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Developing an Understanding of Greenspace as a Resource for Physical Activity of Adolescents in Scotland

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Declaration

I, Justine Geyer, declare that the work presented in this thesis is my own original work and that it has not been submitted in whole or in part for any other degree or professional qualification. The research is entirely my own except where otherwise acknowledged.

Signed:

Date:

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Abstract

This thesis explores the potential role of greenspace to promote physical activity in young adolescents in Scotland through an examination of physical activity behaviour associated with greenspace use and adolescents motivations to use greenspace, and experiences, attitudes and perceptions of greenspace. This is in light of political interest in promoting physical activity in all populations, especially in young people, as one way to help prevent obesity and promote health and well-being, and recognition that a link between greenspace provision and greenspace has been suggested by research, however, the evidence base is currently limited, particularly within Scotland.

Research into greenspace links to physical activity are usually framed within an overarching socio-ecological perspective, however, additional theoretical perspectives are discussed which can add to understanding of adolescents' use of greenspace. An argument is made for the use of Gibson's Theory of Affordances and this is further developed to make the links between greenspace design, provision and use.

The research included two studies. Study one involved the design, testing and placement of greenspace use questions into a survey of a nationally representative sample of 13 and 15 year-olds across Scotland (n=4697). This was done in collaboration with the Scotland team for the Health Behaviour in School-aged Children (HBSC) survey. The second study used a mixed methods design which employed GPS (global positioning system), accelerometry and GIS (geographical information system), referred to in this research as the GAG method, as an objective measure of physical activity location, timing and duration for a sample of n=35 13 and 15 year-olds. This is a relatively new method used in environment and physical activity research and the present study makes a contribution to understanding this method in practice. The GAG study also included semi-structured interviews with participants at the end of the period of monitoring physical activity.

The two studies combined demonstrated a positive association between use of greenspace and higher quantity of and intensity of physical activity. Logistic regression on the survey data revealed that an adolescent who used greenspace more

than three times per week was 42% more likely to achieve 60 minutes of moderate physical activity daily. The GAG study demonstrated that, when in greenspace, a lower proportion of time was spent being sedentary compared to when not in greenspace (48.6% vs. 81.7%).

In interviews, the adolescents described a wide variety of physical activities taking place in greenspace, many incidental to being in greenspace as opposed to planned beforehand, although this was also encountered. Four types of greenspace user were identified and helped highlight how social motivations to use greenspace were paramount suggesting that the impact of greenspace on physical activity is both a result of motivation to be active, but also a benefit of going to greenspace for social reasons. This bi-directional relationship complicates endeavours to demonstrate cause and effect and suggests the requirement for more research to understand the interaction between psycho-social and environmental factors.

Greenspace use appeared to be relatively high. The HBSC survey found that a large majority of young adolescents in Scotland (71%) reported using greenspace at least once per week in the summer months, and may well be one of the most frequent users groups. However, scope remains to further increase use aimed at increasing physical activity and it is argued that more flexibility exists for this possibility than within other domains for physical activity, such as school PE classes.

The interviews revealed that motivations and influences on use of greenspace were found to closely reflect the *a priori* model (based on previous mainly public space research) with clear evidence of interplay between factors influencing intention and opportunity. Developmental attributes of the adolescent stage were indicated to be strongly influential in motivating greenspace use, however, the relative impact of the range of factors was uncertain with decisions to use greenspace complex and dynamic. Despite this complexity, improvements in the physical condition of greenspace, safety and greenspace quality are likely to be universally welcomed.

From a theoretical perspective, the findings supported the existence of design, normative and individual affordances which have relevance for how greenspace and

the facilities within them are designed and used and how exclusionary practices can arise.

Political endorsement of the importance of greenspace to health and well-being is evident and this research supports continued protection, investment and improvement, particularly in greenspace quality. There is, however, a need to further develop policy to incorporate consideration of the role of youth and community services and park management aimed at facilitating positive use of and experiences in parks and other greenspace for all users.

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1 Introduction

Greenspace is pockets of natural landscape in our urban lives¹. Considering that the vast majority (90%) of the UK population now lives in urban areas (United Nations, 2007), greenspace is the most immediate type of natural environment most people have access to. This is likely to be even more relevant to adolescents and children who do not have the same ability to travel the larger distances required to access other types of natural environment. They are unable to drive themselves and must therefore rely on public transport provision, parents or other adults. Thus the environments closer to home are likely to be of greater relevance.

There is mounting interest in just what greenspace has to offer society. A range of benefits has been described, such as improvement in mental well-being and increased physical activity (Croucher *et al.*, 2007; Douglas, 2007), as well as wider ranging environmental benefits such as water drainage management and contribution to maintaining biodiversity (CABE, 2009). One of the key drivers behind growing interest in greenspace as a resource is the health agenda. In the UK, despite increasing life expectancy, there are still major public health issues. There is an increase in health inequalities, obesity, numbers suffering mental illness and length of time spent with poor health (SDC, 2008). This extract from the Sustainable Development Commission (2008) makes it clear this is not an acceptable situation:

The current health scenario in the UK is not in line with the desired outcomes of sustainable development. It is important therefore to consider any strategy that may help to tackle these issues.

Obesity in children and adolescents is a major public health concern in Scotland (Scottish Government, 2008a), and adolescence has been identified as one of the key stages of development of obesity, with increased risk of obesity tracking in to adulthood (Dietz, 1997; Singh *et al.*, 2008). In 2010, 29.9% of children aged 2-15 years (31.1% of boys and 28.5% of girls) were overweight or obese, 15.6% were overweight (BMI \geq 85th percentile and $<$ 95th percentile), 7.4% obese (BMI \geq 95th percentile and $<$ 98th percentile), with 6.9% morbidly obese (BMI \geq 98th percentile). The proportion of children with a BMI out with the healthy range (largely referring to those overweight

¹ Greenspace is defined more fully in Chapter Two

and obese) increased with age and the trend has been for little change since 1998 (Scottish Government, 2010a).

At the level of the individual, obesity development is viewed as an interaction between three main factors: mental well-being, physical activity and diet (WHO/HBSC Forum, 2006). Physical activity is known to support mental well-being in addition to improvements in many other health issues (Cavill *et al.*, 2006; Whitelaw *et al.*, 2008). According to the Scottish Health Survey (SHS), in 2010 62% of those aged 13-15 years met the physical activity recommendations of at least 60 minutes of moderate physical activity daily (Scottish Government, 2010a). Physical activity declines with age in girls with only 48% of those aged 13-15 years meeting the recommendations compared to 70% aged 2-12 years. The decline was less marked in boys where 75% of those aged 13-15 years met the guidelines compared to 84% of those aged 2-12 years (Scottish Government, 2010a). The SHS indicates that physical activity levels in girls have increased since 2008. However, this applies to all girls aged 2-15 years, therefore, it is not possible to say if this trend is accounted for by a change in all girls or more attributable to either children or adolescents. According to the HBSC survey there has been little change in those aged 13-15 years (Currie *et al.*, 2011).

Obesity and inactivity are estimated to place a tremendous burden on Scottish society through lost revenue and the cost of treating the health problems that are associated with them (Scottish Government, 2011). Reducing the rate of increase in the proportion of children aged 2-15 years who are out with the normal healthy weight range is one of the 45 national indicators the Scottish Government is using to assess progress on its national performance and attainment of a flourishing Scotland. Concerns over obesity and inactivity have translated in to mounting interest in and plans for ways to promote physical activity. This is encapsulated in policies and strategies such as *Lets Make Scotland More Active* (Scottish Government, 2003) and *Healthy Eating Active Living* (Scottish Government, 2008b).

Links have been demonstrated between greenspace provision and increased levels of physical activity in young people and adults (Croucher *et al.*, 2007). This evidence has stimulated considerable policy interest in availability of and access to greenspace in Scotland. Government policies such as *Equally Well* (Scottish Government, 2008a) and

Good Places Better Health (Scottish Government, 2008c) have linked policy on health, equality, environmental justice and sustainable development. These have set out commitments and strategies to promote the use of greenspace for health in an attempt to improve the physical health and well-being of children and adolescents. However, it was recognised during the development of these policies that the evidence base was deficient in several areas. One area was the nature of the association between greenspace use and physical activity among young people. Such evidence is vital to arguments about provision of greenspace, given that this resource faces threats from urban expansion and building development. There is concern over the loss of parks and playing fields despite apparent commitment by the Scottish Government to enhance and protect greenspace (Glasgow and West of Scotland Greens, 2003). It is within this context that the Scottish Government, in conjunction with the ESRC (Economic and Social Research Council), provided funding for this policy-relevant PhD. The aim of this research, therefore, was to develop further understanding of the role of greenspace as a health resource for the promotion of physical activity of adolescents in Scotland and contribute to evidence-informed policy decision making. This aim was supported by the following research questions:

- 1) How much do adolescents in Scotland use greenspace during their leisure time?
- 2) Is there a positive association between greenspace use (rather than provision) and physical activity levels?
- 3) How active are adolescents in Scotland in greenspace and what proportion of leisure time physical activity takes place in greenspace?
- 4) What are the motivations for adolescents in Scotland to use greenspace and what are their attitudes towards it?

1.1 Thesis structure

The thesis consists of a total of twelve chapters. Chapter Two explains the background to this research, defines key concepts and explores the historical, theoretical and research context for the relationship between greenspace, health and physical activity. The chapter concludes with consideration of the relevance and implications of research

to date for Scotland. Chapter Three provides a review of research specific to greenspace relationships with adolescent physical activity. Chapter Four reviews research on adolescent attitudes to and behaviours in greenspace. Gaps are identified in the evidence base and the chapter finishes by setting out the research questions that guided this study. In Chapter Five the key theories that have relevance to this field of research are discussed, culminating in an explanation of the conceptual framework used to guide analysis and thinking throughout the rest of the research. Chapter Six discusses the methodological and philosophical considerations that supported the mixed methods design of the research. Chapter Seven describes implementation of the methods and analysis of the data. Quantitative results are presented in Chapter Eight, whilst Chapter Nine details the qualitative results. Chapter Ten is the first of two discussion chapters. It draws mainly on quantitative results to discuss levels of greenspace use and the relationship between its use and adolescent physical activity in Scotland. Chapter Eleven draws primarily on the results from interviews to discuss the implications for understanding the use of greenspace by adolescents in Scotland and how this understanding may be used to promote increased use. Finally, Chapter Twelve reflects on the contribution that this thesis has made to the field of greenspace and physical activity research. It outlines the strengths and weaknesses of the study and highlights key findings and their implications for policy.

2 Background

2.1 Introduction

This chapter begins by defining key terms used throughout the thesis: adolescent, greenspace and physical activity. This is followed by setting the historical and theoretical context of research in the field of environment, greenspace and health. The chapter concludes with an overview of the more general research into the relationship between greenspace, health and physical activity and the relevance of this research to Scotland. This sets the context for a more detailed critique of the research on greenspace relationship to adolescent physical activity set out in Chapter Three.

2.2 Definition of Terms

2.2.1 Adolescent

The dictionary definition of adolescence is '*the period in human development that occurs between the beginning of puberty and adulthood*', the adolescent is someone who is in this period of development (Harpercollins, 1999, p17). This gives the impression of clear-cut boundaries, however, this is far from being the reality. Firstly, the age of onset and duration of puberty is variable (Coleman and Hendry, 1999). Secondly, the term is applied in research to describe a range of different age groups which are not clearly stated to be related to the onset of puberty. It is not the intention here to give a detailed discussion of the debate of what an adolescent is or is not, but instead to give the reader an understanding of how the term has been used throughout this thesis.

The term has a tendency to be loosely applied to anyone under the age of 18 years (the age at which one is legally recognised as an adult in the UK), but generally above 10 years of age. In this thesis adolescent refers to those attending secondary school which, in Scotland, generally applies to those aged 11 to 18 years. There are other terms that often include this age range, such as teenager, teen or young person. Occasionally these other terms have been used throughout the text for variety and because they have been used by other researchers in their publications.

2.2.2 Greenspace

Until relatively recently a clear definition of the term ‘greenspace’ did not exist, leading to confusion and difficulty in conducting and comparing research in this field (Kit Campbell Associates, 2001). This issue has now largely been resolved, at least in Scotland, with the development of a definition and comprehensive typology as set out in Planning Advice Notice 65 (PAN65) (Scottish Government, 2008d).

The term ‘open space’ covers greenspace consisting of any vegetated land or structure, water, path or geological feature within and on the edges of settlements, and civic space consisting of squares, market places and other paved or hard landscaped areas with a civic function. Some spaces may combine green and civic space elements, but one type or other will usually predominate. (Scottish Government, 2008d, p4)

In PAN65 greenspace and civic space are subsets of open space and settlements are defined as villages, towns and major urban areas. An alternative definition is offered by greenspace scotland² who define it as:

Greenspace is any vegetated land or water within or adjoining an urban area³. This includes: green corridors like paths; disused railway lines; rivers and canals; woods; grassed areas; parks; gardens; playing fields; children’s play areas; cemeteries and allotments ; countryside immediately adjoining a town which people can access from their homes ; derelict; vacant and contaminated land which has the potential to be transformed. (<http://www.greenspacescotland.org.uk/what-we-do.aspx> , 2011)

This is very similar to the PAN65 definition but it is the latter that is used for this PhD thesis. PAN65 provides a comprehensive typology of greenspace, see Appendix A. This typology is based on the functional use of the land, for example, one of the categories is sports areas described as:

Large and generally flat areas of grassland or specially designed surfaces, used primarily for designated sports (including playing fields, golf courses, tennis courts and bowling greens) and which are generally bookable. (Scottish Government, 2008d, p5)

² greenspace scotland is a registered charity which seeks to improve the quality of life of people living and working in urban Scotland through promotion of the development and sustainable management of greenspace, <http://www.greenspacescotland.org.uk/about-us.aspx>

³ Urban in Scotland is defined as settlements with populations of more than 3000. Scottish Government two-fold urban rural classification, <http://www.scotland.gov.uk/Topics/Statistics/About/Methodology/UrbanRuralClassification>

The PAN65 definition is used because this is the one used by Local Authorities and policy makers and therefore is necessary to link this research effectively to policy. In addition, this was the definition and classification system used in creating greenspace maps for each Local Authority area. One such map was used in the research to identify where adolescent physical activity took place.

2.2.3 Physical Activity

Physical activity is a complex behaviour, or set of behaviours, but is generally defined as “*any bodily movement produced by the skeletal muscles that results in energy expenditure*” (Sjostrom *et al.*, 2004). This can clearly include a variety of activities from hanging out the washing, walking to work, taking part in a marathon or running on a treadmill at the gym. This has led to attempts to characterise different domains of physical activity:

- **Work** – occupational physical activity
 - **Household** – physical activity undertaken whilst carrying out household chores such as shopping, hanging out the washing or vacuuming
 - **Transport** – physical activity related to getting to places, typically by walking or cycling (active transport)
 - **Leisure/recreational** – physical activity associated with free time or hobbies, non-structured
- (Sjostrom *et al.*, 2004)

In addition *exercise* is viewed as a specific form of physical activity that is structured, planned and intended to improve one’s physical fitness (Sjostrom *et al.*, 2004) and also health. It is the planned and intentional aspects that separate this from more general leisure time physical activity, although it may often take place during leisure time. Adding to the complexity is the understanding that there are different dimensions to physical activity. Key dimensions include: *type, frequency, duration* and *intensity* of physical activity (Sjostrom *et al.*, 2004). The current research is also concerned with *location* of physical activity.

Several researchers have commented on how research must take into consideration the different domains and dimensions and that more clarity and specificity is required in studies to try to simplify and better understand the motivations and influences on

physical activity in a variety of settings and with differing population groups (Giles-Corti *et al.*, 2009; Kaczynski and Henderson, 2007). This arises from recognition that much physical activity and environment research has produced inconsistent results and that more specificity may help to resolve this. However, this can result in difficulties in assessment, requiring the use of multiple methods to capture the different dimensions (Sjostrom *et al.*, 2004).

In the present study the focus was on leisure time physical activity, with the recognition that this may include some degree of active transport, household chores and exercise. This was because the range of types of greenspace likely to be accessed by adolescents whilst at school was thought to be limited, and therefore this would not be as relevant to policy makers in planning for their wider greenspace provision.

2.3 Historical Context, Socio-ecological Theory and 'Nudge'

Historically the role of the environment in health has been recognised as far back as the time of Hippocrates (Cummins *et al.*, 2007; Morris, 2006). In the UK during the Industrial Revolution, the Victorians believed in the importance of the environment to health. Using a common sense approach they instigated various public health measures including the creation of many urban parks (Gordon and Shirley, 2002; Worpole, 2007); the underlying principle being that these spaces provided respite from the dirty and disease-ridden situation of many dwellings and work conditions. Development was piecemeal, dependant on local circumstances and personalities, but more organised planning became a feature in the early 20th Century (Gordon and Shirley, 2002). A shift in focus towards recreational and sports grounds to build fitness and strength happened in the 1930s and '40s as a result of the desire to make the youth "fit to fight" (Gordon and Shirley, 2002). The focus was then on great expanses of sterile open space that favoured quantity over quality. Many parks were given over to food production during the war. They were renovated post-war with massive rebuilding of war-damaged areas, but from about the 1960s investment waned. The public health movement lost momentum, thought to be contributed to by improvements in home and work environmental conditions and medical treatments (Hunt *et al.*, 2000). The decline in park quality may also have been exacerbated by the increased interest and access to the

wider countryside resulting from car ownership, changes to land access legislation and the development of national parks (Worpole, 1999).

The 21st Century, however, has seen a revival in interest in parks (Worpole, 2007), the wider concept of greenspace and their relationship to human health. One of the seminal papers on nature and health which probably contributed in some way to this revival was that of Ulrich (1984). This research, widely referred to, appeared to suggest that patients recovered faster and with less need of pain relief if they had a view of nature from their hospital windows compared to those that did not. Since then there has been an ever-increasing amount of research into the relationship between peoples' exposure to nature and their health. This is evidenced by the number of reviews on the subject that have appeared in the past few years (For example, Bell *et al.*, 2008; Croucher *et al.*, 2007; Health Council of the Netherlands and Dutch Advisory Council for Research on Spatial Planning Nature and the Environment, 2004; Lee and Maheswaran, 2010; Morris, 2003; SDC, 2008; Tzoulas *et al.*, 2007).

