors are associated with children's perceptions and participation in physical activity; factors as diverse as weather patterns, time spent in the outdoors, crime levels and school physical activity policies (Ferreira, et al. 2007; Kohl and

Hobbs 1998). That these factors are not independent of each other adds to the complexity of understanding children's physical activity: as Kohl and Hobbs suggested, 'in all likelihood, these factors interact in various forms to potentially 'cause' a physical activity behaviour'(1998 p553).

It is highly likely that the physical activity behaviours of the children who participated in the present study are equally as complex. While this research was not designed to investigate any potential physiological or certain socio-demographic factors (though it is acknowledged that these factors are likely to have been equally as influential), it was concluded that a number of psychological (e.g. motivation and self-efficacy), environmental factors (e.g. access and use of outdoor spaces and the school's physical activity policies) and social-cultural factors (e.g. perceptions of gender) had influenced the children's physical activity behaviours in the different contexts. Furthermore there was evidence to suggest that these factors were interacting, for instance certain psychological factors had varying levels of influence when related to certain environmental factors. An example of this complexity is demonstrated by point that the girls reported greater motivation to be physically active in the outdoors, however in other environments, such as the playground or the home they were less motivated. Despite this greater motivation their ability and desire to use the outdoors for physical activity was affected by their gender, parental influences and crime levels. This example illustrates the point that one cannot view the various factors (associated with physical activity behaviours) in isolation; behind each child's behaviour is a interconnected matrix of factors which act to facilitate, encourage or prevent physical activity, this matrix is multi-dimensional and contextual.

As this study did not make use of a more substantial controlled, randomised longitudinal design these factors cannot be teased apart to identify which are causally related to the patterns and perceptions of the physical activity in various contexts (though the author holds the opinion that due to the complexity of understanding such behaviours this may not even be possible). Therefore the conclusions which have been drawn regarding why Forest School resulted in greater levels of positively perceived physical activity are somewhat cautious and deliberately limited.

10.11 Discussion of the research, design, and methods

In the following sections the research, the design and the methods, are reviewed and discussed.

10.11.1 Use of mixed methods

The present study made use of a mixed method design, meaning that methods from both the qualitative and quantitative research paradigms were used. The use of mixed methods, it was argued (in section 4.6), is a philosophically and methodologically valid research approach and is frequently used in social, health and educational research (Bryman 2006; O'Cathain, et al. 2007).

Although this researcher is not convinced that there are real and fundamental differences between the two paradigms, a situationalist approach was employed during the present study; meaning that a particular method was chosen for its suitability to answer the particular research questions regardless of which research paradigm it originated from. As Creswell stated the aim is to, 'make the most efficient use of both paradigms in understanding social phenomena' (1994 p176). In common with most situational mixed method research, the methods from either of the paradigms were not mixed or consciously used for triangulative purposes; rather they were used separately to explore different questions. The findings from each phase were brought together during the discussion. For instance, findings from the first phase were referred to during analysis of the children's discussion of their perceptions of physical activity in different contexts.

The use of mixed methods was, in retrospect, necessary for the collection of valid, reliable and, most crucially, useful data. If only a single method design had been used it is likely that many of the findings of this evaluation would have been missed. For instance, while the first phase of the research revealed that the girls were significantly less active than the boys during the break times, we were no closer to understanding *why* the girls were less active. The use of qualitative research methods during the second phase, allowed for an investigation of the reasons for the lower levels of physical activity.

Therefore, it is argued that mixed methods were the most appropriate research approach for this study. Programmes such as Forest School are complex and have multi-factorial impacts and outcomes. This means that a multi-factorial research approach was required to fully explore and evaluate the physical activity at Forest School. The benefits of having used multiple methods are discussed further in the examination of the strengths of this study.

10.11.2 Strengths and limitations of the study

The particular strengths and limitations of this study are examined in the following sections.

Limitations

One of the primary limitations of this study was its small scale. Although the small scale had some benefits (discussed in the following strengths section) it means that the results are somewhat limited in their usefulness. The use of a single study school means that the results are limited in their generalisability and can only really *indicate* at the impact Forest School may have for other participants. While it is acknowledged that involving more examples of Forest Schools would have increased the value of this research, at the time this study was begun there were few Forest Schools in Scotland with sufficient participants and that could guarantee to be running during the data collection period. A number of other factors, including the short time period during which the accelerometers were available and the restricted access to the school (see chapter 4) contributed to the small scale of this research.

A further limitation of the study design is that it cannot indicate whether any change happened as a result of participation in Forest School. This study can only comment on the immediate impact of participating in Forest School on levels and perceptions of the physical activity. One of the reasons for this limitation was the lack of randomisation, particularly of those who participated. The reasons for this are obvious; the researcher was in no position to influence the provision of Forest School. However, it is acknowledged that a larger, randomised, study would produce more useful results. Despite the limitations of the results

of this study, it is possible that these findings could be used to inform future larger scale studies of Forest School.

One of the key methodological limitations of this research relates to the two self-perception scales which were used during the first phase. Although the scales indicated at certain patterns in the children perceptions, the findings were very broad and, upon reflection, unlikely to have much meaning. By asking the children to fill in the scales once before lunch time and then again at the end of school in the afternoon, the children had to make a broad, overall judgement of all the activity they had engaged in during the relevant time period. In retrospect the scales should, perhaps, have been used after the children engaged in specific physical activity, such as after a PE lesson or following the walk up to Forest School. This would have allowed for a clearer and more focused understanding of the children's perceptions of the activity they had just engaged in. On a more philosophical level the experience of using the two scales has further confirmed to the researcher that the more qualitative research methods are the most appropriate for accessing perceptions and experience. The objectivity of the scales is questioned as many factors are likely to have affected the responses given, boredom with filling in the scales included.

While the use of the accelerometers to objectively measure the levels of physical activity is strength, there are issues associated. Although the type of accelerometers used (Actigraph 7164) have been validated for the measurement of children's free living activity (i.e. children's normal everyday physical activity) (Ekelund, et al. 2001), it is recognised that they cannot measure the total range of the wearers physical activity. Accelerometers are unable to detect upper body movements and the effort from carrying, lifting, pushing or pulling heavy loads (Troiano 2006). This is particularly relevant to the present study as a considerable proportion of the children's activity involved upper body movement; the children were also observed carrying and lifting heavy loads. It is possible that the levels of the children's physical activity were underestimated in some contexts.

Accelerometers are considered to be one of the most objective and rigorous method (which can realistically be used by the non-expert researcher) for the assessment of the frequency, amount and intensity of physical activity. While they may record the counts of activity in a relatively reliable and objective manner, the interpretation of the data is not so straightforward. There is still indecision, amongst academics, as to which thresholds are the most accurate for the calibration of accelerometry data (see section 5.5.6) (Riddoch, et al.

2004). There are many sets of published thresholds which have been used in recent studies, some more conservative than the ones used in the present study, others less so. Aware of the variation in the published thresholds, the present study deliberately used a set of thresholds which were argued to be a pragmatic middle ground between previously published thresholds (Ekelund, et al. 2004). Despite this, one of the main results of the present study (the accumulated time spent at MVPA) does rest on the particular thresholds used. If the thresholds which were used are shown to be too low (which would, therefore, mean that the results are an overestimation of the number of minutes of MVPA) or even too high (resulting in an underestimation), the results of the present study may be flawed. This was, however, mitigated by the further analysis of the phase one data using a higher vigorous threshold (see section 6.2.5) and through a clear description of the methods and thresholds used, which, if needed, allows for re-interpretation of the results in the future.

The final limitations relate to the second phase of this evaluation. Whilst both the strengths and limitations of qualitative designs and methods were highlighted in a previous chapter, the potentially negative impacts on this study should be acknowledged here. Although paired interviewing is argued to be strength in the following section, the format does, potentially, have a number of drawbacks. In particular the dynamics within the pairs may have inhibited one or both of the children. It may be that the presence of the second child resulted in the children altering or modifying their responses to questions. This is an especially pertinent point, although the researcher guaranteed anonymity and confidentiality, she could not guarantee that the second child would respect the privacy of the other participant; perhaps the children did not want to make any controversial comments for fear of their opinions getting back to the class as a whole. This threat was evident during Harry and Luke's discussion of dancing. Luke altered his responses after negative comments by Harry. The impact of the researcher herself should also be considered; her age, gender, status and demeanour may have affected the dynamics of the interview and therefore the findings of this research (Williams and Heikes 1993). In particular the (pre-adolescent) boys may have felt less able to talk freely with the adult female interviewer, potentially negatively affecting the data collected. Finally it is acknowledged that certain commonly recognised strategies to ensure the reliability and validity of the qualitative results were not used. The failure to consult with a second researcher and to request their consideration of the appropriateness of the coding, analysis and interpretation, or to revisit the interviewees to ensure that the authors interpretation of

their words fits with their perceptions (Morse, et al. 2002; Patton 1987), limits the reliability and validity of the results.

Strengths

Despite the limitations, this study has certain strengths.

The primary strength of this study is that the most appropriate research methods were used to find reliable answers to the research questions. As was discussed in section 4.6 the methods were chosen for their suitability to investigate the issue.

The use of an objective tool to measure the children's physical activity is one of the key strengths of the present study. Accelerometers are recognised to be a practical, effective and relatively accurate way of measuring physical activity rates (Bassett 2000). While other methods, such as formal observation, may result in more accurate measurement of the levels of physical activity, these types of methods tend to be either highly time consuming, require specialised skills and resources, or are expensive and unrealistic for a small scale study. Furthermore the particular environment in which Forest School takes place, the forest, meant that formal observation would be almost impossible. The use of accelerometers means that the results of phase one are as accurate as was realistically possible.

Similarly the primary method used in the second phase of this research, paired semi-structured interviewing, could be argued to be one of the strengths of this study. Interviews are one of the most effective methods that a researcher can use to understand another's point of view, experiences, and opinions (Denzin and Lincoln 1998). whilst one-to-one interviews may be somewhat daunting for some children (Lewis 1992); this problem was overcome by interviewing the children in pairs, often of their own choosing. This, it seems, in the majority of the cases, gave the more reticent and shy children greater confidence. Furthermore the children were able to discuss points between themselves and were also able to challenge or elaborate on the others opinion. There were many occasions where the quality of the interview was improved because of the interaction between the children. However it must be admitted that on a couple of occasions the paired interviews may have reduced the quality of the information derived from the interview. One of the key issues with the group

interview format is that the participants are not necessarily equal in status or in ability to articulate opinions (Fontana and Frey 1998). This became a problem on one notable occasion; when one of the pair being interviewed ridiculed the other's (a boy) liking of dancing, this appeared to have had the effect of making the boy much more reluctant to say anything that may have been slightly controversial. Despite the occasional negatives, by interviewing the children in pairs the quality of the data is most likely to be much greater than if the children had been interviewed individually. The second issue with the interview is that keeping interviewees 'on issue' is often problematic, especially with subjects such as those which were the focus of this study. The children had most likely not thought much about the amount of physical activity they did at Forest School. By using a semi-structured form of interview the researcher was able to simultaneously allow the children the freedom to express their opinions while maintaining enough control over the direction to remain relevant and ensure the data was useful. The supplementary methods (where the children were asked to rank activities, either for preference or as to how risky they were) also helped to keep the children focused and interested during the interview.