Three ideas have contributed to the shift towards regarding the environment as a resource to promote active healthy lifestyles. Firstly, there was a move away from regarding environments purely as a source of hazards to health and recognition of the potential for environments to promote health (Morris, 2006; Walker, 2004; Worpole, 2007). As Humpel *et al.* (2002) noted, public health strategies are now “*strongly emphasizing the role of the environmental influences to create opportunities and remove barriers to people being more active in their daily lives.*” (p197). This was regarded as a ‘new public health’ (Macintyre *et al.*, 2002), and was possible in light of a change in understanding of health from absence of disease to:

A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. (World Health Organisation⁴)

Whereas health as an absence of disease suggested a binary state of either ill or healthy, this new definition suggests more of a continuum along a scale which can be influenced by a wide variety of factors, but more importantly, can be promoted. The third catalyst has been the high level of concern over what has been termed the “obesity epidemic”.

⁴ <https://apps.who.int/aboutwho/en/definition.html> , accessed 17/6/12

The apparent failure to significantly impact on population obesity levels through focusing on individual lifestyle behaviour has shifted attention to what the physical environment has to offer. It has been increasingly recognised that there are significant barriers to individual behaviour change that include the physical and social environment. Recognition of this and the potential for environmental and social changes to influence health promoting behaviours is referred to as the socio-ecological perspective (Stokols, 1992). Ecological models have increasingly been used to incorporate the recognised influence that the physical environment, as well as social, economic and political environments, have on the physical activity behaviours of individuals and populations. Socio-ecological models refer more specifically to the social and physical environments (Kaczynski and Henderson, 2007; Stokols, 1992).

The general thesis of ecological models of behaviour is that environments restrict the range of behaviours by promoting and sometimes demanding certain actions and by discouraging or prohibiting other behaviours. When environmental constraints operate in significant ways, they emerge as the overriding determinants of behaviour. (Bandura 1986 cited by Kaczynski and Henderson, 2007, p317).

O'Donnell (2005) also argued, "An abundance of opportunity may cancel the need for education and motivation. An absence of opportunity will probably prevent even the most knowledgeable and motivated person from practicing a healthy lifestyle. (Kaczynski and Henderson, 2007, p317)

Kaczynski & Henderson (2007) cite Marcus and Forsyth (1999) as separating efforts to change physical activity behaviour into three general approaches: downstream (e.g. increase exercise self-efficacy, i.e. focus on the individual), midstream (e.g. media campaigns, i.e. focus on raising awareness and increasing knowledge) and upstream (e.g. altering building codes, i.e. environmental). The latter acts to "nudge" behaviour towards the desired active living end goal without necessarily relying on individuals knowing what to do for the best. An approach that has gained such popularity currently, that the UK Prime Minister, David Cameron, set up a special nudge unit (more correctly known as the Behavioural Insight Unit) in July 2010. This unit works on a variety of issues aimed at subtle ways to alter people's individual choices so they can more easily

make the “right” ones⁵. The majority of recent health and environment research is situated within this new public health, socio-ecological and “nudge” perspectives.

2.4 Nature, Greenspace and Human Health and Well-being

Since Ulrich’s seminal paper in 1984 there has been a great deal of research examining the relationship between natural environments and human health. Adding to the growing number of reviews are now some focused specifically on greenspace, or specific types of greenspace, such as parks (Bell *et al.*, 2008; Croucher *et al.*, 2007; Health Council of the Netherlands and Dutch Advisory Council for Research on Spatial Planning Nature and the Environment, 2004; Kaczynski and Henderson, 2007; Tzoulas *et al.*, 2007).

Population level studies in a number of countries have consistently demonstrated that there is a positive association between the amount of greenspace in an area and the health of that population (Croucher *et al.*, 2007; Tzoulas *et al.*, 2007), although some of the studies did indicate quantity alone was not sufficient and that quality may also be an issue (Mitchell and Popham, 2007). These studies all controlled for socio-economic status and multiple other confounders. Of note is that, although Mitchell and Popham’s study found an overall effect of greenspace quantity on improved health, no association was found in affluent suburban and rural areas, and more greenspace was associated with worse health in low-income suburban areas. The authors suggest other evidence points to poorer quality greenspace in low-income areas which may either worsen health or not be sufficient to improve health. This serves to highlight that there remain aspects about the association between greenspace and health that are not well understood, particularly impacts on different population groups or in different locations.

The effect of greenspace on population health may arise through a variety of mechanisms including the protection provided by trees against pollution and so indirectly affecting asthma sufferers; potential to act as heat sinks to keep cities cooler; alleviation of stress; restoration of attention capacity and provision of opportunity for

⁵ Nudge unit: How the Government wants to change the way we think (Martin Hickman 2011) Belfast Telegraph Online *Monday, 3 January 2011*
<http://www.belfasttelegraph.co.uk/news/politics/nudge-unit-how-the-government-wants-to-change-the-way-we-think-15044707.html#ixzz1JPVzWsPr>

physical activity so promoting active lifestyles (Bell *et al.*, 2008; Croucher *et al.*, 2007; Land Use Consultants, 2004).

2.5 Greenspace and Physical Activity

Reviewers have been cautious in their evaluation of the evidence on greenspace links to physical activity. In addition, there is a degree of conflict between conclusions reached by different reviewers. Kaczynski and Henderson (2007), in their review of environmental correlates of parks and recreation settings and physical activity, were cautious about making generalisations from their findings because they felt it important to take different sub-populations into account. They noted especially the lack of research on children and adolescents. They also highlighted how complex the research topic was due to consideration of different domains of physical activity; different conceptualisations of greenspace or other types of environment; and the use of different measures of provision. Greenspace proximity, quantity and certain greenspace features were found to be positively associated with physical activity levels. However, this relationship was not found in all such studies and many had mixed results with some variations occurring by gender or location. In the review by Croucher *et al.* (2007), they concluded that greenspace was valued as a place to be active from the public's perspective, but that access was not clearly linked to levels of physical activity. The authors commented on how exercise is not usually the primary motivation for using greenspace and often people are sedentary in parks. However, a review by Bell *et al.* (2008), concluded that proximity and accessibility of greenspace are clearly factors regarding physical activity levels and this is applicable across different sub-populations including children, adults and the elderly.

Quantity and proximity to recreational facilities (rather than greenspace) have also been shown to be positively correlated to physical activity in adults (Owen *et al.*, 2004). This lends support to the understanding that these aspects of provision are important. However, straight transference to greenspace must be regarded with a certain degree of caution because a paying facility may be perceived and interacted with in a different way than with a free resource such as greenspace. Maintenance and safety issues may be more problematic with a free facility and research supports these factors as influential regarding greenspace use (Croucher *et al.*, 2007; Dunnett *et al.*, 2002;

Kaczynski and Henderson, 2007). However, aside from such caveats, the weight of evidence appears to support the view that proximity and quantity of greenspace are likely to be influential on levels of physical activity.

2.6 Nature of the Evidence and Relevance to Scotland

The evidence for greenspace links to physical activity has been criticised for being dominated by cross-sectional studies, reliant on self-report measures, and scepticism about the transferability of results from studies that have taken place in countries other than the UK (Bell *et al.*, 2008; Croucher *et al.*, 2007; Land Use Consultants, 2004; Tzoulas *et al.*, 2007). Bell *et al.* (2008) comment on how very little research has taken place in Scotland and that this is something that needs to be addressed to determine if the same potential health benefits exist from Scottish greenspace. Several issues have been highlighted that are believed to be particular to the Scottish situation that may make some of the inferences made from research conducted elsewhere in the UK, or abroad, difficult to apply. A report by Land Use Consultants (2004) suggested that these included:

- The built form of urban areas - with a high proportion of tenements and town houses which have communal public greenspace or private shared gardens respectively with little access to private gardens or proximal greenspace.
- The distribution of inhabitants of urban areas such that there are groupings of poor quality environments which can be directly adjacent to areas of affluence and high quality.
- Different demographic and social issues compared to the rest of the UK and the USA.
- A climate which is usually cooler, windier and wetter than other parts of the UK and which is likely to influence outdoor activities.

(Land Use Consultants, 2004)

However, not everyone agrees that Scotland is so different, at least from the rest of the UK (Bell *et al.*, 2008). This may well be debatable when it comes to questions of demographics, however, it seems likely that climatic, topological and cultural differences could still be relevant. Scotland has smaller cities than many in America and natural landscapes beyond the urban confines are arguably more accessible in Scotland. This may actually mean that greenspace has less of an important role to play compared

to highly urbanised areas. City size and accessibility to countryside is also perhaps different between Scotland and England which have markedly different population levels. National cultural differences are also thought to influence adolescent relationships with their environment. A cross-national study, which included adolescents from New Zealand, Australia, Germany and Britain, found that German adolescents enjoyed the greatest level of freedom (Tranter and Pawson, 2001). This was thought to be associated with Germany's cultural expectation of shared responsibility and greater general use of the outdoors. Two British studies of the landscape preferences of adolescents also suggested that cultural factors were influential in shaping preference (Robertson and Walford, 2000; Robertson *et al.*, 2003). Young people from East Anglia were shown to have a tendency to describe preferences that reflected a more rural or urban upbringing (Robertson *et al.*, 2003). What this suggests is that cultural factors may moderate relationships between greenspace and physical activity.

Various authors have remarked that there is a relative lack of evidence on the relationship between greenspace and health or physical activity in children and adolescents compared to adults (Bell *et al.*, 2008; Croucher *et al.*, 2007; Kaczynski and Henderson, 2007; Land Use Consultants, 2004). Few of the many reviews conducted to 2009 dealt separately with the literature specifically on greenspace, or specifically conducted with children and young people, with the exception of Bell *et al.* (2008). It might be reasonable to expect that the same features of provision (i.e. quantity, proximity and certain features of greenspace) found to be associated with adult physical activity may also be influential for children and adolescents. However, research into how children and adolescents engage with their environments demonstrates that there are differences between young people and adults and indeed between children and adolescents (Bell *et al.*, 2003; Dunnett *et al.*, 2002; Kahn and Kellert, 2002; Korpela, 2002; Percy-Smith, 2004; Progressive Partnership, 2007). Adolescents have been shown to enjoy different things from natural environments compared to adults, such as fresh air, being with friends/family and playing games/sports. In comparison, beautiful landscapes, flora and fauna and growing things were more important for adults (Progressive Partnership, 2007). Thus, transference of results conducted on adults, or from one population group to another, is problematic.

Many researchers rightly point out that proximity and quantity are not the only aspects of greenspace that are likely to be influential. A report for the Department for Transport by the Urban Green Spaces Taskforce *Green Spaces, Better Places* (2002) claimed that it was quality rather than quantity that was of more importance for greenspace relationship to health (DTLR, 2006). Yet it is quantity that seems most often researched. Also, the provision of greenspace nearby to residential areas is by no means a guarantee that people will use them or be encouraged to be active in them. It is notable that the majority of greenspace and physical activity research fails to take into account a measure of the actual levels of use of greenspace. In addition, Croucher *et al.* (2007) conclude that investigations to assess the potential moderating influence of variables such as gender, age, socio-economic status and ethnicity are missing from much of the research. Finally, *Green Spaces, Better Places* (2002) called for a comparison to be made between the health of those that used greenspace and those that did not; a call that has largely been ignored until relatively recently.

One final point to note is that many of the reviews tended to lack clarity about which environments the studies they have reviewed are referring to, i.e. natural environment, neighbourhood environment, general environment or greenspace. This can pose a problem as to what the evidence actually means in relation to a stricter understanding of the concept of greenspace. The evidence cited as supportive of the positive connection between natural environments and health and well-being appears to incorporate a range of interpretations of natural environment. This includes the countryside, landscape, plants in offices, and not just greenspace associated with towns and cities. Even the more recent reviews by Croucher *et al.* (2007) and Bell *et al.* (2008), which focus specifically on greenspace, incorporate UK national parks in their definition of greenspace which does not match the urban nature of the current PAN65 interpretation of the term. This may be problematic because the perceptions and experiences of these differing types of environment could be very different. An individual may go to the countryside for recreation, to relax to 'get away from it all' and they are out of the neighbourhood environment and totally away from the town or city. This is different from visiting the local park or community woodland which does not have that same physical separation from the urban setting. Such greenspaces may also be used as a transport route, hence the relationship an individual has with them is entirely different to

that of the countryside. Even though at times a person may seek recreation and relaxation in exactly the same greenspace, the experiences and perceptions will be influenced by the variety of different encounters they have with that space. Thus it may be problematic to infer that evidence supportive of nature's influence on human well-being can automatically apply equally well to countryside as to greenspace.

2.7 Summary

There has been a long history of understanding that the environment is linked to health. A change in conception of health from disease-focused to a resource to be protected and promoted shifted emphasis away from treatment to allow inclusion of prevention. This paved the way for realising that the environment can promote health. Alongside the realisation that a policy focus on individual behaviour was not producing the expected improvements in health, this led to the evolution of the socio-ecological approach to public health. This new approach recognised that making healthy lifestyle choices was not always about the individual, but also was influenced by social and environmental factors acting beyond the control of the individual.

A revival in interest in our physical environment and how it can help us to make healthy choices has produced a great deal of research including the contribution that greenspace and other types of natural environments have to make. A number of reviews have now been conducted that give an overview of this type of research. Population studies show there is a relationship between improved health and quantity of greenspace. One of the mechanisms by which greenspace is thought to improve health is by encouraging greater amounts of physical activity. Quantities of greenspace, proximity to and certain features of greenspace have all been shown to be related to physical activity. However, the evidence has been criticised for being reliant on cross-sectional studies and self-report measures. There is a deal of inconsistency across studies and it has been pointed out that just because greenspace is there does not mean that people will be active in it. It is recognised that there is much about the relationship between greenspace and physical activity that is still not well understood. Issues of quality and what people do in greenspace are not well researched, yet are thought to be important. There is limited research on a range of different populations, including children and adolescents, and the latter population have been poorly dealt with in reviews. The application of findings

from adult studies is problematic due to the differences in how adults and children and adolescents perceive and use their environments. In addition, cultural, climatic and landscape differences between countries mean that research conducted internationally, or even elsewhere in the UK, may not be readily transferrable to Scotland. In the next chapter the evidence specific to adolescents, greenspace and physical activity is reviewed and discussed in light of this wider research outlined here.

3 Adolescents, Greenspace and Physical Activity

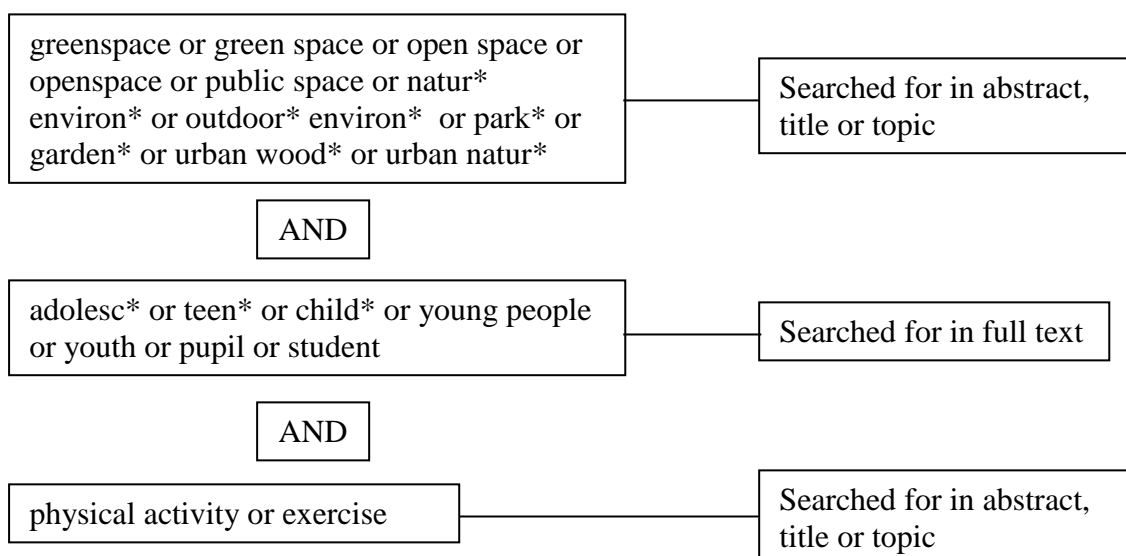
3.1 Introduction

This chapter presents a review and critique of the literature that has specifically focused on adolescents' physical activity and its links to greenspace. However, publications on children are also considered due to the nature of the range of participants in different studies.

3.2 Adolescents, Greenspace and Physical Activity

A literature search was conducted using a variety of key words to try to capture as many publications as possible relevant to greenspace, adolescents and physical activity. There was no predefined start date but it was noted that the vast majority of the relevant research, particularly with respect to greenspace and adolescent physical activity, has been conducted since 2000. Key terms and the main combinations are detailed in Figure 3.1. Variations on this combination were used where it was not possible to include multiple terms and combinations as outlined. The main databases searched were: Web of Knowledge, PubMed, Google and Google Scholar, ASSIA, Sociological abstracts, EBSCO (includes CINAHL, SPORTDiscus, MEDLINE & International bibliography of social sciences).

Figure 3.1 Search terms combination



A number of previous reviews set quality criteria for the inclusion of studies. For this review, quality was not a criterion for elimination as the number of studies on adolescents was limited in comparison to adults. Instead, the quality of studies was critiqued as part of the review. Only studies published in English were considered and which included children and/or adolescents (aged less than 18 years) as a distinct group, had a measure of greenspace independent to other recreation facilities or other measures of the environment, and a measure of physical activity. Studies were excluded that specifically investigated hazardous links between greenspace and health. The focus of this research was on health promotion. Studies that focused on organised adventure and/or countryside experiences were excluded in addition to research on exercise or community activity programmes. Primarily this was because it was considered difficult to separate environmental from social influences within this type of organised contact (Bell *et al.*, 2008; Croucher *et al.*, 2007). Further details of the inclusion and exclusion criteria, adapted from Croucher *et al.* (2007), are presented in Table 3.1.

Table 3.1 Inclusion and exclusion criteria for identification of literature for review

Inclusion Criteria	Exclusion criteria
Studies that included children and/or adolescents and where researchers presented results for children and/or adolescents separately from adults	Studies where children and/or adolescents were not treated separately from adults or were not part of the population under study
Studies including a measure of or focus on greenspace (greenspace taken as that defined by PAN 65 typology)	Studies that had no independent measure of a type of greenspace, for example where a greenspace was included in a composite measure of recreational facility provision Studies that focused on non-urban natural environments or wilderness experiences only
Studies including a measure of or focus on physical activity	Studies which did not focus on or include a measure of physical activity
Studies published in English	Studies published in other languages
Empirical studies both qualitative and quantitative	Reviews, discussion papers, theoretical and methodological papers and editorials etc.