Further strengths of this study are argued to be related to specifics of the research design, particularly that of the first phase. Firstly, the use of repeated measures increased the reliability of the results. Repeating the measures helps decrease the impact of secondary factors which could have affected the children's physical activity, factors such as weather or the variability of the activities the children did, both at Forest School and during normal school. For example, if the measurements of the activity on the typical school days had been taken just once and that day had happened to be very wet, the levels of activity would have been low and, therefore, unrepresentative of the children's 'normal' levels of activity. Averaging across the three days of measurement for each day type ensured that a more representative result was obtained. Secondly, the design of the first phase made use of controls. The two typical school day types (a day with no physical activity and a day with one PE lesson) acted as controls. The results from the Forest School day were compared against those of the typical school days. This put the Forest School results into context; the measurement of the activity on the control days indicated at the children's 'normal' levels of physical activity. When compared to the Forest School results the researcher was able to make judgements as to the impact and value of the Forest School activity and to its need.

Although it meant that there are certain limitations, the use of a single case study allowed for a detailed, in-depth and thorough investigation of the participants' levels and perceptions of the physical activity at Forest School. The single case meant that a good relationship was built between the participants, the school and the researcher. In particular, when issues arose with the data collection protocol, changes could be made quickly and easily, with as little disruption to any of the parties involved.

10.11.3 Suggestions for further research

Further to those previously detailed in this chapter, three suggestions are made as to how the physical activity at Forest School could be further investigated.

Use of longitudinal design

As has been suggested previously in this chapter, a more complete and effective evaluation of the physical activity at Forest School would use a longitudinal design. A well-designed longitudinal study, which ideally would be randomised, use adequate controls and most likely have a mixed method design, would allow the researcher to examine the long term impacts of participation in Forest School. Potential research questions which this design could investigate are:

(a) Does Forest School have an impact on the participants' use of green space?

It is hypothesized that positive experiences of forests and woodlands during childhood are positively related to adult usage. If this is true, Forest School may have positive long-term impacts. The children who were interviewed for this study indicated that their perceptions of their local woodlands were different while at Forest School than they were at other times. It would be interesting to investigate, using a semi-experimental longitudinal design,

whether experiences such as Forest School resulted in greater use of local green space including forests and woodlands in later life (Ward Thompson, et al. 2008).

b) Does Forest School have an impact on participants' physical activity patterns?

While this research showed that the children were more active on Forest School days than they were on normal school days, it can say nothing about whether participation affected the children's *overall* levels and patterns of physical activity. It is feasible that the children's confidence in using the local forests and woodlands for physical activity grew as a result of participating in Forest School. A controlled design, with data collection pre- and post-intervention, would allow the researcher to begin to understand the impact participation in programmes such as Forest School can have on physical activity behaviours.

c) Does Forest School have any impact on academic performance?

There is some evidence to suggest that greater amounts of physical activity during the school day is positively associated to academic achievement (Carlson, et al. 2008; Trudeau and Shephard 2008). It is possible that the physical activity aspect of Forest School is therefore, beneficial to the participants' academic performance. However, it could be argued that losing significant periods of 'formal academic learning' time to Forest School may have a negative impact on children's performance. Tracking the academic performance of children who participated in Forest School and comparing their progress against children who had not had the opportunity, would be one way of investigating the long term academic impacts of Forest School.

Examining the variation in experience between groups

Further research could also focus on the differences in experience between participants from different backgrounds or with different circumstances. This research focused on just one group of children who all attended the same school, it is likely that they had similar social-economic backgrounds and, to some extent, shared a common culture. Comparing and contrasting the experiences of participants from different socio-economic and cultural backgrounds would allow for a more complete understanding of the experience of Forest School. The experiences of children from different areas, geographically, as well as urban or rural, could also be investigated. It is likely that children, from different socio-economic backgrounds and from different areas of the country, experience Forest School quite differently. Alternatively it would be interesting and valuable to investigate any variation in experience between groups of children who share common characteristics, for instance levels of fitness, weight status or, and of particular interest, age. It is possible that such factors could have a considerable impact on the experience of Forest School and the resulting physical activity.

A greater investigation of the impact of gender

The third suggestion relates to the findings associated with gender. This study found that the Forest School activities had not been gendered; both the boys and the girls enjoyed the activities greatly, furthermore, the girls were almost as active as the boys. Further research into the physical activity at Forest School could explore the reasons behind these findings. For instance, it would be interesting to explore whether other outdoor based physical activity experiences have similar results; the researcher found no studies which had formally, using objective measures, assessed physical activity levels during outdoor education or activity sessions. If a longitudinal design was used, changes in the perceptions of, and levels of, physical activity could be tracked as the participants aged. This is important as it is widely accepted that the levels of physical activity, especially those of girls, falls sharply in adolescence and into adulthood.

10.11.4 Implications of this research for policy and practice

The thesis concludes with a discussion of the implications of this research. Seven possible implications were identified; these are detailed in the following sections.

Forest School could contribute to the public health agenda

This research has demonstrated that Forest School and, conceivably, some similar types of education in the outdoors, can be of benefit to participants' health and wellbeing. These benefits are additional to the positive educational, behavioural and emotional impacts highlighted in other research (Borradaile 2006; Davis and Waite 2005; Eastwood and Mitchell 2003; Massey 2005; Maynard 2003; Murray 2004; Murray and O'Brien 2005; Nicol, et al. 2007; Rickinson, et al. 2004; Swarbrick, et al. 2004).