Several authors of previous reviews on greenspace or natural environments and health have commented on the difficulty in conducting an extensive and systematic review due, in part, to the different terms used to describe the environment (Bell *et al.*, 2008; Croucher *et al.*, 2007). This difficulty is compounded by the wide variety of disciplines that have shown an interest in the field. Croucher *et al.* (2007) applied systematic review principles with complex search strategies, yet they comment on how, despite their rigorous searches, they did not identify all key studies referenced by other authors.

... it became clear as the review progressed that there is a wider literature covering many different aspects of greenspace ... there are particular challenges for those conducting reviews in complex health and social policy areas, where many different disciplines and agencies are investigating a variety of related themes and topics. (p4)

Due to the difficulties experienced by other reviewers, citations from reviews, especially those by Kaczynski and Henderson (2007), Croucher *et al.* (2007) and Bell *et al.* (2008), were checked for publications that may have been missed.

In total 19 studies were identified to 2009 informing development of the research for this thesis. There have been further relevant studies published since 2009. These are discussed alongside results from this research in Chapter Ten. Several of the studies reviewed here have been cited in previous reviews but have never been separately critiqued as a distinct body of literature, nor put into the wider context of understanding how adolescents and young people interact with their local environments. Setting the greenspace and physical activity research within a broader understanding of adolescents' engagement with their environments is important for identifying more informed policy decision making. Hence, inclusion of previously reviewed literature here is important. A summary of the main features and findings of each study can be found in Table 3.2.

Table 3.2 Primary studies investigating greenspace and physical activity in adolescents and children

(+ = positive relationship, - = negative, and 0 = no relationship detected)

Year	Authors	Population	Sample	GS measure	PA measure	Association
2004	Timperio <i>et al.</i>	Children age 10-12 yrs, suburban Australia	919	Perception of availability of parks/sports grounds	Parental report of frequency of cycling/walking to local destinations	+
2004	Gomez <i>et al.</i>	Adolescents, grade 7 students, age 12-13 yrs USA	177	Euclidian distance to nearest open play area from home (eg. playground, pool, athletics field)	Self-report bouts per week of outdoor non-school PA	+ and 0 (+ for boys, 0 for girls and total sample)
2005	Hume <i>et al.</i>	Children age 10 yrs, urban, low SES Australia	147 (127 for accelerometry)	Qualitative and no. of parks appearing in maps	Accelerometer measured PA	+ and 0 (+ maps depicted GS as destination for PA) (0 no association with measured VPA)
2005	Jago <i>et al.</i>	Children & adolescents age 10-14 yrs, boy scouts only USA	210	No. of parks/trails	Accelerometer measured PA	0
2005	Norman <i>et al.</i>	Children & adolescents age 11-15 yrs, mixed gender and ethnicity USA	799	No. of parks	Accelerometer measured PA	0
2005	Broderson <i>et al.</i>	Children age 11-12 yrs England	2578	No. of sports pitches	Self-report number of days in previous week had carried out hard exercise Self-report time usually spent watching TV, playing video games, or on the computer during a week	- (girls positive association with being sedentary) 0 (boys PA or sedentary)
2006	Cohen <i>et al.</i>	Children age 11-12 yrs, girls only USA	1556 randomly selected	No. of parks Proximity to parks Features of parks	Accelerometer measured PA	+ (-) (golf course & skate park had negative association)
2006	Roemmich <i>et al.</i>	Children age 4-7 yrs USA	59	% park area	Accelerometer measured PA	+ and 0 (+ for boys, 0 for girls)

GS=greenspace, PA=physical activity, SES=socio-economic status, VPA=vigorous physical activity

Table 3.2 continued

Year	Authors	Population	Sample	GS measure	PA measure	Association
2007	De Vries <i>et al.</i>	Children age 6-11 yrs, urban Netherlands	422	Researcher-assessed availability of GS on a rating scale of 1-4 Ratio of GS to Buildings	Self-report hours per week of MVPA	0 (GS rating) + (ratio of GS/Buildings)
2007	Roemmich <i>et al.</i>	Children, mean age 10.5 yrs USA	88	% park area	Accelerometer measured PA	+ and 0 (+ for boys, 0 for girls)
2007	Scot <i>et al.</i>	Children age 11-12 yrs, girls only USA	1367 randomly selected	Self-report access to certain GS types GIS determined number of golf courses, playing fields	Accelerometer measured PA	+ (self-report access) 0 (objective number)
2008	Pate <i>et al.</i>	Adolescents, mean age 17.7 yrs, urban, suburban, rural, girls only USA	1506	No. of parks within a 0.75mile street network from home	Self-report 3 day PA recall questionnaire (3DPAR)	+ and 0 (+ in white girls only)
2008	Babey <i>et al.</i>	12-17 yrs USA	4010 random	Self-report access to safe park	Self-report PA	+
2008	Timperio <i>et al.</i>	13-15 yrs Australia	334	Objective measures of features of nearest network public open space excluding golf courses and school grounds	Accelerometer measured PA	+ ** (girls) 0 (boys)
2008	Ries <i>et al.</i>	Adolescents 14-18 yrs, African-American USA	48	Qualitative investigation of environmental factors influencing the use of recreational facilities for physical activity (interviews and observations of recreation facilities (mainly parks))		Adolescents were attracted to facilities that were •low-cost •well-maintained •offered preferred activities •within close proximity to home •perceived to be safe, especially the girls •found to have other active adolescents
2009	Cradock <i>et al.</i>	Adolescents, mean age 13.7 yrs USA	152	% area of open space per resident in neighbourhood	Accelerometer measured PA	0

MVPA=moderate and vigorous physical activity

Table 3.2 continued

Year	Authors	Population	Sample	GS+ measure	PA+ measure	Association
2009	Tucker <i>et al.</i>	Adolescents, age 11-13 yrs USA	694 purposive sampling of schools	% level of park coverage	Self-report adapted previous day questionnaire (PD-PAR)	0
2009	Ries <i>et al.</i>	Adolescents, African American primarily USA	316	Perceived availability of parks, park quality. Objective no. of parks within 1 mile radius of home	Accelerometer measured PA	+ (perceived availability, quality) 0 (quantity)
2009	Jones <i>et al.</i>	Children age 9-10 yrs England	100 convenience sample	GPS/GIS assessed time spent in parks, woodlands, beaches, grassland	Accelerometer measured PA	Urban children and girls did most of their MVPA in gardens, on streets or other built land. Parks, woodlands and beaches accounted for 8.8% of MVPA Girls did a greater proportion of their MVPA in parks compared to boys (8.8% vs 6.6%) Boys did most MVPA with a higher proportion in grassland and farmland compared to girls or urban

GPS=global positioning system, GIS=geographical information system

** A positive relationship was demonstrated between the presence of trees providing shade and signs regarding dogs and physical activity, but only in girls. No relationship between any features assessed and boys' PA was demonstrated.

Only two studies were conducted in the UK (Broderson *et al.*, 2005; Jones *et al.*, 2009). The majority of research has taken place in the USA and Australia. It has already been argued that substantial cultural and climatic conditions may make transference of the findings to a Scottish setting difficult. For example, in many of the American studies there is mention of pools in parks, not a common feature in UK, let alone in Scotland. The body of research is dominated by cross-sectional studies and a range of subjective and objective measures is used which adds to the complexity of drawing conclusions about the influence of any one aspect. However, there is a greater use of objective measures of both physical activity and greenspace compared to research done previously with adults.

Population samples across the studies are varied in the range of ages included and classed as adolescents. This can make it difficult to compare findings across the studies due to the expected differences by age, as previously argued. One study, by Timperio *et al.* (2008), included adolescents with the same age range as included in the research for this PhD. Eight of the studies included small numbers of participants (<400) which reduces the power to detect relationships (Altman, 1991). However, this did not appear to have any obvious bearing on which studies detected relationships and which did not. For example, one of the smallest studies, with only 88 participants, found a positive relationship between percentage area of park and physical activity for boys (Roemmich *et al.*, 2007). However, a larger study with 694 participants found no such relationship (Tucker *et al.*, 2009). The study populations in these examples are not directly comparable. Those in the study by Tucker *et al.* were older and from Canada, not the USA. Also, Roemmich *et al.* used an objective measure of physical activity whereas Tucker *et al.* used a self-report one. These differences may explain why the smaller study unexpectedly found a positive result whereas the larger one did not. This also illustrates the difficulty in reviewing this body of literature due to the number of variations between studies. This makes them difficult to compare even when the measures used are similar. Finally, only two qualitative studies were encountered (Hume *et al.*, 2005; Ries *et al.*, 2008).

The studies focused almost exclusively, as with research on adults, on provision - primarily quantity. They also investigated the relationship with proximity and perceived availability. In addition, a small number examined whether certain features (or qualities) of parks promote or inhibit physical activity. Only three looked at the relationship between greenspace use and physical activity. Table 3.3 presents a summary of the different aspects of greenspace researched in relation to adolescent and child physical activity, including the direction of association. Each of these relationships will be looked at in turn.

Table 3.3 Number of studies that have investigated different aspects of greenspace provision and the association with physical activity

	Quantity	Perceived availability	Proximity	Perceived Access	Quality related aspects
positive association	5	2	2	3	1
no association	11	-	-	-	1
negative association	1	-	-	-	1

3.2.1 Physical Activity Relationship to Quantity and Availability of Greenspace

The relationships between quantity and availability of greenspace and physical activity have been the most common aspects of provision to be researched in young people. A total of 15 of the 19 studies measured this. A number of different measures of quantity were used: number of greenspaces, percentage of area that was parks, ratio of greenspace to buildings or percentage of open space per resident. The results show an inconsistent picture. Five indicated a positive association with physical activity (Cohen *et al.*, 2006; De Vries *et al.*, 2007; Pate *et al.*, 2008; Roemmich *et al.*, 2007; Roemmich *et al.*, 2006). Eleven revealed no association, either across the whole study sample (Cradock *et al.*, 2009; De Vries *et al.*, 2007; Hume *et al.*, 2005; Jago *et al.*, 2005; Norman *et al.*, 2005; Scott *et al.*, 2007; Tucker *et al.*, 2009) or in one of the study sub-groups (Pate *et al.*, 2008; Roemmich *et al.*, 2007; Roemmich *et al.*, 2006; Timperio *et al.*, 2008). One study found a negative relationship between girls and the number of sports pitches (Broderson *et al.*, 2005).

In many instances, both a positive association and no association were found in the same study. For example, Pate *et al.* (2008) researched the number of parks in relation to the self-reported physical activity level of adolescent girls. They found a positive relationship for white girls only and no relationship for those from ethnic minority backgrounds. In both studies by Roemmich *et al.* (2006, 2007) the researchers found that the percentage of park area was only positively related to physical activity in boys, but no relationship was found for girls. This suggests a more complex picture where gender and ethnicity need to be further explored and taken account of. It is possible that

some of the studies that found no association may have done so because their sample was mixed. Two of the best quality studies, based on the nature and size of the sample and the use of a well validated or objective measure of physical activity, demonstrated a positive relationship between number of parks and physical activity level (Cohen *et al.*, 2006; Pate *et al.*, 2008). However, both studies only included girls and restricted their investigations to only one type of greenspace (parks). This limits the extent to which the results may be generalised to other greenspace or to boys.

Two studies assessed the relationship between perceived availability of greenspace and physical activity (Ries *et al.*, 2009; Timperio *et al.*, 2004). These both demonstrated a positive relationship. Perceived availability, although related to the objective measures of quantity used in the other studies, is a more complex concept. To an extent, it includes awareness by an individual of their neighbourhood and the facilities within it. This can be dependent on a number of other factors such as; the individual's perception of distance, length of residency and thus awareness of what is in their neighbourhood, personal activity interests and promotion of facilities (Scott *et al.*, 2007). This may make it more likely for a relationship between greenspace and physical activity to be demonstrated, but also is less helpful in informing whether quantity or some other factor is more relevant.

Researchers have commented on the need to gain a greater understanding of the influence of different types of greenspace (Bell *et al.*, 2008; Croucher *et al.*, 2007). The number of parks has been shown to be positively related to the physical activity levels of girls (Cohen *et al.*, 2006; Pate *et al.*, 2008), and in 10 year-old boys (Roemmich *et al.*, 2007). Scott *et al.* (2007) found no association between girls' physical activity and number of golf courses or playing fields (Scott *et al.*, 2007). In contrast, Cohen *et al.* (2006) found that the number of golf courses was negatively related to girls' physical activity levels. Broderson *et al.* (2005) found a negative relationship between girls' physical activity and playing fields. The different findings support the suggestion by Croucher *et al.* (2007) that there may be different types of relationship to different types of greenspace and in different sub-populations of young people. The lack of consistency in the research linking quantity of greenspace to physical activity could, in part, be due to these differential effects. Table 3.4 presents a summary of the number of studies to

have investigated different types of greenspace in the context of child and adolescent physical activity.

Table 3.4 Frequency of type of greenspace investigated

Type of greenspace	Number of studies
Parks	11
Open space/play area	3
Parks plus other greenspace	4
Sports pitches	1

Parks have been by far the most common type of greenspace researched. Greenspace consists of a wide variety of different types of natural environments. What has been shown to be the case for parks may not necessarily transfer to other types. It could be argued that adolescents use parks more than other types of greenspace, and therefore research on parks is most relevant, however, this has not been clearly demonstrated and there is still a requirement to understand how to manage other types of greenspace.

3.2.2 Physical Activity Relationship to Proximity and Accessibility of Greenspace

Five of the 19 studies investigated the influence of proximity or accessibility to greenspace on physical activity levels in children and young people. This perhaps seems a surprisingly small number. This may be due to comments by previous researchers on the inconsistency of findings with respect to proximity, availability or access (Croucher *et al.*, 2007; Kaczynski and Henderson, 2007), and the consideration by some that accessibility to greenspace is not the key factor explaining the relationship to physical activity (Croucher *et al.*, 2007). A review of environmental correlates of physical activity levels in children and young people found that accessibility to facilities (which can include greenspace) was not consistently associated with physical activity (Ferreira *et al.*, 2007).

Proximity and accessibility are related concepts referring to how easy it is to get to greenspace. Proximity is an expression of how close a greenspace is. This can be perceived or actual, and can be expressed in terms of distance or time taken to get there.

Accessibility is a more complex concept which implicitly includes characteristics of the intervening route to get to the greenspace. This can be expressed in an objective fashion, for example, describing the number of roads that have to be crossed and where the access points are to the greenspace. Alternatively, perceived accessibility can be assessed which may include perceptions of safety (associated with road traffic), personal understanding of distances and awareness of social problems in the area.

There is evidence to support a relationship between proximity to greenspace and physical activity. This comes from two studies (Cohen *et al.*, 2006; Gomez *et al.*, 2004). A small study by Gomez *et al.* (2004), with 177 participants, demonstrated that the Euclidian⁶ distance to the nearest open play area (e.g. playground, pool, athletics field) was associated with self-reported bouts of physical activity in boys, but not in girls. Cohen *et al.* (2007), in a more robust study on 11 to 12 year-old girls, demonstrated clearly that proximity to parks was related to increased physical activity level. Whilst this gives some indications of the importance of proximity, the number of studies is too small to make any firm conclusions and, once again, there is the suggestion that differences may exist by gender.

Only perceived, but not objective, accessibility has so far been investigated. Timperio *et al.* (2004) surveyed 919 ten to twelve year-old children and their parents. They asked the children to what extent they agreed or not with the statement “There are no parks or sports grounds near where I live”. The study demonstrated that parent-reported levels of the child’s cycling and walking was lower in those that agreed with this statement, especially in girls. In other words, the perception of greater availability of sports grounds and parks was positively associated with greater levels of walking and cycling. Scot *et al.* (2007) found that perceived access to golf courses and playing fields was associated with increased levels of physical activity in 11 to 12 year-old girls. Babey *et al.* (2008) showed that self-reported access to safe parks was linked to greater physical activity levels in 12 to 17 year-olds. The consistency of findings across the three study

⁶ Euclidian distance is the straight line distance from the participant’s home to an open space play area. This ignores that a person may not actually be able to travel in a direct straight line. An alternative measure of distance or proximity is to measure the network distance which takes account of road and path routes.

designs lends support to the understanding that perceived accessibility to greenspace is associated with physical activity levels in adolescents.

The evidence from these studies supports an understanding that proximity and accessibility to greenspace are important to the relationship with adolescents' physical activity in contrast with previous suggestions that they are not (Croucher *et al.*, 2007). This may well be a result of the restricted level of mobility of young people in comparison to adults, with a greater reliance, therefore, on resources closer to home. The number of studies is too small to draw any firm conclusions and is certainly an area that should be further researched. Accessibility, as with availability, is a complex concept and may not be as practical in application to policy without a greater understanding of the factors underlying it.

3.2.3 Physical Activity Relationship to Greenspace Quality

The influence of greenspace quality on physical activity is the least researched area in respect of adolescents. Only 3 of the 19 studies included some assessment of greenspace quality (Cohen *et al.*, 2006; Ries *et al.*, 2009; Timperio *et al.*, 2008). Cohen *et al.* (2007) looked at various features and facilities of parks and found that the most common amenities in the parks were playgrounds, multipurpose fields, and picnic areas. Increased physical activity was associated with miniparks⁷, the presence of walking paths, running tracks, natural resource areas, playgrounds, basketball courts and lighting (street lights and flood lights). Running tracks appeared to have the biggest effect. This seems more likely to be because active girls seek parks with running tracks rather than running tracks increasing the activity levels of girls. Unfortunately, the cross-sectional nature of the study cannot determine the causal direction. Skateboard areas and special-use parks (such as skateboard parks) had a negative association, thought to be due to less interest being shown by girls in such activities (Cohen *et al.*, 2006). Timperio *et al.* (2008) investigated the physical activity relationship with the presence or absence of a range of features⁸ in the nearest public open space (POS) to respondents' homes. They

⁷ Defined as a park used to address limited, isolated, or unique recreational needs with service area usually <0.25-mile radius and size 2500 sq ft to 1 acre

⁸ Number of recreational facilities, number of playgrounds, amenities, walking paths, cycling paths, lighting along paths, trees providing shade, water feature, signage regarding dogs, signage restricting other activities.

found that only trees providing shade and signage regarding dogs had a relationship to physical activity. This was positive but only in girls. No relationships were detected between any of the features and boys' physical activity. The authors comment on how more research is needed to unpick these complex relationships. Ries *et al.* (2009) surveyed 316 mostly African-American adolescents. They compared park quality to self-reported park use for physical activity and accelerometer measured physical activity. Park quality was rated on a scale created from previous qualitative work with the same population. Strictly speaking, the study covered both commercial indoor settings as well as outdoor greenspace, but the authors comment on how the vast majority of observations undertaken and comments from interviews were about parks (Ries *et al.*, 2008). The quality scale consisted of nine items ranked on a five point scale including aspects such as amenities, maintenance, aesthetics and safety. Ries and colleagues found that park quality was strongly associated with self-reported park use for physical activity, but not with objectively measured physical activity. The authors suggested that perceived park quality attracts adolescents to use the public openspace (POS) but this does not necessarily mean they are active in it (Ries *et al.*, 2009). This is a view echoed by other researchers (Croucher *et al.*, 2007; Godbey *et al.*, 2005).

The studies indicate that quality may be important in attracting use. However, we are some way from determining which particular aspects, features or facilities of greenspace are consistent with promoting physical activity and in which groups of children and adolescents. The research by Ries *et al.* also suggests that there are multiple other considerations to the assessment of quality and it is not just about what features and facilities are present or absent. Social, organisational and economic factors are also implicated (Ries *et al.*, 2008). Further insight into quality can come from research on adolescent attitudes to and behaviour in greenspace. The research in this area is reviewed in the next chapter.

3.3 Use of Greenspace and Relationship to Physical Activity

An area that has received virtually no attention, until recently, has been the relationship between the actual use of greenspace and adolescent physical activity. Two quantitative studies were encountered (Jones *et al.*, 2009; Ries *et al.*, 2009). One study demonstrated

that self-reported park use was not strongly predictive of accelerometer-measured physical activity (Ries *et al.*, 2009). As mentioned earlier, this may be because once in greenspace adolescents are mostly inactive. The study by Jones *et al.* (2009) tracked the location of moderate and vigorous physical activity (MVPA) in English urban and rural children aged 9-10 years using GPS combined with accelerometers. This is a new method in environment/greenspace and physical activity research and has the potential to give very detailed information about where physical activity takes place. Over a period of four days they found that MVPA took place in nine types of land use: gardens, streets, other built land use, buildings, grassland, farmland, parks, woodlands and beaches. Most MVPA took place in gardens, streets and other built land use for girls and urban children. Boys were, on average, more active and did more of their MVPA in grassland and farmland and less in other built land use. Of note is that only a small percentage of the children's MVPA took place in parks. This percentage did not increase much if beaches and woodlands were also included. Overall this study indicates that parks and other greenspace are not used as much for MVPA as other locations such as the street or gardens at this age. It suggests that girls may get more MVPA in parks than boys do, but boys may use a wider variety of places for MVPA than girls.

Both these studies suggest that a limited amount of physical activity is taking place in parks. However, no firm conclusions can be drawn from this research as there are only two studies. Both samples have limitations regarding the extent to which generalisations can be made. Both are limited in terms of number of respondents. The study by Ries *et al.* included mainly African-American adolescents and was conducted in the USA. The study by Jones *et al.* included only 100 participants, selected through convenience, and they were children rather than adolescents. Their sample also included both rural and urban children. This will have affected the range of land use types available, and a difference between rural and urban children's MVPA in different locations was demonstrated. It was not clear whether some land use types such as grassland may have been greenspace or mainly available in rural areas. Finally, Jones and colleagues only assessed MVPA and not light physical activity. Perhaps parks and other greenspace have more of an influence on walking and other forms of light physical activity.

The study by Jones *et al.* is important because, for the first time, it demonstrates the relative importance of different places to physical activity in children. This type of research offers exciting scope to explore levels of use and physical activity behaviour in greenspace.

3.4 Factors Associated with Use of Greenspace for Physical Activity

Ries *et al.* (2008) carried out a qualitative study to identify the influences on recreational facility use for physical activity. This was one of only two qualitative studies encountered which explored greenspace associations with physical activity. The study combined observations of parks with interviews. A synthesis of the results found that adolescents were attracted to:

- Low-cost facilities
- Well-maintained facilities
- Facilities that offered preferred activities
- Facilities within close proximity to home
- Facilities that were perceived to be safe (this was especially the case for the girls)
- Facilities where they found other active adolescents

An issue with this research is that it identifies aspects of greenspace that appear to attract use but it is not clear if these attributes are indeed related to physical activity.

3.5 Summary

A lack of consistency across the studies means that little that is conclusive can be said about the relationship between quantity of greenspace and the physical activity levels of adolescents, although, the most robust studies are suggestive of a positive association. There is some support for a positive association with perceived availability, but the number of studies is too small to draw firm conclusions. They are also too few in number to make any comment on whether perceived measures are likely to have a stronger relationship to physical activity than objective ones. Perceived measures are inherently more complex to understand than objective ones. Consequently, they may not be as useful in informing policy and practice unless there is a better understanding of the underlying factors that contribute to the overall concept. The four studies that

investigated proximity and perceived accessibility all showed a positive relationship, suggesting these aspects of greenspace provision are important to adolescents. This contrasts with conclusions drawn from research mainly conducted with adults, and may be due to differences in the mobility of the two different population groups.

The lack of consistent findings on relationships between adolescent physical activity and greenspace quantity, quality and access may be for several reasons. Firstly, the evidence indicates there are differences in the relationship between greenspace and physical activity by gender, ethnicity and the type of greenspace investigated. Secondly, the age range, settings for research and characteristics of the participants vary across different studies. In addition, different types of measurements of greenspace and physical activity have been used. There is a need to better understand the influence of age, gender and other characteristics that may influence the relationship between greenspace and physical activity in different subsets of the adolescent population. A greater inclusion of qualitative studies could aid understanding here, as well as providing further insights into the nature of the relationship between greenspace and physical activity.

The research is dominated by studies conducted in the USA and Australia, with only two conducted in the UK. This limits generalisation to Scotland and the UK. The cross-sectional nature of much of the research limits the conclusions that can be drawn from the evidence base. The studies are almost entirely focused on aspects of provision of greenspace in terms of quantity, availability and accessibility. Much less attention has been paid to aspects of quality. Quality encompasses a wide variety of attributes of greenspace and the research has only just started to investigate some of these. There are indications that quality is important in attracting use in the first instance, as well as certain features and facilities that may promote or inhibit physical activity in different groups. As yet, no clear conclusions can be drawn about these and further research is warranted.

A variety of different greenspace types have been investigated, however, there is a predominance of research on parks. Research is needed that encompasses a broader range of greenspace. Linked to this is the need to better understand physical activity and actual use of greenspace. Several research groups within the UK have started to

investigate this, SPEEDY - <http://www.mrc-epid.cam.ac.uk/Research/Studies/SPEEDY/> and PEACH - <http://www.bristol.ac.uk/enhs/peach/project/>, but within the timescale of this review, only one relevant study had yet been published (Jones *et al.*, 2009). Understanding if it is the presence of greenspace (provision) or the use of greenspace (or both) has implications for the range and types of greenspace infrastructure that is provided. A relationship to provision but not to use suggests that greenspace may act as an incentive to be outside more and engage in more active transport. A relationship between use and physical activity supports the idea that greenspace is an opportunity to be active. If greenspace acts more as an incentive, it may be that smaller, more numerous and aesthetic greenspaces are required. Alternatively, if greenspace exerts its influence more as an opportunity, perhaps larger greenspaces are more preferable with more facilities for physical activity.

3.6 Literature Update

Since 2009, a number of additional studies have been published of relevance to the relationship between greenspace and adolescent or children's physical activity. These include two reviews (Lachowycz and Jones, 2011; Lee and Maheswaran, 2010) and eight primary studies (Almanza *et al.*, 2012; Beets *et al.*, 2011; Boone-Heinenon *et al.*, 2010; Chomitz *et al.*, 2011; Lachowycz *et al.*, 2012; Prins *et al.*, 2011; Quigg *et al.*, 2010; Wheeler *et al.*, 2010).

Lachowycz and Jones (2011) conducted a systematic review in which they included an examination of the quantitative research on the association between objectively measured access to greenspace and physical activity covering the period 200 to 2010. A number of studies were identified which reported results on children and adolescents. A summary of the findings from these revealed that six reported a positive association between access to greenspace and increased levels of physical activity. However, a further three had equivocal results and five showed no association. In addition, there was evidence that there were differences by sex and ethnicity. The conclusion the authors reached when considering all the studies (adults, seniors and children and adolescents) was that the evidence base remains mixed for an association between greenspace access and physical activity. This appears to be no less the case when only considering the research involving children and adolescents.

Lee and Maheswaran (2010) carried out a review of the health benefits of greenspace which included a section on the relationship to physical activity. They also concluded that, although there is a strong evidence base for the health benefits of physical activity, the evidence for the link between availability of greenspace and physical activity is weak.

An overview of the more recent primary research studies does not substantially alter the strength of the evidence base or the conclusions derived from it. Three of the studies addressed the issue of quantity of greenspace and its association with physical activity in children/adolescents (Almanza *et al.*, 2012; Boone-Heinenon *et al.*, 2010; Prins *et al.*, 2011). Boone-Heinenon *et al.* found a positive association between percentage greenspace and self-report of equal to or more than five bouts of MVPA in a week in a sample of 10,359 American 12-18 year olds. The other two studies found no association. Prins *et al.* examined the relationship between number of parks and accelerometer measured MVPA in 209 Australian adolescents (mean age 14.5 years). Almanza *et al.* investigated the relationship between the greenness index of a neighbourhood and accelerometer measured MVPA in 208 American children/adolescents aged 8-14 years. A lack of association in the latter two studies may be a factor of their relatively small sample sizes, especially in comparison to the very large sample used by Boone-Heinenon *et al.* However, when added to the study summary presented earlier in table 3.3, there is no change to the overall conclusion of mixed findings.

Regarding the issue of proximity, Boone-Heinenon *et al.* (2010) also demonstrated a positive relationship between proximity to greenspace and reports of equal to or more than five bouts of MVPA in a week and participation in active sports. This adds further support to the importance of proximity.

Since the studies by Ries *et al.* (2009) and Jones *et al.* (2009) there have been several more that have investigated the relationship between use of greenspace and physical activity. There has also been research carried out on the location of physical activity giving some indication of the contribution that physical activity taking place in greenspace makes to overall physical activity accumulation (Almanza *et al.*, 2012; Beets *et al.*, 2011; Chomitz *et al.*, 2011; Lachowycz *et al.*, 2012; Quigg *et al.*, 2010;

Wheeler *et al.*, 2010). Chomitz *et al.*, using a questionnaire survey of 926 American adolescents (aged 11-14 years), found a positive relationship between use of greenspace and meeting physical activity guidelines. Almanza *et al.* , mentioned earlier, also examined the relationship between the 'greenness' index of a 30 metre buffer to each recorded physical activity location and demonstrated that exposure to greenspace was positively associated with MVPA . Wheeler *et al.* (2010) examined the location of MVPA in 1307 primary pupils (aged 10-11 years) from across Bristol, UK also using GPS and accelerometers. They showed that when in greenspace, the activity taking place was more likely to be more vigorous than when outside but not in greenspace. They also demonstrated that these pupils only spent about an average of 13% of their non-school time outdoors and only 7% of boy's and 5% of girl's total non-school activity took place in greenspace. Quigg *et al.* demonstrated, through the use of GPS and accelerometers, that 2% of total daily physical activity took place in parks in playgrounds for a sample of 184 five to ten year olds from two low socioeconomic status neighbourhoods in Dunedin, New Zealand. In research with the same cohort of participants as used in the study by Wheeler *et al.*, Lachowycz *et al.* (2012) revealed that most MVPA takes place in the home, especially at weekends. On weekdays, when it does occur outside, a greater proportion takes place in the garden (22%) compared to in public greenspace (10%). At weekends public greenspace is used more with 29% of outdoor MVPA taking place there and 16% in private gardens. One final study, the only qualitative one, asked a number of randomly selected American 9-11 year olds to take photographs of the locations where they were physically active (Beets *et al.*, 2011). These photographs were then discussed in interviews and/or focus groups. A total of 66 provided results and content analysis of the photographs revealed that the front or back yard and driveway were by far the most photographed locations (69%). Greenspace such as parks and sports fields also featured, although nowhere near to the same extent.

In summary, this additional research does not alter the conclusion that evidence for a link between quantity and availability of greenspace is uncertain. Proximity to greenspace is further supported as being associated with greater levels of physical activity in children and adolescents, however, the studies are cross-sectional and are still too few in number to allow for a firm conclusion. The research indicates that physical activity does take place in greenspace, however, this is only one of the locations where

physical activity takes place and it may be less used than other locations such as gardens, yards and driveways closer to home. However, when activity does take place in greenspace the evidence suggests it is of a greater intensity than occurs in the other locations and therefore may be of greater importance in meeting guidelines for MVPA.

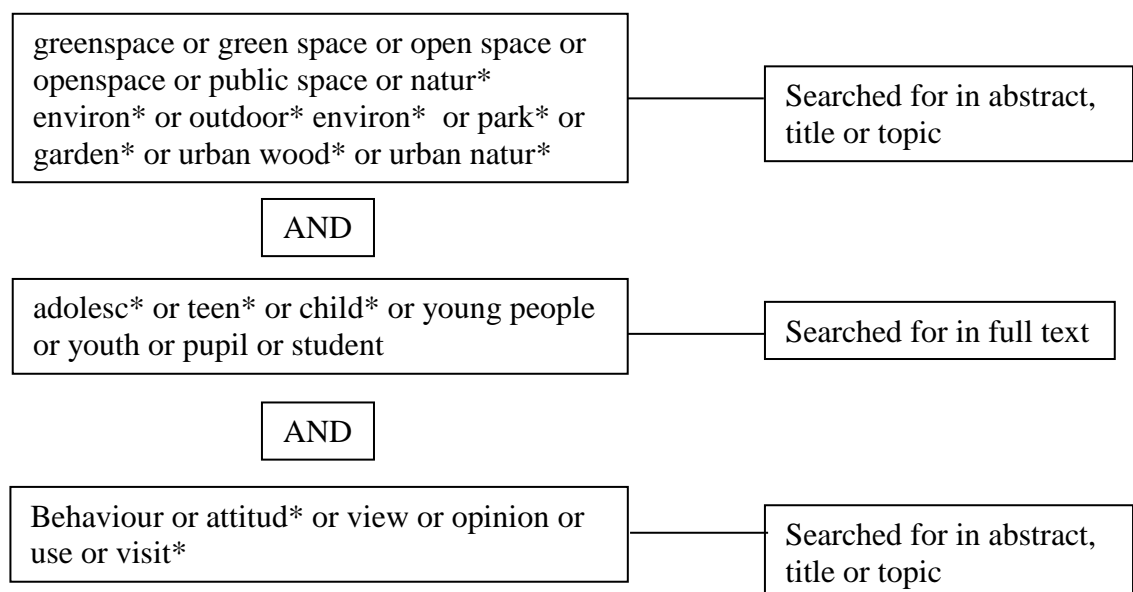
4 Adolescents' Attitudes to and Use of Greenspace

4.1 Introduction

This chapter presents a review and critique of the UK research on the attitudes of adolescents to greenspace and how they interact with it. Reference to international research, wider public space and neighbourhood research has also been made due to limitations in the extent of the research specifically on greenspace in the UK.

A literature search was conducted; see Figure 4.1 for key terms and the main combinations used (where possible). The databases searched were as for Chapter Three. In addition, the following organisational sites were searched for relevant research reports: Greenspace Scotland, Greenspace, CABE, OpenSpace and Scottish Natural Heritage. Only studies referring specifically to parks or other type of green space, which explicitly presented results for adolescents as a separate group from either adults (age greater than 18 years) or children (age less than 12 years) were considered, although a strict age range for adolescents was difficult to apply, as previously discussed in Chapter Three. Due to the limited number of studies encountered, those investigating broader natural heritage (including more distant countryside) were also considered. Seven studies were identified from between 1995 and 2009 (Bell *et al.*, 2003; Dunnett *et al.*, 2002; Comedia and Demos, 1995; Greenspace, 2007; Jones *et al.*, 2008; Progressive Partnership, 2007; Travlou and Roe, 2009).

Figure 4.1 Key search terms and combinations



The majority of this research was from non-peer reviewed reports. Only one of the studies appeared as an article in a peer-reviewed journal (Bell *et al.*, 2003). Several of the primary studies were commissioned or carried out by stakeholders with a vested interest in greenspace, such as the Central Woodland Trust, Scottish Natural Heritage (SNH) and Greenspace (Greenspace, 2007; Progressive Partnership, 2007; Travlou and Roe, 2009). In addition, the studies were often limited in scale (For example, Travlou and Roe, 2009), or researched a specific type of greenspace such as only woodlands, for example Bell *et al.* (2003). The evidence is, therefore, limited in quantity, as well as robustness, and a degree of caution is advised in drawing firm conclusions from it.

Several themes of enquiry were evident from this primary research:

- Levels of greenspace use and types of use, i.e. activities in greenspace, by adolescents and the importance of greenspace to adolescents
- Motivations to use greenspace
- Perceptions of and attitudes to greenspace
- Problems associated with greenspace including dislikes and barriers to use
- Access to greenspace
- Desires concerning greenspace
- Memories of greenspace and influence on use in later life

This chapter addresses the evidence with respect to each of these themes in turn.

4.2 Importance of Greenspace and Levels of Use by Adolescents

Evidence of the importance of greenspace to adolescents, indicated by levels of use, is limited and inconsistent. A review of surveys from across England and Wales undertaken between 1972 and 1991 concluded that the large majority of the users of parks tended to be those aged 15 years and younger (Lewellyn Davies cited in Dunnett *et al.*, 2002). In contrast, in other research, observations of park users indicated that young and middle-aged adults made up over half the users (Comedia and Demos, 1995). The measure used in both of these studies was proportion of observed park users who were adolescents. No account appears to have been taken of the proportions present in parks in relation to the proportions of different types of user present in the surrounding residential population. This might have given a clearer indication of

relative levels of use. Also, the research is now quite dated and levels of use may well have changed.

In qualitative focus groups with adolescents from several different Local Authority areas across England and Wales, adolescents commented on how much they used parks, especially during the summer time when the weather was better (Comedia and Demos, 1995). The respondents expressed concern over what they would do if there were no parks. The authors noted that:

One of the most significant findings of the research (Bromley, Greenwich, Middlesbrough, Leicester, Bristol) is how important parks are to young people, whether park managers or other users like them or not. (p48)

This suggests that parks are important to adolescents and they are making substantial use of them. However, reliance on qualitative statements of regularity of use is not robust enough to give a clear indication of levels of use.