The key finding which supports this claim, is that attendance at Forest School resulted in the children, on average, achieving and exceeding the recommend amount of physical activity for that day. The evidence suggests that even if the Forest School session took place over half the school day (as some Forest Schools do) the participants would still have accumulated significantly higher levels of physical activity. It should also be noted that there is potential for even greater levels of physical activity during Forest School sessions.

Forest School may represent a new approach to increasing children's levels of physical activity in the school setting

The majority of interventions which have aimed to increase children's physical activity levels in the school setting appear to have focused on the PE lesson or the break times (Hannon and Brown 2008; Ridgers, et al. 2007). However the time allotted to physical activity in the school setting, in particular physical education lessons, tends to be decreasing (Mallam, et al. 2003). Some researchers have argued that focusing on just the PE lessons or the break periods, is not enough, instead physical activity needs to be encouraged and integrated throughout the whole school day (Reed, et al. 2008).

Forest School could be one important approach to increasing children's levels of physical activity in the school setting. While this research has shown that the children are highly

active at Forest School, other, previous, evaluations of Forest School have indicated that participation also has potential educational benefits (improved language skills, more positive attitudes towards learning and through greater self-esteem and confidence) (Eastwood and Mitchell 2003; Maynard 2003; O'Brien 2009). The learning opportunities are *supplementary* to the physical activity. Forest School could represent a way of incorporating physical activity and learning, reducing the need to find alternative periods of time in which the children could be physically active, which potentially reduce 'academic' learning time.

Forest School has value as a source of physical activity

This research has demonstrated that Forest School also has particular value as a source of physical activity. Firstly, the children who participated were found to have been active at a relatively high intensity for prolonged periods of time at Forest School. Secondly, the children were observed, and reported, engaging in a variety of different types of physical activities. Finally, the children had overwhelming positive perceptions of the physical activity during Forest School sessions.

The majority of the children had positive perceptions of the physical activity they engaged in during the Forest School sessions: most of the activities were enjoyed by the children (there were of course exceptions). Providing children with an enjoyable experience of physical activity at school is an aim of the Scottish Government (Scottish Executive 2004 p27). Enjoyment of physical activity is also a correlate of children's physical activity (Sallis, et al. 2000). Therefore, Forest School could be used to give children an enjoyable experience of physical activity which may have further impacts on their physical activity patterns outside of school.

Forest School results in similar levels of physical activity between boys and the girls

Forest School resulted in similar levels of physical activity between the boys and the girls. This is important as it is commonly recognised that, in general, girls are less active than boys

(Biddle, et al. 2005; Sallis, et al. 2000). Forest School may represent a novel way of encouraging girls to more physically active.

Forest School provides positive experiences of physical activity in the outdoors

This study highlighted the importance of Forest School in providing a structured and regular experience of physical activity in the outdoors. Although the children appeared to have held positive perceptions of physical activity in the outdoors prior to attending Forest School, they had had little opportunity to use certain outdoor spaces. Attendance at Forest School was, therefore, for many of these children, one of their first experiences of physical activity in the outdoors outside of the confines of their village. Forest School also overcame a number of barriers, such as 'bad' weather and getting dirty, to the children's use of the outdoors for play and physical activity.

There was also some tentative evidence to suggest that participation in Forest School promoted physical activity in the outdoors; a number of the children reported that they had visited the Forest School site out of school time to play in their dens.

Forest School promotes more positive perceptions of local forests and green spaces

The evidence collected during this study suggests that participation in Forest School altered the children's perceptions of the local forests and woodlands.

The children had in, general, negative perceptions of much of their local area, including the forest in which Forest School took place; typically the children were worried about serious anti-social behaviour and the poor quality of the environment. However the children's perceptions of the forest while discussing Forest School were significantly more positive; while at Forest School the children reported feeling considerably more confident, safe and secure in the forest.

Furthermore, anecdotal evidence suggested that antisocial behaviours had decreased in the forest after Forest School had begun; the result of this may be that the particular forest will be viewed more positively as a place to use for physical activity and other leisure pursuits.

Forest School may promote the use of forests and green spaces in adulthood

It is hypothesised that participation in Forest School may promote the use of local forests, woodlands and other types of green space in adulthood. Evidence suggests that adult usage of these spaces is strongly correlated with childhood experience; those who had positive experiences as children are more likely to have positive perceptions and to use forests and woodlands as adults (Ward Thompson, et al. 2008).

The participants of the present study had very positive experiences of using their local forest and green spaces during Forest School. It is therefore possible that as adults the participants of the present study will be more likely to use their local forests and woodlands as a space for leisure and physical activity.

10.11.5 Policy

In conclusion the results of this research indicate that Forest School offers a practical means of achieving or contributing towards certain Scottish physical activity policy objectives. That the children achieved the suggested levels of activity means that Forest School could obviously contribute to the Scottish Government's physical activity recommendations (2002b). Furthermore Forest School could contribute to policies focused on increasing physical activity levels specifically in the school setting. There is currently an emphasis on finding new ways of increasing participation in school based physical activity, particularly for those who have been 'turned off sport'. Forest School fits well with the drive to support and encourage 'the provision of a wider range of activities, extending from the traditional' (Scottish Executive 2004 p22-23).

10.12 *A final summary*

The following quotes from children interviewed during this study summarise the findings of this evaluation and bring this thesis to a close.

Interviewer: So how much physical activity do you do at Forest School?

Sean: Lots.

Emma: Lots.

Interviewer: Lots?

Emma: Lots and lots and lots!

Interviewer: What do you think of the activity at Forest School?

...

Andrew: ... I just think it's amazing that we do it,

Interviewer: What do you like about it [Forest School]?

Jackie: Its fun, 'cos you get to run about up the forest.

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Appendices

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**Appendix one: Phase one parental covering letter,
information sheets and consent form**

Research Unit in Health, Behaviour and Change
Medical School
The University of Edinburgh
Teviot Place
Edinburgh
EH8 9AG
0131 651 1447

1/03/2006

Dear Parent/Guardian

The Evaluation of the physical activity of Forest School

I am writing this letter to request your consent for your child's participation in the evaluation of Forest School at....

I am a PhD student at the University of Edinburgh. The **Forestry Commission** and the **Central Scotland Forest Trust** have provided funds for me to evaluate the health and wellbeing benefits of Forest School to the children who participate. I will focus on the physical activity aspect of Forest School, looking at how much they do, what they do and how much they enjoy it.

Please find enclosed an information sheet with details of the research plan. At the end of the document is a consent form. Please take time to read though the information sheets and if you wish, discuss it with others or I can answer any questions you may have. Take time to decide whether you want your child to participate.

Please return the consent form to....

Thank you for reading this letter and the subsequent information sheets.

Yours faithfully

Rebecca Lovell

Parental Permission for Child's Participation in Research

INTRODUCTION:

These information sheets and consent form is to request your permission for your child's voluntarily participation in a research study entitled: "**Evaluating the physical activity impact of Forest School**"

Principal Investigator: **Rebecca Lovell**

Research Unit in Health, Behaviour and Change
Medical School
The University of Edinburgh
Teviot Place
Edinburgh
EH8 9AG
0131 651 1447

To be carried out under the supervision of:

Dr Richard Mitchell

Associate Director/Head of Risk & Resilience
Research Unit in Health, Behaviour and Change
The University of Edinburgh
Teviot Place
Edinburgh
EH8 9AG

Tel: (0131) 651 1283

STUDY SPECIFICS

1. PURPOSE OF STUDY AND RESEARCH PLAN:

I, Rebecca Lovell, am undertaking a PhD at the University of Edinburgh. The **Forestry Commission** and the **Central Scotland Forest Trust** have provided funds for the evaluation of the health and wellbeing benefits of Forest School. They are interested in what effects Forest School has on the children who participate. I am focusing on the physical activity the children do while at Forest School.

I am hoping to measure how much physical activity the children do while at Forest School and compare it with measures of physical activity at normal school. I would also ask the children to complete a short questionnaire at the end of the morning session and then again

at the end of the afternoon session. The questionnaire will ask the children how much activity they think they have done and how much they enjoyed the activity.

After the summer holidays I hope to do a number of focus groups with those who have been involved in Forest School and the study, in order to look at the longer term impacts of the physical activity at Forest School, you or your child maybe invited to participate. I will contact you later in the year regarding possible participation in the focus groups.

2. PROCEDURES:

On the days when I am measuring physical activity, the children will each wear a small device called an accelerometer. An accelerometer is a small watch sized instrument that is worn around the waist on a belt. Accelerometers are similar to pedometers but are able to measure a bigger range of movements; I can then download the information to a computer to see how much activity the child has done over the day. I will ask the child to wear the accelerometer for the whole day, I will give them to the children on Monday and collect them again on the Friday, it takes less than one minute to put on and take off the accelerometer. (I will give you and the child an information sheet about how to wear the accelerometers)

The children would fill in a short questionnaire about how much activity they did, how hard they thought they worked and whether they enjoyed the activity, once before lunch and then again when I am collecting the accelerometers in again at the end of the day. During the days the children are wearing the accelerometers and filling in the questionnaires I hope to attend the school in order to make a diary of the activities the children do though the day. This is so I will know what kinds of activities the children were doing when I download the data form the accelerometers.

I hope to measure the children's activity on three sequential days in a week (most likely a Tuesday, Wednesday (Forest School) and the Thursday) and I hope to do four sets of physical activity measurements in the spring and summer terms.

There are no risks to the children associated with this research. An accelerometer is simply a very sensitive pedometer; it is commonly used to get a good measure of overall movement and physical activity. None of the procedures in this study are experimental.

I have received enhanced disclosure from Disclosure Scotland (a requirement for working or researching with children; meaning that the police have checked for any criminal convictions) a copy of which can be viewed by contacting the research unit (address at the end of this information sheet).

3. BENEFITS:

It is hoped that this research will help bodies such as the Forestry Commission and the Central Scotland Forest Trust make decision on how to most effectively use educational resources. Other studies have focused on the educational and behavioural benefits of Forest School; this study is focusing on the benefits to the health and wellbeing of the participants, primarily those gained through physical activity.

4. CONFIDENTIALITY:

The study research records will be kept confidential and your child will not be identified in any written or verbal reports. The research records will be kept in a secured area and locked in a filing cabinet in my office. Only research personnel authorized by me will have access to these records.

5. CONSENT AND WITHDRAWAL:

**PARENT OR GUARDIAN: PLEASE INDICATE YOUR CHOICE BY INITIALING
ONE (1) OF THE FOLLOWING OPTIONS**

..... I **DO** give permission for my child to participate in the Forest School study

..... I do **NOT** give permission for my child to participate in the Forest School Study

Name of Child

.....

Signature of Parent of Guardian

.....

Relation to child

.....

Date

.....

If you have indicated that you give your consent for your child's participation in this study, it indicates that you have read the information in this document and are aware that you may ask any questions that you may have about the study and are aware that you can change your mind and withdraw your consent for your child to participate at any time.

Office use only

Signature of Investigator

.....

Date

.....

**Appendix two: Phase one children's information sheets,
consent form and accelerometer instructions**

Physical activity at school and forest school

How much do you do? How hard is it?
Do you like it?