Small-scale qualitative research suggested that young adolescents in Central Scotland were low users of woodlands (Bell *et al.*, 2003). Again, the small-scale and qualitative nature of this research limits the conclusions that can be made from this study. In addition, the findings can only be applied to woodlands and not to other types of greenspace.

A more recent questionnaire survey of Scottish adolescents aged 10-17 years was carried out for SNH (Progressive Partnership, 2007). The survey was of a nationally representative sample of different age groups and gives a clearer, more up to date indication of levels of greenspace use across Scotland. It found that 56% of the adolescents reported visiting natural heritage at least once per week. This was in comparison to 74% of adults, suggesting adolescents are less frequent users than adults. However, this research was with respect to natural heritage. This was defined as “*countryside, our coastlines, and green areas in town and cities, and every living thing these support*”. This includes a much broader range of natural environments than greenspace, including distant countryside. Adolescents are likely to have less mobility to access the countryside than adults which may explain the difference.

Evidence is equivocal from UK studies on wider populations and international research on adolescent use of greenspace (and broader natural environments), with uncertainty regarding whether they are the main users or not. A Swedish study showed that those aged 7 to 17 years reported 220 visits to urban open greenspace per year compared to 130 visits among adults and pensioners (Grahn and Stigsdotter, 2003), suggesting young people as greater users of green space. Kipke *et al.* (2007) carried out observations of the age range of users of parks in the USA and found young people to be missing from these, suggesting adults as the greater users of parks. Bell *et al.* (2004) observed visitor numbers to a range of open green space sites across an area of England and found fewer children visited than expected, again suggesting adults as the greater users.

One explanation for the contradictory results is the difference in methods and type of natural environment included in each study. Parks may not be comparable to woodlands or broader natural environments including distant countryside. The UK studies indicating high levels of adolescent use were those that focused on parks and those where the young people themselves reported levels of use. The studies suggesting low use of greenspace used observations or investigated woodlands or natural environment. Observations risk missing the periods of time when adolescents use parks, for example the cut-off time used in the study by Kipke *et al.* (2007) was 7pm. Some research supports late use of parks by teenagers (Comedia and Demos, 1995). The authors described the use of a park in Bromley, England by a changing group of teenagers over a period of 10 years and how it was used every evening till 10pm or later.

4.2.1 Influence of Gender on Level of Greenspace Use

Determining use of greenspace is further complicated by the suggested influence of gender. UK and international research on park users has noted a tendency for there to be more men than women in parks (Cohen *et al.*, 2007; Dunnett *et al.*, 2002; Comedia and Demos, 1995; Harding, 2003). Comedia and Demos (1995) found a fairly consistent ratio of six men to four women in surveys of park users. An American study of young people aged 7-14 years found boys used parks more than girls (Loukaitou-Sideris and Stieglitz, 2002). Some support is also offered for a gender difference in woodland use by adolescents in Scotland (Bell *et al.*, 2003). Bell *et al.* revealed increased concerns

about where girls go recreationally and greater parental restrictions on their independent mobility. There may be some doubt, however, about the influence of gender because research on adolescents and their use of public space indicates there may be little difference between girls and boys (Matthews *et al.*, 1998; Travlou, 2003; Tucker and Matthews, 2001). Also, the differential relationship may depend on the type of green space investigated.

4.2.2 Influence of Socio-economic Status (SES) on Levels of Greenspace Use

Loukaitou-Sideris and Stieglitz (2002) demonstrated that SES may influence the use of green space. They demonstrated that deprived inner city children were greater users of parks than more affluent suburban ones. This was attributed to a greater reliance on parks by the inner city children as a no cost leisure destination compared to children from families with greater financial resources to go to more distant and costly places. Travlou and Roe (2009) used focus groups to investigate the views and use of greenspace of adolescents aged 15-17 years. Two focus groups were conducted, one each from contrasting locations in central Scotland. The researchers noted that those from the more deprived area tended to prefer to “hang about on the streets” rather than visit local parks or woods. This contrasted with the group from the less deprived area which described using a variety of green spaces. However, the adolescents in these focus groups differed not only in economic terms but also in educational aspects, as well as in level of urbanity. Those from the less deprived area were also more rural and from a more educated background. It is difficult to interpret, therefore, whether differences were attributable to SES, educational aspirations or level of urbanity.

A key element in understanding the role of greenspace as a resource for physical activity is to understand levels of use and whether factors such as gender or SES influence use. The evidence is currently insufficient in this respect and there is clearly a need for further research relevant to Scotland. This will not only contribute to understanding the role of greenspace as a resource for physical activity, but also contribute to an understanding of health inequalities in adolescents and help support the planning and management of greenspace for other recreational purposes.

4.2.3 Activities in Greenspace

Research was very limited on the activities that adolescents engage in when in greenspace. Only two of the studies encountered commented on this (Bell *et al.*, 2003; Travlou and Roe, 2009). Focus group discussions revealed that adolescents from central Scotland, aged 12-14 years, showed they were still engaged in play activities in local woodlands (Bell *et al.*, 2003). Site observations in the same study indicated that adolescents may also start to get involved with illicit drinking, smoking and vandalism in the woods, although it may be difficult to judge the age of those involved in such behaviours from observations alone. Travlou and Roe (2009) investigated a broader range of greenspace. The adolescents in their study reported a range of activities when in greenspace including: “getting chased by gangs of youths”, sitting and drinking, camping in woods, relaxing and talking. Neither study specifically researched the relationship between greenspace and physical activity, and only provided limited information in this regard.

It has been noted that little is known about the physical activities of people once they are in a park or greenspace, with an apparent assumption that use of greenspace is primarily motivated by a desire to be active and, therefore, automatically has an impact on physical activity (Godbey *et al.*, 2005). A better understanding of the types of activities that adolescents engage in when in parks may help to identify what facilities need to be modified, improved or provided to help encourage physical activity.

4.3 Motivations to Use Greenspace

Research on adolescent motivations to use greenspace was limited to two questionnaire-based studies (Greenspace, 2007; Progressive Partnership, 2007). A survey of park satisfaction and use across the UK was conducted by Greenspace. Children up to age 16 years reported that their primary reasons for going to greenspace were to play sport or games or to meet friends (Greenspace, 2007). Other slightly less common reasons included for fresh air, to ride a bike, to exercise and to relax or think. Research into motivations to go to natural heritage showed adolescents primarily went for leisure, sport, to be with family or friends and for health and relaxation (Progressive Partnership, 2007). Whilst this gives some indication of motivations, there are limitations to this evidence. Aggregation of children and adolescents in both surveys

may obscure reasons more pertinent to adolescents. The Greenspace survey was not nationally representative and respondents were primarily from a small number of Local Authority (LA) areas that promoted the GreenSTAT questionnaire. It might be supposed that these LAs were more motivated towards their greenspace which may have biased responses about satisfaction and use and limits the ability to generalise from this study. Motivations to go to natural heritage may differ from those for going to local greenspace. More research is needed to better understand adolescent motivations to use greenspace and support ways to encourage greater use and more physical activity.

4.4 Perceptions of and Attitudes to Greenspace

4.4.1 Attitudes to Greenspace

Perceptions of and attitudes towards greenspace have received a limited amount of research attention in the UK to date. There is some overlap with research into problems associated with greenspace which is addressed in section 4.5.

In the UK, one study found that interest in parks peaks at about age 8-9 years, with a decline in interest particularly from about S2 onwards (age 12-13 years) (Dunnett *et al.*, 2002). This is based on a survey of approximately 1000 children from one Local Authority area (Dunnett *et al.*, 2002). In qualitative research, adolescents aged 15-17 years were found to be less interested than younger adolescents and children in visiting woodlands (Bell *et al.*, 2003). A questionnaire survey of attitudes towards the natural heritage in Scotland demonstrated that a lower proportion of the adolescent age group reported enjoying natural heritage a lot, 60% compared to 75% of children (Progressive Partnership, 2007). This also demonstrated that those aged 10-17 years were the least likely to be interested in natural heritage when compared to adults and children. The survey for SNH showed that adolescents prioritised fun over the natural heritage (Progressive Partnership, 2007). The focus group research by Travlou and Roe (2009) found that their adolescent participants generally expressed negative attitudes towards greenspace, associating it with boredom, lack of safety, unattractiveness, lack of excitement and they felt it catered only for younger children. When asked about their favourite places, greenspace did not feature at all in the focus group from the more deprived urban area, and was not prominent in the rural more affluent group.

International research has also indicated that there may be a decrease in interest in natural environments during the teenage years (Kaplan and Kaplan, 2002; Korpela, 2002), although, evidence suggests that greenspace may still be perceived as one of the best places to go for feeling better and getting life into perspective (Korpela, 2002).

4.4.2 Influence of Gender on Attitudes to Greenspace

Preference for natural environments may be influenced by gender with girls having a greater preference for indoor environments and boys for outdoor ones (Korpela, 2002). One UK study made reference to this and tended to support this understanding (Bell *et al.*, 2003). Lack of interest in woodlands in mid-teen adolescents, as mentioned earlier, was found to be especially the case for the girls. Visiting the woods was regarded as “uncool” and they expressed concerns about how they would be perceived, especially if they were with a group of boys (Bell *et al.*, 2003).

4.4.3 Perceptions of Greenspace

Focus group research showed how adolescents perceived parks as a place to “hang out”, to meet with friends for social interaction including flirting and kissing (Comedia and Demos, 1995). Also, the park was viewed as a place to escape from the pressures at home such as chores, nagging and annoying siblings. The adolescents commented on how the park was a good place to go to vent anger and avoid hurting family (Comedia and Demos, 1995). This research is somewhat dated now and it is possible that attitudes and perceptions for today’s adolescents may have changed, however, support for the perception of greenspace as a place to be with friends, to relax and escape was also found in more recent research by Travlou and Roe (2009).

The earlier study also found that adolescents perceived that at night the park became deserted and, in effect, became “their” park suggesting a positive sense of ownership, albeit temporary (Comedia and Demos, 1995). Also, the park was perceived as safer than being on the street where some adolescents described bullying behaviour such as name-calling. There was a perception that on the street there was a greater chance of being “snatched”, therefore, the park was safer, despite concerns over other users of parks (Comedia and Demos, 1995). This contrasts with later research where adolescents

were found to perceive parks as “arenas for bullying and vandalism” and where the adolescents were in general quite critical of parks and greenspace (Dunnett *et al.*, 2002).

A decline in interest in natural environments may contribute to decreased levels of greenspace use and preference for other locations for leisure. These may include indoor locations such as shopping centres, the cinema, ten- pin bowling alley, the homes or houses of friends (Travlou, 2003, 2004). The importance of being outdoors in relation to keeping physically active has been emphasised by clear evidence of the association between time spent outdoors and physical activity levels of young people (Ferreira *et al.*, 2007; Sallis *et al.*, 2000). It is, therefore, important to further explore the apparent decrease in preference for greenspace and whether this impacts on level of use. Attention also needs to be given to further investigating a possible gender effect on greenspace preference. Despite negative perceptions of and attitudes towards greenspace, this was not universal and several positive features of greenspace were identified by adolescents. These positive attributes have much in common with findings from wider public space research and are discussed in more detail in section 4.7.

4.5 Problems Associated with Greenspace – dislikes and barriers to use

Investigation of problems associated with adolescent greenspace use has been one of the main areas of research focus. Several key distinct themes arise from this aspect of the research: issues associated with exclusion, safety fears, boredom and physical environmental quality.

4.5.1 Exclusion

Comedia and Demos (1995) describe how the adolescents in their study felt excluded from other places where they would rather be, such as the town centre or cinema. This was a result of either running out of money or being moved on. They felt that the park was the only place for them to go. However, adolescents commented on how they were “thrown off” swings and other such playground apparatus by adults who thought they were too old for it (Comedia and Demos, 1995). In other qualitative research, adolescents have commented on how they felt adults disapproved of them using swings (Dunnett *et al.*, 2002). More recent research from Glasgow demonstrated that

adolescents can feel frustrated over the perceived unacceptability of their behaviours in greenspace, and over how it is assumed that a group of young people gathered together must be drinking (Jones *et al.*, 2008). This describes a situation where exclusion from other leisure locations can encourage greater use of greenspace, but this may be reluctant. However, disapproval and distrust can also affect adolescent behaviour and experiences in parks which may affect their enjoyment and levels of use.

In public space research it has been shown how adolescents have experienced harassment and social stigma and been moved on from a variety of public spaces (Travlou, 2003; Valentine, 2004a; Valentine *et al.*, 1998). The situation regarding greenspace appears to be no different. Social exclusion and stigma appear to have been consistent sources of dissatisfaction for adolescents in their relationship with public space (Travlou, 2003). It has been noted that adolescents do not have access to autonomous space of their own, where they have sole control over it (Valentine *et al.*, 1998). Their only option is to use public space which, some have argued, is increasingly regarded as the domain of adults where the presence of young people is often not welcomed (Valentine, 2004a). Adolescents can use places in different ways to that which is intended or conceived by adult designers and users. This brings them into conflict with adults. Attempts have been made to curtail such socially unacceptable behaviour (Travlou, 2003; Valentine, 2004a; Valentine *et al.*, 1998). This can further emphasise (perceived) adult hegemony over public space and increase the social exclusion of adolescents from such places. This could be a substantial problem in encouraging adolescents to use greenspace more often to increase their activity levels. However, it may be the case that parks are regarded differently from other types of public space. The comment that the park was the only place to go, when moved on from elsewhere, suggests there may be a greater level of tolerance for adolescents to be present in parks compared to other public space.

4.5.2 Concerns about Safety

Concerns about safety appear to be a key issue with respect to use of greenspace. Adolescents have expressed concern about other groups of young people and their behaviour (Bell *et al.*, 2003; Dunnett *et al.*, 2002; Comedia and Demos, 1995), especially commented on by girls in relation to woodland use (Bell *et al.*, 2003). Safety

fears were one of the main deterrents to park and greenspace use expressed by 12-15 year-old non-park users (Dunnett *et al.*, 2002). Gang fighting and the presence of drug users were mentioned by adolescents, from a relatively deprived area of Glasgow, as inhibitory to greenspace use, with gang activity and territorialism affecting where they felt able to go (Jones *et al.*, 2008). Also mentioned was the presence of broken glass and vandalism, however, it was not clear whether these were related to safety or aesthetic concerns. Travlou and Roe (2009) concluded that greenspace was often unattractive to the adolescents due to lack of facilities combined with associations with danger and dangerous “others”. The issue of undesirable others seems to be a consistent concern in respect of safety fears and the adolescents in Glasgow were supportive of measures to address anti-social behaviour, in particular through improvements in lighting and use of surveillance cameras (Jones *et al.*, 2008).

Concerns about safety, whether in greenspace or the wider public realm outside, have been a commonly repeated theme. Research on public space and international studies have shown a tendency for concerns to revolve mostly around undesirable “others” (Godbey *et al.*, 2005; Loukaitou-Sideris and Stieglitz, 2002; Travlou, 2003, 2006; Wridt, 2004). Some writers have suggested that modern society in the UK and in the US has become risk averse with fear of dangerous elements in our wider neighbourhood environment contributing to reduced access to the outdoors and greenspace by our young people (Gill, 2007; Louv, 2005). It is a difficult issue as adolescents are both reported as fearful and at the same time are being cited as one of the reasons for others to feel fearful; they are perceived as both victims and perpetrators (Valentine, 2004a). Safety concerns are clearly an issue, although it remains unclear to what extent this impacts on actual levels of use.

4.5.3 Boredom

Several of the studies highlighted how boredom could be an issue in relation to use of greenspace (Dunnett *et al.*, 2002; Jones *et al.*, 2008; Travlou and Roe, 2009). Adolescents aged 12-15 years and older ones aged 16-19 years reported being put off using parks and greenspace by there not being enough to do. They reported they would be encouraged to use them more by having more to do, including more sports facilities and cafes (16-19 year-olds), and more events (Dunnett *et al.*, 2002). Adolescents from

Glasgow felt there was little for them to do in parks and boredom was cited as a reason for taking part in acts of vandalism (Jones *et al.*, 2008). Travlou and Roe (2009) found that often the adolescents found greenspace unattractive due to lack of facilities and lack of excitement.

It may be that boredom is a factor contributing to decline in interest in natural environments during adolescence. Alternatively, it could be a feature of poor provision of facilities or not catering for the needs or desires of adolescents. It is not possible to comment on this from the research to date. Valentine (2004) claims that adolescents are provided with token spaces (whether public or greenspace) which are not suited to their needs or aspirations. She comments that adolescents desire to engage in adult activities but often have no access to them, e.g. pubs and gyms. Clearly catering to their needs and improving their engagement with greenspace is an important issue in promoting use.

4.5.4 Physical Environmental Quality

Several of the greenspace characteristics that adolescents complain about relate to features of the physical environmental quality. Adolescents were found to be critical of the condition of play equipment, presence of broken glass and lack of maintenance in parks (Comedia and Demos, 1995), although there was recognition from the adolescents themselves that some of their actions contribute to this. Dunnnett *et al.* (2002) found that adolescents cited poor maintenance as one of the key deterrents to park and greenspace use. The GreenSTAT questionnaire found that less than half (46%) of those aged under 16 years rated the facilities for children in their local parks as good or very good (Greenspace, 2007). The adolescents in the study by Travlou and Roe (2009) thought that local greenspace lacked appropriate management and maintenance. Adolescents from Glasgow cited litter, vandalised park equipment and broken glass among the problems in their local parks (Jones *et al.*, 2008). Public space research has also shown that the presence of litter was found to be a consistent source of dissatisfaction with public places used by adolescents (Travlou, 2003). Poor environment quality was found to be a barrier to engaging with outdoor adventure experiences, which included use of greenspace (Travlou, 2006). This suggests that adolescents are aware of the appearance and quality of the greenspace they use and this is important to them. It has been

suggested, however, that adolescents, although aware of the aesthetics and quality of the natural or physical environment, can be quite ambivalent about aesthetics (Kaplan and Kaplan, 2002; Travlou, 2007). Such quality issues are thought to be secondary to the social characteristics of place (Travlou, 2007).

In Chapter Three it was shown that environmental quality may well be an important issue for the relationship between green space and physical activity, but to date has not been studied to the extent of other factors. This, alongside the research on greenspace attitudes and use, strengthens the idea that quality is an important aspect of greenspace.