Rebecca Lovell

The University of Edinburgh

Who am I?

I am Becca Lovell; I work at the University of Edinburgh.

What I would like to do with your class

I would like to find out how much physical activity that you do at school

Physical activity means things that make your heart beat faster and some times makes you out of breath, like running around, riding your bike, doing PE lessons or dancing

How I would like to do this

I would ask you to wear a little box on a belt around your tummy; the box is called an accelerometer. The accelerometer records every time you move; I can then download it on to the computer and make graphs out of the results. The graphs show me how much you have moved over the day. I would ask you to wear the accelerometer for the whole day

I would also ask you to fill in a question sheet that asks you how much physical activity you think you did through the day. It would also ask you if you enjoyed what you did. This will be very easy and there will be no hard questions.

You will also see me in all your classes; this is because I want to make a diary of what you do through your school day.

After the summer holidays I might ask you and your friends to talk to me about Forest School and the physical activity you do there.

How often will I come?

I will come and ask you to wear the accelerometers three times a week, three/four times in the spring and summer terms...

This part is for you to say whether you would like to be part of my project... please put a tick in a box

I WOULD LIKE to take part in the Forest School project

I DO NOT want to take part in the Forest School project

My name is

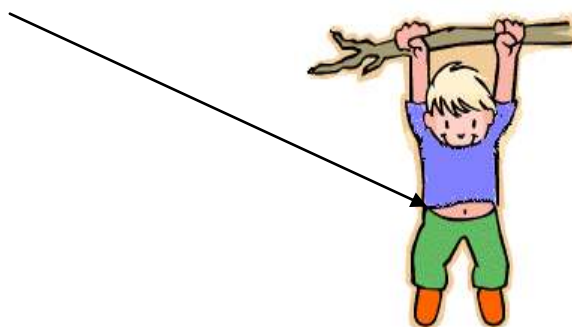
.....

How to wear the accelerometer...

It is really important to me that you wear the accelerometer in the right way

Here are the instructions for how to wear the accelerometer...

- Wear the accelerometer snugly on your hip; it can go either on top of or underneath your clothing. It should be worn on your **RIGHT** hip



- Put the accelerometer in the pouch so that the writing faces outwards and the side with the white label is against your body
- The little notch (just below the writing on the front) should point downwards, pointing towards your feet
- The belt can be made tighter by pulling on the ends of the straps or you can make it looser by feeding the strap back through the clasp. Please make it tight enough so the accelerometer does not move around too much

- Put the accelerometer on first thing in the morning and take it off just before you go to bed, please wear it all day
- *Remember it does not like getting wet so take it off before you have a shower or bath or if you go swimming. Please try to keep it dry!*



**Appendix three: Phase two parental covering letter,
information sheets and consent form**

Research Unit in Health, Behaviour and Change
Medical School
The University of Edinburgh
Teviot Place
Edinburgh
EH8 9AG

March 2006

Dear Parent/Guardian

The Evaluation of the physical activity of Forest School

I am writing this letter to request your consent for your child's participation in the **second phase of the evaluation** of Forest School at...

I am a PhD student at the University of Edinburgh. The **Forestry Commission** and the **Central Scotland Forest Trust** have provided funds for me to evaluate the health and wellbeing benefits of Forest School to the children who participate. I will focus on the physical activity aspect of Forest School, looking at how much they do, what they do and how much they enjoy it.

Please find enclosed an information sheet with details of the research plan. At the end of the document is a consent form. Please take time to read though the information sheets and if you wish, discuss it with others or I can answer any questions you may have. Take time to decide whether you want your child to participate.

Please return the consent form to...

Thank you for reading this letter and the subsequent information sheets.

Yours faithfully

Rebecca Lovell

Parental Permission for Child's Participation in Research

INTRODUCTION:

These information sheets and consent form is to request your permission for your child's voluntarily participation in the **second phase** of a research study entitled: "**Evaluating the physical activity impact of Forest School**"

Principal Investigator: **Rebecca Lovell**

Research Unit in Health, Behaviour and Change
Medical School
The University of Edinburgh
Teviot Place
Edinburgh
EH8 9AG

0131 651 1447

To be carried out under the supervision of:

Dr Richard Mitchell

Associate Director/Head of Risk & Resilience
Research Unit in Health, Behaviour and Change
Division of Community Health Sciences
The University of Edinburgh
Teviot Place
Edinburgh
EH8 9AG

Tel: (0131) 651 1283

STUDY SPECIFICS

1. PURPOSE OF STUDY AND RESEARCH PLAN:

I, Rebecca Lovell, am undertaking a PhD at the University of Edinburgh. The **Forestry Commission** and the **Central Scotland Forest Trust** have provided funds for the evaluation of the health and wellbeing benefits of Forest School. They are interested in what effects Forest School has on the children who participate. I am focusing on the physical activity the children do while at Forest School. This is the second phase of the research; the first phase measured the actual amounts of activity the children engaged in while at Forest School also asking the children how they enjoyed the activity and how hard they found it.

This phase aims to investigate in more depth how the children perceive the activity they do while at school, I am especially interested in the activity of Forest School.

2. PROCEDURES:

I intend to interview the children in pairs. The children will be asked to choose a partner for the interview. The interview will take place at school and will last for no more than thirty minutes. Providing both you and both children participating in the interview have given consent (please see section 4), the interview will be tape recorded. I hope to conduct the interviews during November and December.

During the interviews I will ask simple and straightforward questions regarding the physical activity that the children engage in. I am especially interested in the physical activity they do while at Forest School.

I have received enhanced disclosure from Disclosure Scotland (a requirement for working or researching with children; meaning that the police have checked for any criminal convictions or cautions) a copy of which can be viewed by contacting the research unit (address at the end of this information sheet).

3. BENEFITS:

It is hoped that this research will help bodies such as the Forestry Commission and the Central Scotland Forest Trust make decision on how to most effectively use educational resources. Other studies have focused on the educational and behavioural benefits of Forest School; this study is focusing on the benefits to the health and wellbeing of the participants, primarily those gained through physical activity.

4. CONFIDENTIALITY:

The study research records will be kept confidential and your child will not be identified in any written or verbal reports. The research records will be kept in a secured area and locked in a filing cabinet in my office. Only research personnel authorized by me will have access to these records.

The recordings of the interviews will be transcribed and then destroyed. Your child will be given a pseudonym and will not be identified in any way in any format.

5. CONSENT AND WITHDRAWAL:

Your child's participation in this research study is voluntary. You may permit your child to be a participant in the research study only if you wish. **You may choose not to have your child participate in this research study;** this will NOT affect whether your child attends Forest School, or affect the normal schooling of your child. **You may withdraw your child from the research study at any time** for any reason.

The research design and plan, including this consent form, have been approved through an ethics procedure at the University of Edinburgh

6. QUESTIONS

If you have **any** questions about any aspect of the research and your child's or your involvement please do not hesitate to contact me. **You can contact me or my supervisor at anytime with any queries you have.** If I am not available an answer phone will take a message and I will contact you as soon I receive the message.

**PARENT OR GUARDIAN: PLEASE INDICATE YOUR CHOICE BY INITIALING
ONE (1) OF THE FOLLOWING OPTIONS**

..... I **DO** give permission for my child to participate in the Forest School study

..... I do **NOT** give permission for my child to participate in the Forest School Study

Name of Child

.....

Signature of Parent of Guardian

.....

Relation to child

.....

Date

.....

If you have indicated that you give your consent for your child's participation in this study, it indicates that you have read the information in this document and are aware that you may ask any questions that you may have about the study and are aware that you can change your mind and withdraw your consent for your child to participate at any time.

Office use only

Signature of Investigator

.....

Date

.....

Appendix four: Phase two children’s information sheet and consent form

Physical activity at school and forest school

Part Two

I want to know what you *really* think
about it



Rebecca Lovell

The University of Edinburgh

Who am I?

I am Becca Lovell; I work at the University of Edinburgh.

What I would like to do with your class

I would like to find out more about **what you think** about the physical activity that you do at school

Physical activity means things that make your heart beat faster and some times makes you out of breath, like running around, riding your bike, doing PE lessons or dancing

How I would like to do this

After some of you wore the accelerometers for me last term (that's was very nice of you to do that for me!) I know how much physical activity you do at school. I now want to know more about **what you think** of the physical activity you do at school.

I want to do this by asking you some questions on the physical activity you do, the questions will be quite easy. Questions like,

'What physical activity do you do at school' and 'do you like that physical activity?'

What will happen?

I will come and ask you and a friend to talk to me for about 30 minutes about physical activity. I would like to record us talking on a tape recorder.

Do I have to take part?

I am asking you if you would like to take part in my project, **you can say NO if you want to**. If you say no that is Ok. **You can also change your mind at any time**; you will not have to explain why you don't want to carry on being part of my project, no one will be cross with you

This part is for you to say whether you would like to be part of my project... please put a tick in a box

I WOULD like to take part in the Physical Activity project

I DO NOT want to take part in the Physical Activity project

My name is

.....

Appendix five: Phase two interview guide and ranking exercise activities

Phase two of the Evaluation of the Forest School at XXX

Interview guide

Hello, thank for last terms work, explain about this part of the research. Only last about 30 mins *at the most*, teacher wants them back!

Remind that it's all confidential, explain about what that means for them, as in a pair.

Tell them they can stop the interview at any point, that's fine, also if there are any questions they don't want to answer just say so and we can move on.

All I am going to ask you about is what you think of physical activity, what you do at school and what you do out of school.

Explain about the voice recorder...

Ask them to choose a pseudonym

Ask age (birthdate)

The first questions I am going to ask you are just questions about what physical activity means...

Can you tell me what the words 'physical activity' means to you?

What about sports/walking the dog/walking to school/housework...

- Do you think physical activity is good for you?
 - o Why is that?
 - o Who tells you that?
- For who is it most important to do lots of physical activity?
 - o What about, children/adults/older people skinny/big people
- Can you think of some physical activities that are really good for you?
 - o Why are they so good?
 - o What would not be so good?
- Tell me some of the places where a person can do physical activity?

Can you tell me whether you do or don't like to do physical activity?

- Why is that?
 - o What kinds are especially good/bad

What differences, if there are any, are there between what boys and girls do?

- why is that so?
 - o Enjoy/can do/ friends

Ok so I am now going to move on and ask you some questions about physical activity at school

Well the first question has to be can you tell me what kinds of physical activity you do at school?

- When do you do physical activity at school?

- Do you think you do much physical activity at break time/lunch time?
- Is there a difference between what boys and girls do at break time/ lunch time?

- What kinds of physical activity do you do in P.E lessons?

So these are some of the physical activities I thought you might do at school, can you put them in order for me so your favourite is at the top and so on...

Child one

Child two

1-

2-

3-

4-

5-

So now we have talked about the kinds of physical activity you do at school I want to now ask you about what you do outside of school, like in the evenings or at weekends:

The first question is do you do any organised physical activity when you are not at school

Like in the evenings or on weekends (holidays etc)?

- What kinds of physical activity do you do?
- What about physical activity that is not organised do you do anything like walk a dog?
-

When you are not at school, who do you do physical activity with?