4.5.5 Other Problems

In addition to the key problems described above, several others were encountered including:

- Weather was found to be potentially restrictive on greenspace use (Travlou and Roe, 2009)
- Older adolescents remarked they could find it difficult to use greenspace due to unsocial working hours (Dunnett *et al.*, 2002)
- Although very little of the research on greenspace demonstrated any issues relating to socio-economic status or ethnicity, these were cited as consistent barriers to outdoor adventure experiences in a review by Travlou (2006)

4.6 Access

Some evidence was encountered which indicated that access to greenspace may be an issue for adolescents in the UK, thus tending to support the suggestion that accessibility and proximity are important in the relationship between greenspace and adolescent physical activity, as already discussed. A survey of 1000 children in one Local Authority showed they tended to use small local parks rather than larger, more distant ones (Dunnett *et al.*, 2002). A survey of adolescents found that they would use greenspace more if it was easier to get to (Dunnett *et al.*, 2002). Travlou and Roe (2009) reported that easy access was a key issue in the use of greenspace. However, the Local Authority survey included a wide range of both primary and secondary school children which may have obscured any differences in the behaviour of adolescents. The woodland study by Bell *et al.* (2003) found that adolescents aged 12-17 years were found to travel further afield than primary school children. They were also afforded

more freedom by their parents. Other research has indicated that independent mobility increases with age (Davis and Jones, 1996; Von Vliet, 1983). These findings suggest that adolescents have more freedom to travel to more distant places than younger children and do so. Combining the results for children and adolescents may therefore have over-estimated the importance of proximity for adolescents. Out of a choice of 10 deterrents to the use of greenspace, only 20% of those aged 12-15 years and 25% of 15-19 year-olds chose poor access or “too far away”. Access as a deterrent came near the bottom of a list of ten options (Dunnett *et al.*, 2002). Thus there remains a degree of uncertainty regarding the impact of access on greenspace use by adolescents.

4.7 Desires Concerning Greenspace

Some of the researchers explored what adolescents wanted with respect to greenspace. Suggestions included youth zones, youth shelter, a basketball post, drinking fountain, toilets and kiosk (Dunnett *et al.*, 2002). In Glasgow mention was made of desire for a youth centre, a place to sit and talk out of the rain (Jones *et al.*, 2008). These adolescents particularly mentioned wanting a place that they had ownership of and control over and felt that this would help prevent it getting vandalised. However, the authors commented they thought this was perhaps naïve considering that the previous youth centre had been set on fire (Jones *et al.*, 2008). The authors also felt that the desires were somewhat limited considering that one of the main complaints about greenspace had been the lack of things to do. There was mention made of a desire for facilities aimed at the adolescent age group (Jones *et al.*, 2008), but what shape or form this might take, other than a youth centre, was not elaborated on. The adolescents in the study by Travlou and Roe (2009) were asked to describe their ideal greenspace, but many found this difficult to do. This was especially the case for those in the focus group from the more deprived urban area (Travlou and Roe, 2009). This group described desirable characteristics that were illegal as well as some that would be likely to bring them into conflict with other users, although, the researchers comment that these ideal characteristics may have been intended to shock the researchers rather than truly reflect their wants (Travlou and Roe, 2009). The adolescents in this study also mentioned wanting a place away from adult supervision, a place only for young people, not busy and which it was their responsibility to look after.

Research on adolescents and public space has encountered similarities in what adolescents seek from a place. It has been repeatedly shown that they look for freedom and control (or autonomy) in the places they use (Davis and Jones, 1996; Travlou, 2003, 2007). This resonates with the desire for their own youth centre, youth zone or place only for them, where they are in charge. This desire also chimes with another important characteristic of public space felt to be important to adolescents, which is somewhere to meet peers for social interaction and a sense of acceptance (Travlou, 2003). However, there was little indication given of the nature of the facilities sought, even though it was evident that more appropriate provision for adolescents was a desire and lack of facilities was implicated in adolescents' sense that greenspace was boring. More sporting facilities and general amenities were suggested but overall it remains unclear what features of greenspace are appreciated, used, desired or would encourage greater levels of use of greenspace and physical activity in greenspace.

4.8 Memories

The potential for childhood memories to influence use of greenspace as an adolescent arose as an issue in one study (Travlou and Roe, 2009). The authors concluded that their evidence suggested that childhood experiences were linked to the adolescents' current attitudes and behaviours. However, this is not clear from the data presented. The childhood memories reported were of playing games, climbing trees, playing on swings and exploring which appeared generally positive, yet the authors reported that current attitudes towards greenspace were generally negative with greenspace perceived as boring, unsafe, unattractive and not exciting (Travlou and Roe, 2009). Other evidence exists to suggest that positive memories of childhood visits to greenspace are a significant predictor of attitudes and visits to woodlands in adulthood (Ward-Thompson *et al.*, 2008). The link between childhood memories and adult behaviour may, therefore, exist and in relation to woodlands, but it is not certain what effect they have on adolescent behaviour and attitudes towards a wider variety of greenspace.

4.9 Summary

The research on adolescent attitudes to, use of and behaviour in greenspace is limited in both quantity and quality. The evidence base is dominated by non-peer reviewed literature with much of it commissioned by stakeholders, presumed to have a vested

interest. There are limitations in the scale of many of the studies and the type of respondents included in the research. Despite this, many of the themes encountered in the research have much in common with findings from wider public space research and research from abroad. The consistency adds confidence to some of the findings. Several aspects, however, almost entirely lack evidence or lack quality or consistency. This is particularly the case for greenspace use and behaviours in greenspace, motivations to use greenspace, access and desires, and the influence of childhood memories.

Evidence for the level of use of greenspace by adolescents in Scotland is virtually non-existent and yet this is a key aspect of understanding greenspace as a resource for physical activity. Understanding how greenspace promotes physical activity in adolescents also requires an understanding of the activities they undertake there. Although research exists on this, some researchers consider that there has been a tendency for it to be assumed that once in a park people are active, and, therefore, behaviour in parks and other greenspace has tended to be ignored.

The research has shown some motivators, appreciated attributes of greenspace and a variety of barriers to use of greenspace by adolescents. There is much in common with research on wider public space and similarities to international research. This suggests key motivations are:

- To meet friends and for social interaction
- To take part in an activity such as a sport, exercise, biking, games
- To promote mental well-being – relax, think and vent anger
- To escape from annoyances at home

Other motivators included a perception that the park may be safer than being elsewhere, such as on the street. Also the park can be perceived as a place to go when excluded from elsewhere. However, these motivations have limited evidence to support them.

Barriers and problems have tended to be the major focus of greenspace attitudes and use research and the key ones to date include social exclusion and safety concerns. Boredom, dissatisfaction with physical environment quality, bad weather, unsocial working hours (for older teenagers) and access have also been encountered.

Understanding motivations and barriers is key to effective management of greenspace as a resource for adolescents. Although there are some similarities to wider public space research, there remain questions about the distinct role of greenspace in adolescents' lives for a number of reasons. Evidence is indicative of a decline in positive attitudes towards natural environments through late childhood and into the teenage years. In addition, the evidence indicates particular problems with perceptions of greenspace quality. There may be some differences in the way adolescents are perceived when in greenspace compared to other public space. Finally, public space can encompass a variety of different types of places, many of which can be indoors and commercial environments such as shopping centres and cinemas. This sets greenspace apart from public space.

4.10 Literature Update

Since 2009, a number of additional studies have been published of relevance to understanding adolescent views and use of greenspace. These include one review (McCormack *et al.*, 2010) and seven primary studies (Cohen *et al.*, 2009; Day and Wager, 2010; Floyd *et al.*, 2011; Scott Porter Research and Marketing, 2011; Tester and Baker, 2009; Tzoulas and James, 2010; Veitch *et al.*, 2012). All were peer reviewed with the exception of the study by Scott Porter Research and Marketing, which was a commissioned report for Scottish Natural Heritage.

Tzoulas and James (2010) conducted an observational study of the use of a specific greenspace network, Birchwood Forest Park in Warrington in England. A total of 1825 people were observed to use the network during April 2003 between the hours of 8:30am to 8:30pm. Only 11.5% (210) were estimated to be aged 11-18 years and the authors note that teenagers and those aged over 60 years of age were the least observed groups. This supports the understanding that teenagers are low users of greenspace in comparison to other groups. However, this does not take account of the proportion of teenagers in the surrounding population and how that compares to adults (the main users). In addition, late use, possibly more typical for teenagers, was not captured. Also, this type of greenspace may not be used by teenagers but they may be using an alternative. Therefore, this study does not help clarify levels of greenspace use in adolescents.

The study by Scott Porter Research and Marketing (2011) undertook a questionnaire of a representative sample of 11-17 year old adolescents in Scotland to survey their views on the outdoors and participation in outdoor activities. A large majority (69%) reported use of the outdoors of one to two times a week in the past 12 months, with the most popular locations being woods, forests, playing fields, beaches and parks. This gives a good indication of levels of greenspace use (although not restricted to local) in adolescents that is not limited by observation timing or location.

Several of the other studies also investigated use of greenspace (Cohen *et al.*, 2009; Day and Wager, 2010; Floyd *et al.*, 2011; Tester and Baker, 2009; Veitch *et al.*, 2012). Three looked at the impact of making park improvements on levels of use (Cohen *et al.*, 2009; Tester and Baker, 2009; Veitch *et al.*, 2012). All looked at the difference in use of parks that had improvements made to facilities and in some circumstances also the provision of programmed activities, such as sports and dance. These were compared to control parks where no improvements were made. The results were mixed with some indication that programmed activities had the most or only impact on park use by teenagers (Cohen *et al.*, 2009; Tester and Baker, 2009). However, this was not necessarily the same impact depending on gender. Tester and Baker (2009) found that an increase in programmed activities was associated with an increase in park use but only by female adolescents. Cohen *et al.* (2009) found that use by all teenagers decreased across all study parks (intervention and control) and was largely associated with a decrease in programmed activities, although the economic recession was also thought to have contributed to the decline. In contrast to both these American studies, Veitch *et al.* (2012) in an Australian park improvement intervention study with no programmed activities stated or included as part of the changes made, showed an increase in park use by those aged 5-18 years. A statistical analysis is not presented by the authors for this age group (only for an aggregate of all users), however, the data suggests a marked increase from baseline (August 2009) and at two further time points (March and then August 2010), 57, 122 and 359 respectively. In comparison the control park had 14, 13 and 2 users aged 5-18 years at the three different time points. It is early days in understanding what improvements may affect levels of use by different user groups and no firm conclusions can yet be drawn with respect to adolescents, but this research

indicates that it may take more than a makeover of facilities to tempt greater use by teenagers.

A number of studies added further evidence to the understanding that park and wider greenspace use is influenced by gender, age, access, levels of affluence, variety of facilities, maintenance and issues of safety, perceptions of age-appropriateness and time constraints (Day and Wager, 2010; Floyd *et al.*, 2011; M^cCormack *et al.*, 2010; Scott Porter Research and Marketing, 2011; Tester and Baker, 2009). These same studies also lend further support to understanding the main motivations for young people to use parks, greenspace and the outdoors is to get quality personal space, away from adult supervision and to be with friends. One additional factor was highlighted by a qualitative study in Scotland which examined the local places that were important to children and young people from three different areas, a deprived urban estate, an accessible town with mixed levels of deprivation and a remote coastal area, again with a mixed level of deprivation (Day and Wager, 2010). The respondents informed them that one appeal of greenspace was that there was no time constraint placed upon them for how long they could spend there, compared to other locations they might use.

In summary, this additional research does not alter the conclusion that evidence for adolescent levels of use of greenspace is uncertain, although the research by Scott Porter Research and Marketing provides the best indication yet. The multiple factors and motivations already described that influence levels of use are further supported with the addition that the existence of no time restrictions on the duration of greenspace use may act as a facilitator.

4.11 Adolescents attitudes to, use of and physical activity relationship with greenspace

Chapters Three and Four explored and critiqued the literature specific to adolescents' attitudes to, use of and physical activity relationship with greenspace. There has been a considerable amount of research that indicates there is a positive link between aspects of greenspace provision and adolescent physical activity, such as proximity and quality, although quantity remains very uncertain. However, as with the overall literature on greenspace links with health, the research remains indicative rather than conclusive (Bell *et al.*, 2008; Croucher *et al.*, 2007; Health Council of the Netherlands and Dutch Advisory Council for Research on Spatial Planning Nature and the Environment, 2004; Kaczynski and Henderson, 2007). Also, despite a growing body of evidence that indicates that the range of factors influencing use of greenspace is very similar to those affecting use of broader public space, research within the context of Scotland is lacking and there has still been a very limited exploration of the issues specific to greenspace.

Many questions remain. Provision has been the primary focus of much of the previous research but understanding how adolescents use greenspace, in general and for physical activity, is limited but has great potential to add insight in this area. There is a clear requirement for research to establish levels of use and to establish if differences in use exist by demographics, paying particular attention to gender and SES. There is also a requirement for more research about behaviours in greenspace, and establishing how much physical activity actually takes place in greenspace. There is a need for more research to further understand attitudes, motivations and challenges to greenspace use and physical activity in greenspace and through this identify needs and areas for action.

5 Theoretical Framework

5.1 Introduction

There have been repeated calls by researchers for greater inclusion of theoretical consideration of the relationship between greenspace and health issues such as physical activity (Bell *et al.*, 2008; Travlou and Roe, 2009). Much of the research on physical activity and greenspace is situated within an over-arching socio-ecological framework, as already explained in Chapter Two, but very little of the research has gone on to employ more specific theoretical frameworks to understand physical activity in greenspace. A number of relevant theories have been encountered in the literature.

- Theories on the mechanisms underlying the influence of greenspace on physical activity – opportunity and incentive
- Theories of place preference – cognitive development, personal development and self-regulation theory
- Gibson's theory of affordances (Gibson, 1977)

5.2 Mechanisms for Influence of Greenspace on Physical Activity

There are two dominant explanations given for the apparent link between greenspace and physical activity:

- Greenspace offers the opportunity to be physically active. It provides the space where physical activity can take place and is a direct influence.
- Greenspace contributes to the aesthetics of the neighbourhood. This encourages people outdoors where they will naturally be more active, thus contributing indirectly through the incentive to be active.

(Health Council of the Netherlands and Dutch Advisory Council for Research on Spatial Planning Nature and the Environment, 2004).

The review presented in Chapter Three revealed how the vast majority of research on children and adolescents to date has concentrated on aspects of provision such as proximity, accessibility and quantity, all aspects related to greenspace acting as an opportunity. Very little has explored the possibility of greenspace as an incentive. There has, however, been research on place preferences and how different aspects of place attract use by young people.

5.3 Theories on Understanding Place Preference

It may be supposed that preference for a place leads to use of it and therefore can help in understanding mechanisms underlying use. Only very limited research has been done to establish whether place preference by young people does indeed lead to use (Clark and Uzzell, 2002), and therefore, for the moment, this connection has to be assumed. There is a considerable body of research on place preference (Kaplan and Kaplan, 2002; Korpela, 2002), but it has been noted that there are limited discussions of the theoretical understanding of it (Korpela, 2002). This is particularly so in relation to the apparent differences observed by age. Korpela mentions three theories, all of which are linked in some way to the development of young people through childhood and adolescence. The first proposes that place preference is linked to the development of self-identity and social relationships. Different place preferences between children and adolescents are thought to reflect changes in the nature of social relationships and play. These alter from local exploration and co-operative games with same-sex friends as children, to the privacy of the home or distant central town or commercial settings with mixed friends of both genders as adolescents. Based on a review by Chawla (1992), place preference is assumed to provide important support to these aspects of young people's development (Korpela 2002). A second theory, known as "environmental self-regulation theory", initially attributed to Silbereisen, Eyforth and Noack (1986-88) (Korpela, 2002), suggests that adolescents shape their development through their choice of external contexts including leisure destinations. Their choice of place is seen to be contributing to development of identity and social relations (Korpela, 2002). This has been developed further to include regulation of emotions with the suggestion that the physical environment "*can become an essential part of the process of regulating the experience of self and emotions.*" (Korpela, 2002, p367). In essence, the first theory emphasises that development leads to changes in preference, whereas, the second emphasises that preferred places influence development. In combination, they suggest that the places adolescents prefer are both shaped by and contribute to shaping their developing identities, social interactions and emotions.

Korpela describes a third theory with a developmental theme, proposed by Malinowski and Thurber (1996). This suggests that changes in place preference from early to late childhood and then into the teenage years is linked to development of cognitive

understanding of the environment (Korpela, 2002). This was based on a study of boys aged 8-16 years who attended a summer sports camp for two to four weeks in America. Previous place use research showed differences in the places used and understanding of the wider environment according to age (Malinowski and Thurber, 1996). With age, understanding of environment becomes increasingly abstract (Malinowski and Thurber, 1996). Initially very young children understand the environment only in relation to themselves (an egocentric viewpoint). This develops to an understanding in relation to significant external landmarks such as home and school and then around the age of 10-11 years understanding incorporates increasingly abstract concepts such as direction (North or South) (Hart and Moore, 1973 in Malinowski and Thurber, 1996). Malinowski and Thurber thought this may be used to explain differences also previously found in place preferences. Their study actually did not reveal difference in place preference by age, but did show differences in why favourite places were chosen. The authors concluded that this supported the increasingly abstract understanding of the world as children grow up. They found that those in late childhood (age 9-13 years) expressed reasons in terms of the purpose and use of place and, therefore, preferences were based on land-use. Teenagers aged 14-16 years expressed reasons related to aesthetic attractions or cognitive ones (a place to sit and think).

5.4 Gibson's Theory of Affordances and Understanding Place Use

One theory that has gained some level of popularity in understanding the relationships between children and place has been Gibson's Theory of Affordances (Clark and Uzzell, 2002; Kytä, 2002). More recently, Bell *et al.* (2008) advocated the use of affordance theory in UK studies to examine place preference including relationships to greenspace.

Gibson stated that an affordance is a "*functionally significant property of the physical environment*" (Gibson 1979). It is a perception by the observer of the possibility for an action or behaviour that the observer intends or is capable of doing - in effect affordance refers to a possibility for a desired behaviour. For example, if there is a concrete path it offers the affordance of skateboarding on it but only if the individual perceives this through their intentions and abilities to skateboard. Affordance is understood to be

relational and dependent on both the environment and the observer (Greeno, 1994; Jones, 2003). Such affordances arise from a combination of *intention* and *ability* of an individual (also referred to as the actor) with an *opportunity* (the environment). The theory proposes that the environment offers certain possibilities for behaviour which are dependent on what the perceived features of the environment are. As such, affordances are seen as properties of the environment, though dependent on an observer. Affordance is therefore a special type of property of the environment.

It seems clear to me that Gibson's intention was that the affordance is a property of whatever the person interacts with, but to be in the category of properties we call affordances, it has to be a property that interacts with a property of an agent in such a way that an activity can be supported. (Greeno, 1994, p340)

Gibson's theory of affordances is still the subject of much debate. Gibson is reported to have stated that an affordance does not change with the changing needs of the observer and it is up to the observer to perceive that the affordance exists (Clark and Uzzell, 2002). Two areas of debate are related to this: firstly, this assumes the location of the affordance lies with the environment or object; secondly, that the affordance is independent of the observer. Both these positions are contested (Greeno, 1994; Michaels, 2003). Chemero argues that affordances are not properties of the environment or observer but of whole systems and dependent on context and he therefore avoids both areas of debate (Chemero, 2003). This is a position that Heft appears to agree with (Heft, 2003), illustrating this by considering the affordance a chair provides for sitting on in two different situations. In one's own living room it affords sitting on, but a similar chair in a museum with a cordon around it would not due to the socio-cultural meaning of the context leading to the realisation that the observer is not supposed to sit on this kind of chair. This complexity also includes an understanding that affordances are dynamic due to the wider contextual influences and socio-cultural meanings that change over time (Heft, 2003). Another example is a low wall that offers a possible affordance to sit on it. According to some of Gibson's statements, this affordance is a property of the wall, it exists whether it is perceived or not. However, interpreting the discussions of Chemero and Heft the wall provides the *opportunity* to sit but this is not an *affordance* unless perceived to be an *opportunity* by an observer. Thus the

opportunity is external to the observer but the affordance is a property of both environment and observer.

If one keeps in mind these dynamic contextual considerations, one is unlikely to slip into thinking that an affordance is a fixed functional property of a feature. (Heft, 2003, p173)

Heft introduces the idea of shared understanding of affordances which he terms “normative” or “canonical” affordances. For example, a chair affords sitting on is widely understood in society and therefore a canonical affordance of the chair and observer relationship. Heft also cites another example of a toddler using a fork. Initially the fork may be used for digging and play until social conditioning leads to the toddler perceiving the fork to offer the canonical affordance of eating with. Eating with the fork is a normative affordance. Digging with the fork is still an affordance, but would be considered a non-normative one (Heft, 2003). There is also the issue of potential versus actualised affordances (Heft, 1997; Kyttä, 2002). An object may offer a range of affordances to different individuals at different times (Heft, 1997). Heft uses the example of a book which can be read or used to prop open a window, support a table or provide decoration on a shelf. It could also be used to light a fire or rest one’s head on. The actual affordance that is realised is dependent on the person and their intentions and their “behaviour repertoire” (Heft, 1997). Kyttä extended this to include; potential, perceived, utilized and shaped affordances:

- **Potential affordance** —an opportunity for behaviour offered by an object or environment, may be perceived or not
- **Perceived affordance** – an opportunity for behaviour offered by an object or environment that has been perceived by the observer but not acted out
- **Actualised affordance** - an opportunity for behaviour offered by an object or environment that has been perceived by the observer and acted out
- **Shaped affordance** – observer alters environment in a way to create an opportunity for behaviour

It is implied from this that potential affordance is a property of the environment or object and independent of the observer, thus an opportunity offered by the environment but not an affordance. An affordance, by definition, must be perceived even if it is not acted upon.

Much of the confusion over location of affordance has been attributed to the existence of three possible perspectives to view affordances from; the object itself, the agent and a third party observer (Sahin *et al.*, 2007). Despite the tendency to avoid explicitly stating a perspective in previous discussions of affordance theory, it would appear that the third party observer perspective is implicit in Heft's description of shared understanding of canonical affordances. The environmental or object perspective is implicit in regarding the existence of potential affordances (opportunities) or that an affordance is the property of the environment. The agent perspective is used when affirming that an affordance exists only through perception by the agent and is distinct and personal to that agent.

Greenspace is not provided in a vacuum of intention and instead has a preconceived purpose be that for leisure, recreation or sports, drainage, or business etc. As such, the designer or provider has thought about potential for certain behaviours to take place. An oft used term in Local Authority literature is "fit for needs" implying that thought has been given to what the provision or service will offer. This adds a further dimension to the third party observer perspective. All perspectives are relevant, except perhaps that from the environmental perspective. The possibility for behaviour offered by the object or environment is an *opportunity* and not an affordance. It only becomes an affordance through perception by an agent. This can be third party or collective or individual and personal. Thus, I propose that affordances can be conceptualised the following different levels:

- **Design** – intended (fit for needs) affordances, e.g. provision of a large grassy area with football pitch markings and goal posts expected to afford playing of football. The providers perceive that there will be a shared normative understanding that such a space can be used for such an affordance.
- **Normative** – collective shared understanding of an affordance, e.g. a picnic bench in a park offers the affordance of sitting at and having a picnic. The affordance is an interaction between perception and object/environment shaped by cultural norms. It may be an observation by a third party observer or personal and may be solely perceived or acted upon.
- **Personal** – dependent solely on personal circumstance, experiences and abilities and may be non-normative, e.g. a concrete path offers the possibility to walk or skateboard on it but only if the individual wishes or *intends* to do so and has the skills and physical *ability* to do either behaviour and perceives that it is acceptable given current circumstances to do so.

In place-use research with children and adolescents, affordances have been viewed primarily as “functional properties” of environments which are opportunities for user-specific behaviours relative to the individuals or groups of individuals under investigation. Clark and Uzzell (2002) state that “*Gibson’s theory of affordances offers environmental psychology a method of examining the functional significance of environments for adolescents.*” (p95). They used the idea of affordances to investigate differences between the types of places adolescents frequented. This was on the assumption that those places with more of certain affordances would be favoured and frequented more. The different places examined were: home, school, town centre and neighbourhood. The affordances examined were social and retreat affordances, considered two key “developmental needs” of adolescents (Clark and Uzzell, 2002, 2006). Adolescents aged 11-16 years (n=539) rated the number of places available for 34 different affordances in each of the four environments. Interestingly, despite difference in numbers of social affordances, there was no difference in how often each type of environment was used for social interaction. Number of affordances was not found to be related to place preference or place use.

In another study, Kytta (2002) used the theory of affordances in a similar fashion to understand features of different outdoor environments that were associated with user-identified behaviours (activity orientated and social affordances) in children. Kytta investigated whether differences existed, and the nature of the differences in number of affordances and level of affordances⁹ according to degree of urbanity, between two different countries (Kytta, 2002). Differences were found with, for example, those in more rural settings reporting more affordances than those from cities.

5.5 Theoretical Perspective Applied to this Research

In summary, the first two theories (greenspace as opportunity and/or incentive) seek to explain how greenspace might increase physical activity by providing an opportunity to be active and/or by creating an aesthetically pleasing environment which increases desire to be outside, where children and adolescents tend to be more active (Sallis *et al.*, 2000). The research to date has not clearly established whether providing greenspace as

⁹ potential, perceived, actualised or shaped, as previously discussed

an opportunity does indeed increase adolescent physical activity. There has been no research yet to examine whether greenspace acts as an incentive to adolescents to be more active. However, aesthetic aspects of the environment have been shown to be of potential importance to greenspace use.

The second set of theories seeks to explain place use. Place preference is assumed to lead to place use. Although this has been demonstrated by Clark and Uzzell (2002), this has not been clearly established and needs more research. The theories suggest that place preference is associated with developmental aspects of young people. One theory suggests changes in cognitive understanding of environments leads to alteration in places preferred. The other two theories combined suggest a reciprocal relationship between developing identities, social interactions and regulation of emotions and environment. Whilst there is support from greenspace and public space research for the importance of social interactions and identity development in adolescent motivations to use certain places, little research has focused on the reciprocal relationship of place use impacting on social development. There is, however, a reasonable body of research to support the influence of certain types of environment on mental well-being, emotions and emotional regulation (Faber Taylor *et al.*, 2001; Faber Taylor *et al.*, 2002; Korpela *et al.*, 2002; Wells and Evans, 2003).

Gibson's theory of affordances suggests a reciprocal relationship between individual and environment in explaining what activities are possible or take place in specified environments. The theory has been used to examine the ability of different environments to support specific needs or range of affordances, and whether one type of environment may be better than another, or preferred, and may explain higher levels of use depending on the number/range of affordances. Clark and Uzzell (2002) reiterated the importance of developmental factors in understanding place use. They proposed that the places that had the most social and retreat affordances, thus meeting the developmental needs of adolescents, would be most preferred and used. Evidence from the literature review supports the understanding that aspects of adolescents' developmental stage are indeed implicated in adolescent and place interactions. It has already been discussed that place preference studies reveal consistently that adolescents seek places that are away from adult censure, are interesting, afford the opportunity to

meet friends and that are safe (Travlou, 2003). This is thought to reflect the increasing desire to be autonomous and the growing influence of peers in comparison to parents/carers at this stage (Coleman and Hendry, 1999; Hendry, 1993). Young adolescents are undergoing many changes, for example, in their bodies, in their status in society and in how they view themselves. Adolescence is seen as a specific time where children are in a transition period between childhood and adulthood (Valentine *et al.*, 1998) and as such have their own relationship with the public outdoor realm. Physical and intellectual development leads to alterations in self-image combined with a desire to move towards emotional and situational independence or autonomy (Coleman *et al.*, 2007). Socialising with like-minded friends and exposure to the wider social community (social relatedness) is a way of achieving this and helps establish an independent identity. Adolescents are also thought to seek out challenge to test their own competencies and engage in interesting and exciting activities to do this (Clark and Uzzell, 2006; Coleman and Hendry, 1999; Furlong and Cartmel, 2007; Hendry, 1993).

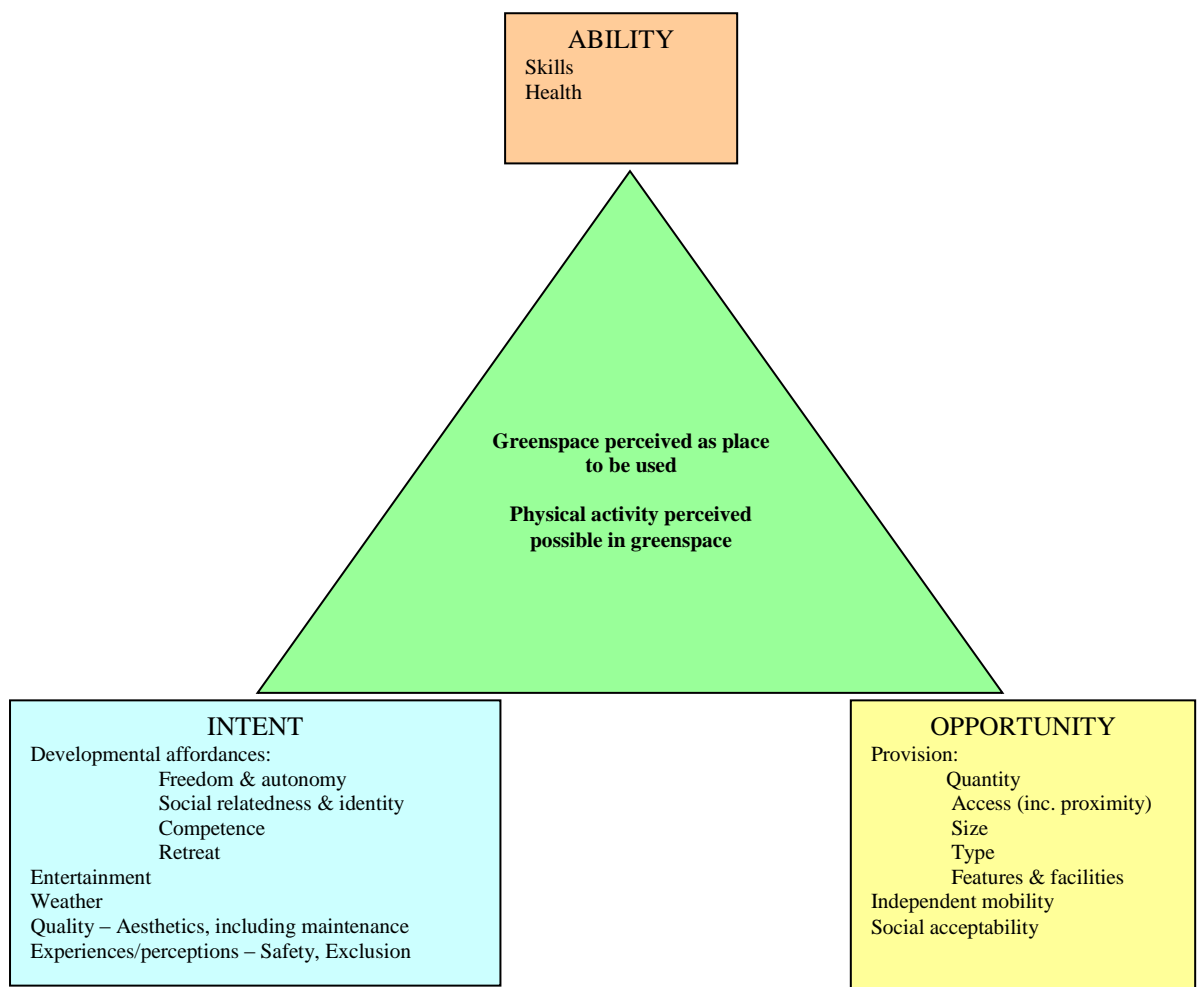
Despite the indicated importance of developmental affordances to understanding adolescent place use, Clark and Uzzell did not find the number of social or retreat affordances was related to frequency of use of the different environments or to place preference. This may be a consequence of place use being much more complex and influenced by multiple other factors not included in their research.

Much of the theoretically orientated research has concentrated on motivations with little account taken of the role of problems and barriers in understanding place use in young people. Yet it is barriers and problems that have been most researched in the greenspace literature. Malinowski and Thurber (1996) also recognised that many other factors were influential in place preference including prior level of exposure, rural versus urban upbringing, parental restriction and peer preferences amongst others. The literature review presented in Chapter Four demonstrated a wide range of influential factors on use in addition to the impact of attitudes and potential preferences. The current theories thus offer only partial explanations.

Gibson's theory of affordances emphasises the need to understand the interaction between ability, opportunity and intention. Many of the multiple potential influences on green space use and physical activity in greenspace can be conceived as operating on

intention and several on opportunities. Thus the affordance theory provides a useful conceptual framework to locate influences on these behaviours. Many influences have already been encountered in the literature and can provide an *a priori* framework for analysis of further qualitative work. In addition, it allows the opportunity to add further influences that may be encountered during the research. This can then be used to identify where gaps in understanding may exist, where further evidence is required and provide a starting point for a more sophisticated model of understanding of physical activity behaviour in greenspace. Figure 5.1 presents a provisional model. The “affordance” is both “use of greenspace” and “physical activity in greenspace”. In using this model there is still recognition that any behaviour in relation to greenspace is a combined interaction between individual intentions, ability and opportunity provided by the physical environment, although ability to use greenspace and be active in greenspace is assumed in this research and is not a primary focus.

Figure 5.1 Conceptual Diagram for Adolescents’ Use of and Physical Activity in Greenspace



6 Methodology

6.1 Introduction

A key issue in research is that of “validity”, also referred to as “credibility” or “trustworthiness”. Validity has been defined as the extent to which something is accurately measured (Fielding and Gilbert, 2006). It is understood in the context of this research to mean a fair representation of a social phenomenon encouraging a shared understanding, albeit always contingent. Validity is central to methodological debates. Validity is applicable at all levels of the research, from choice of research topic, the researcher, paradigm and design to the methods chosen, sampling, analysis and interpretation and even reading of the research. It is unlikely that a reader will not bring further interpretation and be influenced in turn by their own values, knowledge and philosophy. “*Inquiry always has been and will always be a moral, political, value-laden enterprise.*” (Denzin, 2010, p425).

Validity is not dichotomous as valid or invalid but is more an issue of degree and lies upon a continuum (Onwuegbuzie and Leech, 2007). With this understanding it is the responsibility of the researcher to clearly state their position and provide as much information as possible to enable the reader to make a judgment as to the validity of their research. With this in mind, this chapter discusses the rationale guiding the approach, research design and methods chosen to answer the research aim and questions in this study.

The first section gives an overview of the justification and philosophical background for taking a mixed-methods (MM) approach. This refers to a mix of research strategies rather than just a mix of different methods (Bryman, 2004). The second section goes on to describe and justify the methods included in the design, addressing some of the key pros and cons of the individual methods.

6.2 Mixed Methods Research Design

6.2.1 Motivations

A primary motivation to use a MM approach was the understanding that strategies advocating the use of either wholly quantitative or wholly qualitative methods have a

range of strengths and weaknesses and therefore could be open to criticism. Combining methods from each tradition is aimed at counteracting the weaknesses of one approach and associated methods with the strengths of the alternative approach and methods (Creswell and Plano Clark, 2007).

The main strengths of a quantitative approach are considered to be that typically larger samples are included and findings are applicable on a broader scale (allow a greater degree of generalisation or external validity) (Bryman, 2004). Quantitative results, if from a truly random sample, are regarded as representative of the population the sample has been taken from, and can therefore be widely applied (Bryman, 2004; Creswell and Plano Clark, 2007). Numbers indicate prevalence and can enable comment on strength and direction of relationships. Also, the influence of identified factors relative to one another can be examined to highlight the most important ones. This is based on an ontological position where it is believed there is a social reality external to the researcher's and subject's understanding or interpretation of the situation. This is best researched using measures, numbers and statistics to explore and verify the existence of general social "laws" of human thought and behaviour. The purpose is to allow prediction of human interaction given certain conditions (Hesse-Biber, 2010a). However, those favouring a qualitative approach criticise this methodology and some of the assumptions underlying it. They propose that social reality cannot exist independently and external to either the researcher or researched. Any knowledge obtained through the process of research is a negotiated, interpreted understanding influenced by researcher values, the subjects and the context of the research (Bryman, 2004; Onwuegbuzie and Leech, 2005). Thus, multiple social realities exist and identifying a single social "truth" is not possible. The main purpose and strength of the qualitative approach is considered to be the exploration of diversity, meaning and experience. Quantitative methodology is further criticised for taking social phenomena out of its context, thus lacking ecological validity (Bryman, 2004; Creswell and Plano Clark, 2007), i.e. the extent to which findings from the research are able to accurately reflect or be of relevance beyond the context and sample of the research (Ritchie and Lewis, 2003). Social lives of humans are complex and taking a snapshot in a survey fails to capture the complexity of many social phenomena. Research is always undertaken within a context and particular to a given time or set of circumstances, so

even when a representative sample is included there may be no recognised average person. However, lack of ecological validity could also be applied to some qualitative research. An example is participant observation, where a situation is created that does not resemble a free-living, normal situation by the very presence of the researcher.