- What about with parents/brothers-sisters/other family/friends/ever on own?
 - o What kinds of physical activity with each group?

Do you ever go into forests/hills/countryside/wild places etc with your family, like going for walks?

- Is that a good thing? Do you look forward to it or do they have to drag you there?
- Do you know where you go?

Do you ever go to forests/wild places etc, with friends?

- if no, why is that? (probe about whether it is scary/to far away/not allowed/other people)

- if yes, what do you do?, scary, other people, etc

Do your parents say where you allowed to go in the village on you own or with your friends? Are there are places that you are not allowed to go?

- Why are you not allowed to go to these places?
- Do you feel safe going out in the village or even into the forest on your own or with your friends?

Thanks for telling me about the physical activity you do at when you are not at school, now I want to know more about forest school:

What do you think of Forest School?

- whats the best thing?
- whats the worst thing?

Do you think that you do much physical activity at Forest School?

Can you tell me some of the kinds of activity you do at Forest School?

Are there any of the physical activities you do at Forest School that you really enjoy?

- Why do you enjoy that?

Are there any physical activities that you do as part of Forest School that you do not enjoy?

- The walk to the site
- Doing the physical activity in the dirty/muddy environment
- In the outdoors? When it is raining/snowing/cold etc
- Do you worry about hurting yourself at Forest School?
- There might be strangers

Thinking about things that might be dangerous or a bit scary can you put these activities in order so that the most risky one is first (do you know what I mean by risk?)

Child one

Child two

1-

2-

3-

4-

5-

6-

7-

8-

These are the last questions now... I want to know what you think about what you will be doing when you move on to secondary school..

Do you think you will be doing different kinds of physical activity at your next school?

- What kinds of things will you get to do?
- Do you look forward to that?

Finally if the person who is in charge of what kinds of physical activity school children do, asked you 'what's the best kind of physical activity to do?' what would you tell them?

And as you are the experts what would be your top tip on how to encourage more children to do more physical activity?

Turn off recorder!

Tell the children thanks and what you have to do now. Tell them that soon I hope to come and tell them all about the results of this work.

Ranking exercise activities:

Enjoyment :

- Doing a PE lesson
- Break time football game
- Playing capture the flag in the forest
- Learning a dance routine
- The walk to Forest School

Risk:

- Forest School
- Break time in the playground
- Doing cycling training
- School trip to Glasgow
- School trip to Polkemmet park
- Doing a swimming lesson
- A PE lesson
- Sitting in the classroom doing maths

Appendix six: NVivo Nodes

NODE LISTING

Nodes in Set: All Nodes

Created: 09/02/2007 - 14:28:49

Number of Nodes: 52

- 1 Dogs
- 2 understanding of risk
- 3 (1) /Forest school
- 4 (1 1) /Forest school/Walk to FS
- 5 (1 2) /Forest school/What think of forest school
- 6 (1 3) /Forest school/How much PA at FS
- 7 (1 4) /Forest school/FS
- 8 (1 5) /Forest school/Dirty
- 9 (1 6) /Forest school/worst thing
- 10 (1 7) /Forest school/best thing
- 11 (1 8) /Forest school/Comment on PA at FS
- 12 (1 9) /Forest school/All FS PA
- 13 (2) /Greenspace
- 14 (2 1) /Greenspace/Countryside-family
- 15 (2 2) /Greenspace/Countryside-friends
- 16 (2 3) /Greenspace/Go to forest-friends
- 17 (3) /inside~outside
- 18 (3 1) /inside~outside/Difference inside~outside
- 19 (3 2) /inside~outside/GD inside~outside
- 20 (3 3) /inside~outside/PE inside~outside
- 21 (3 4) /inside~outside/Prefer PE inside~outside
- 22 (4) /Risk
- 23 (4 1) /Risk/Forest School risk
- 24 (4 1 1) /Risk/Forest School risk/FS risk comparison
- 25 (4 1 2) /Risk/Forest School risk/Mediating risk of FS
- 26 (4 1 3) /Risk/Forest School risk/Getting hurt at FS
- 27 (4 1 5) /Risk/Forest School risk/feeling safe~scared in forest~fs
- 28 (4 1 6) /Risk/Forest School risk/other users of forest
- 29 (4 2) /Risk/understanding of risk
- 30 (4 9) /Risk/Freedom
- 31 (4 10) /Risk/Risk rankings
- 32 (5) /Physical Activity understanding
- 33 (5 1) /Physical Activity understanding/What is PA
- 34 (5 2) /Physical Activity understanding/Is PA good for you
- 35 (5 3) /Physical Activity understanding/Is PA good for certain people
- 36 (5 4) /Physical Activity understanding/How found out PA good
- 37 (5 5) /Physical Activity understanding/Enjoy PA~
- 38 (5 6) /Physical Activity understanding/PA that is good for you
- 39 (5 7) /Physical Activity understanding/PA that is not so good for you
- 40 (5 8) /Physical Activity understanding/Where do PA
- 41 (6) /gender differences
- 42 (6 1) /gender differences/Boys or girls more active~strong etc

- 43 (6 2) /gender differences/Breaktime PA diff
- 44 (6 3) /gender differences/Doing other gender pa
- 45 (6 4) /gender differences/Doing other gender PA out of school
- 46 (6 5) /gender differences/Gendered PA
- 47 (6 7) /gender differences/Typical boy~girl charac
- 48 (7) /School PA
- 49 (7 1) /School PA/Do enough PE
- 50 (7 2) /School PA/School PA
- 51 (8) /Home PA
- 52 (8 1) /Home PA/PA out of school