Another criticism of a quantitative approach is that the research is framed from the perspective of the researcher and excludes the participants' perspectives. It is thus only one of several possible descriptions of the phenomenon being researched. The benefits of the qualitative approach are perceived to be that participants are given a voice and their perspective of a social phenomenon is aired. This highlights a range of perspectives which can give a broader understanding of a given phenomenon and provide explanatory insight into why some generalities might not be effective. However, opponents of the qualitative approach are critical of susceptibility to bias and lack of reliability (Creswell and Plano Clark, 2007; Bryman, 2004), with the potential to reduce validity. Findings from such research, typically involving smaller samples, are perceived to lack external validity and there is scepticism about how such research can be reliable (i.e. ability to reproduce consistent findings under similar circumstances (Fielding and Gilbert, 2006)).

The debate about which approach is best continues. However, it seems that many of the criticisms of each are more associated with the types of questions asked and information sought. Social phenomena are complex and dynamic (Archer, 1998) and it seems reasonable to expect that each approach can be used under different circumstances to elucidate a different aspect of a social phenomenon. One approach or one method can only give a partial insight to this complexity. The application of a mixed approach using multiple methods can give a more holistic understanding of the phenomenon being researched (Dures, 2011; Irwin, 2006). It has been suggested that combining qualitative and quantitative approaches more readily allows inductive and deductive thinking and the inclusion of words and numbers to explain a phenomenon. This is considered to be much closer to how people naturally think about problems (Creswell and Plano Clark, 2007).

Complementing the strengths and counteracting the weaknesses of both approaches, alongside a more holistic coverage of a social phenomenon, form the primary

justifications for using a combined approach in much of the MM research literature (Teddlie and Tashakkori, 2009). An additional argument in support of a MM approach is that the purpose of the research and the research questions indicate the requirement for using quantitative and qualitative methods. The purpose of the current research is to assess greenspace as a resource for physical activity, with government policy makers one of the key audiences. Policy, at this level, by its nature is concerned with generalisation and maximum reach or relevance. Therefore, the ability to apply findings across a broad section of the population is important, and large-scale quantitative studies are a key way of addressing this. However, increasingly policy makers have recognised that qualitative research adds to understanding of social phenomena by being able to explore complex social processes that are poorly handled by quantitative methods (Ritchie and Lewis, 2003). Research for such practical application is one of the key justifications for using MM (Dures, 2011). The research questions reflect several aspects of greenspace and adolescent physical activity research that are currently unknown and this includes both quantitative and qualitative elements.

Previous research in this field has comprised both quantitative and qualitative studies but most are solely quantitative. One American study used MM to investigate the relationship between adolescents' park use and physical activity (Ries, 2007; Ries *et al.*, 2008, 2009). The quantitative element combined a web-based questionnaire survey, objective GIS measures of environmental features and accelerometer measurement of physical activity (Ries *et al.*, 2009), preceded by in-depth qualitative interviews and observations made in parks (Ries *et al.*, 2008). This was a sequential MM study with qualitative results used to inform and develop survey items for the subsequent quantitative questionnaire (Creswell and Plano Clark, 2007; Teddlie and Tashakkori, 2009). In another study Hume *et al.* (2005) used accelerometers as an objective quantitative method for assessing physical activity, and qualitative maps and photographs to identify themes that were of importance to children in the local area. In addition, maps were analysed quantitatively to examine for any associations to physical activity. This was a concurrent study but results were presented in a way that indicated greater emphasis on the quantitative rather than the qualitative aspect. This suggested the qualitative was developmental in the study. These were the only two studies encountered that included qualitative methods in exploring the relationship between

greenspace and physical activity in children and adolescents. This emphasised the need for more qualitative alongside quantitative research.

6.2.2 Philosophical Foundations

Any research is undertaken within certain ontological and epistemological assumptions, whether these are made explicit or not. Using a MM approach is no different even though it has been claimed that such research can be conducted without recourse to any particular philosophical stance (Gelo *et al.*, 2008; Onwuegbuzie and Leech, 2005; Teddlie and Tashakkori, 2009).

There are several philosophical frameworks, also referred to as paradigms, which are used to direct the process of research and underpin understandings of what constitutes valid research. A paradigm is defined here as “*a system of beliefs and practices that influence how researchers select both the questions they study and methods they use to study them*” (Morgan, 2007, p49 cited in Teddlie and Tashakkori, 2009). Mixed methods (MM) research has been referred to as the “third paradigm” or the “third methodological movement” (Onwuegbuzie and Leech, 2005; Teddlie and Tashakkori, 2009). The other major paradigms (also known as approaches, or “communities of researchers”) are quantitative and qualitative (Bryman, 2004; Teddlie and Tashakkori, 2009).

The use of wholly quantitative methods is typically associated with a “positivist” or “post-positivist”¹⁰ philosophical world-view. The use of wholly qualitative methods is associated with an “interpretivist”¹¹ world-view (Teddlie and Tashakkori, 2009).

A consequence of the attempt to create a dichotomy between the two prevailing paradigms has been that methods have been seen to be inherently attached to one paradigm or the other. The methods and approaches are “incommensurable” or “incompatible” and, therefore, it is not possible to include both a quantitative and qualitative element to a single research study, i.e. ‘cherry-picking’ the methods

¹⁰ Positivists and post-positivists are united in an understanding of the world as having a reality external to our interpretation of it which can be measured objectively (Cresswell and Plano Clark, 2007)

¹¹ Interpretivist is used as an umbrella term here encompassing a whole range of more nuanced philosophies but which have a common understanding of the nature of reality and how best to research it, including the existence of multiple realities and an understanding that the researcher and the social world impact upon each other (Ritchie and Lewis, 2003).

(Bryman, 2004; Creswell and Plano Clark, 2007; Dures, 2011; Teddlie and Tashakkori, 2009). It is from this viewpoint that some researchers argue that MM research is not valid. The criticism is that either the qualitative or the quantitative method is transformed into the prevailing paradigm (Bryman, 2004; Mason, 2006). However, attempts to dichotomise between quantitative and qualitative approaches often fail to create distinctions that are satisfactorily separate. Dures *et al.* (2011) comment on how Morgan (2007) compared three key defining dichotomous features of both paradigmatic traditions: subjective versus objective, deductive versus inductive and context versus generalisation. Morgan argued that these were points of connection not distinctions. Reasoning is never wholly inductive or subjective. Research findings are never so narrow as not to be transferable beyond the individual setting or so generalizable that there are no exceptions. Morgan further emphasised the process of communicating shared meaning in research and recognised that neither absolute objectivity nor subjectivity are possible, they are abstract notions. Methods do not clearly map onto either quantitative or qualitative traditions as perhaps they once did, and there are more similarities within the two traditions than differences (Creswell and Plano Clark, 2007; Onwuegbuzie and Leech, 2005). Although aware that this still remains contested (Lincoln, 2010), this suggests there is scope for a greater degree of inter-relationship between the two major paradigms than some researchers may think. The two major paradigms have been conceptualised as lying on a continuum and not as distinct dichotomies (Hesse-Biber, 2010a; Teddlie and Tashakkori, 2009). This creates an area of middle ground enabling a location for MM researchers with an understanding of the world contributed to by both post-positivist and interpretivist philosophies. This is the location of the “third paradigm”. In essence this has an understanding that:

- Both versions of reality exist in the social world – multiple interpreted and relatively stable external ones
- One can neither be wholly objective nor subjective, wholly inductive nor deductive in research, and that the influence of values is inescapable

(Gelo *et al.*, 2008; Hesse-Biber, 2010b).

The term pragmatic has been applied to this paradigm. Confusingly it has also been used to describe an a-philosophical stance which holds that methods are independent of philosophy. Methods can therefore be used together and interchangeably and it is a

matter of “what works” in any given situation. Choosing a method is dictated by the research questions and is not a factor of one specific paradigm or world-view (Gelo *et al.*, 2008; Onwuegbuzie and Leech, 2005; Teddlie and Tashakkori, 2009). Cresswell and Plano Clark (2007) take the approach that there are undoubtedly philosophical underpinnings to any research plan which determines the research design. They consider that MM is a research design and the methods are tools to collect the data. Any claim to philosophical neutrality appears naïve if it fails to recognise implicit or latent philosophical underpinnings of any process of research. The a-philosophical stance is, therefore, rejected. It is the understanding of this researcher that there are certain tendencies regarding how adolescents use and regard greenspace and the kinds of impacts these may have on physical activity. Tendencies are used here to describe results from research that could be repeated by another researcher and similar findings would appear with discernible, repeated patterns of behaviour. However, no two individuals will be subject to the same influences and, therefore, there is also a need to explore differences and subtle nuances that may shed light on why there are outliers to general patterns. Revealing such differences highlights what pitfalls may need to be watched for in trying to develop and apply a policy based on general patterns. To achieve a balance between the general and exploring the range of differences, a mixed quantitative and qualitative approach was therefore considered most appropriate for gaining insight into the complex phenomenon of greenspace use and its relationship to adolescent physical activity.

6.2.3 Mixed Methods Design

The quantitative methods used in the present study included questionnaires and the combined use of GPS, GIS and accelerometry. Questionnaires were included to answer research questions one and two: How much do adolescents in Scotland use greenspace during their leisure time? Is there a positive relationship between greenspace use (rather than provision) and adolescent physical activity levels? GPS records geospatial movement, in other words, tracks an individual’s movements in the physical environment. Accelerometers objectively measure physical activity. GIS provides detailed information on the physical characteristics of the environment the individual has been shown to encounter using GPS. The combined use of GPS, accelerometry and GIS allows quantification of the amount of physical activity taking place in specified

environments. This was used to answer research question three: How active are adolescents in greenspace and what contribution does greenspace make to total leisure time physical activity? The qualitative method comprised the use of semi-structured interviews. Visual maps were created using the GPS data to provide visual prompts for stimulation of discussion in interviews, a process known as image-elicitation (Rose, 2007). Interviews were primarily aimed at exploring motivations to use greenspace, range and type of activities in greenspace, and experiences in and attitudes to greenspace. This was used to answer research question four: What do adolescents think about greenspace and why do they use it? Each section of the study was then combined to contribute to answering the overarching research aim: What do levels of use, actions and attitudes contribute to developing our understanding of the role of greenspace as a health resource for the promotion of adolescent physical activity in Scotland? A schematic overview of the research design is presented in Figure 6.1.

6.3 Methods

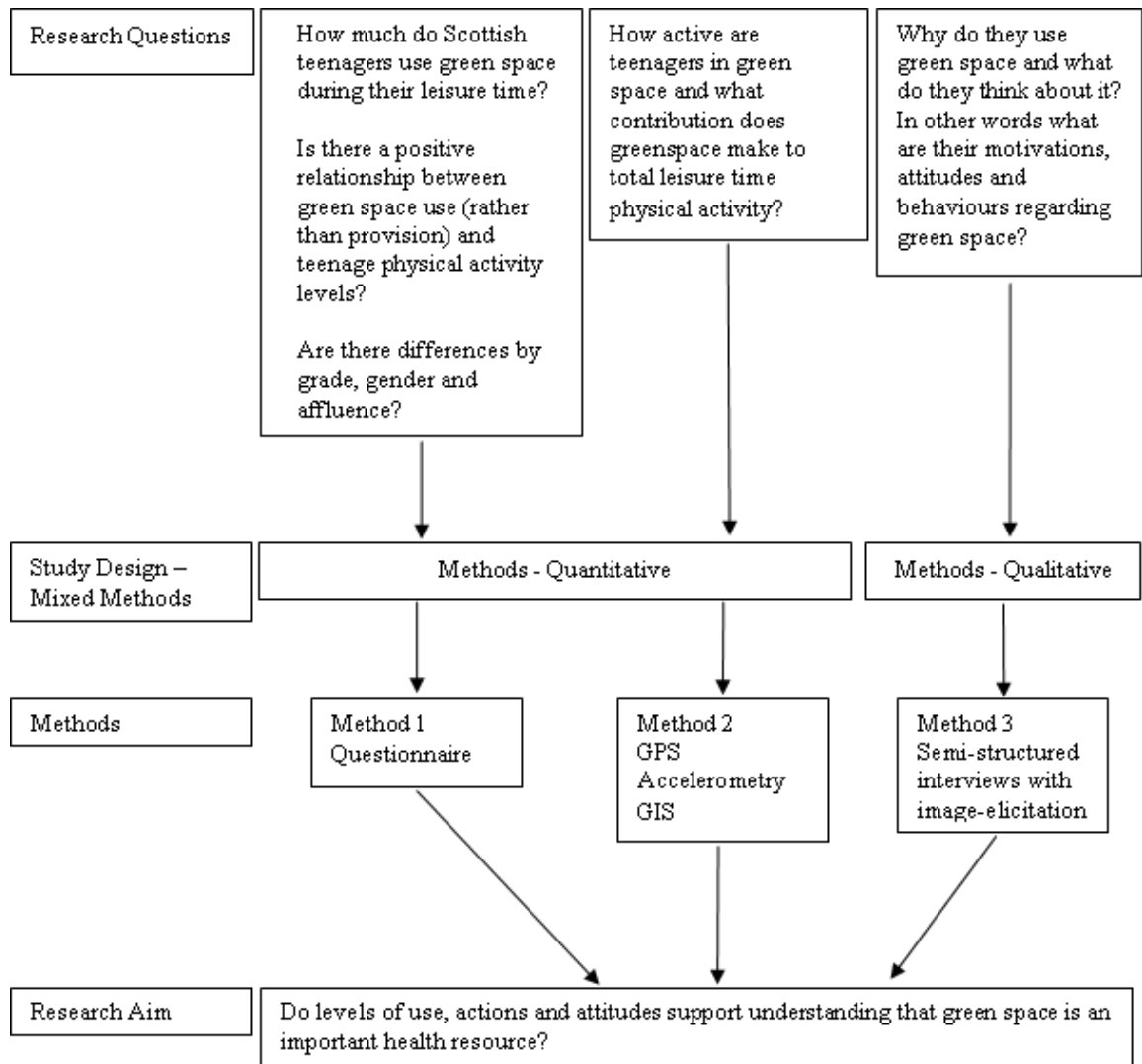
6.3.1 Questionnaire Survey

At the time this study was devised there were no data to indicate at a national level the amount of greenspace use by adolescents across Scotland. Data existed for adults (Progressive Partnership, 2009) but not for children and adolescents. A survey by SNH from 2007 gave an indication of the level of visitation by adolescents in Scotland to all natural environments, including greenspace, but also more distant countryside (Progressive Partnership, 2007). This is now several years old and not specific to urban greenspace. Understanding of the level of use at a national level can help towards understanding importance of greenspace as a resource for these young people and supporting appropriate policy development. To provide this data at a national level, the most practical and obvious choice was to use a questionnaire survey. This was further supported by the serendipitous opportunity to place questions in an already existing Scotland wide survey of adolescents – the Health Behaviour in School-aged Children, HBSC. HBSC is a World Health Organisation collaborative cross-national study which includes 43 nations across Europe and North America and surveys 11, 13 and 15 year-olds every four years. Scotland has participated since 1990¹². The researcher

¹² See website <http://www.hbsc.org/> for more information

collaborated with colleagues in the Scotland HBSC team, to develop and include questions on greenspace use in the 2010 wave of the survey.

Figure 6.1 Schematic overview of research design



Questionnaires have been criticised for providing data reliant on subjective, self-report of behaviour with criticism of reliability and validity. Such subjective data can be regarded as being vulnerable to recall bias¹³ and social desirability responding¹⁴. Physical activity and transport research tends to indicate that participant perspectives on their own behaviour can be inaccurate (Mackett *et al.*, 2007; Pate *et al.*, 2002; Sallis and Saelens, 2000; Shephard, 2003). Use of GPS in transport research has demonstrated that self-report via other methods such as diaries tends to under-report journeys (Mackett *et al.*, 2007). During pilot research for this PhD study it was clear that participants often could not recall their movements over the previous week in and around their local environment, even when they were shown a map of where they had gone. It has also been suggested that respondents recall time spent in a physical activity *setting* rather than the actual *time* being physically active (Pate *et al.*, 2002). There is also an issue with the understanding of what is meant by greenspace and how to capture the range of spaces it encompasses clearly in a concise question for adolescents. Research has shown that understanding of the term greenspace is problematic in adults and adolescent populations (Sarah Davidson personal communication, Ipsos MORI 2009; Travlou and Roe, 2009). However, focus group research conducted during development and testing of greenspace questions for the HBSC questionnaire revealed a reasonably consistent understanding of what greenspace is in 11, 13 and 15 year-olds. Pilot testing of a greenspace question for adolescents is discussed in more detail in Chapter Seven.

Research demonstrating levels of greenspace use is limited and has tended to rely on observations or surveys of park users (Cohen *et al.*, 2007; Dunnett *et al.*, 2002; Comedia and Demos, 1995; Kipke *et al.*, 2007). Owen *et al.* (1994) counted the number of mentions of types of places used during focus group research. Comedia and Demos (1995) gained a sense of level of use through talking to adolescents in focus groups. There are substantial limitations to observations and the two qualitative methods mentioned. Observations fail to take account of infrequent or non-users and have various logistical and safety issues associated with them. In addition, this type of

¹³ Inaccurate or incomplete recall from memory with tendency to recall specific types of information leading to introduction of bias (Nelson *et al.*, 2004).

¹⁴ Tendency to over or under report a behaviour or phenomenon because of awareness of what one is supposed or expected to do. An example is under-reporting of energy intake in obese participants compared to normal weight ones (Mosdol and Brunner, 2005).

research has tended to focus solely on parks and ignores the broader range of greenspace available. Focus groups limit the numbers that can be included and, therefore, the ability to generalise from the results. Also, a subjective explanation of importance and level of use is not precise enough to enable comparison to other research or across time.

Despite certain limitations in accuracy, as outlined above, questionnaires are ultimately a simple research instrument that can relatively cheaply and quickly be distributed to large numbers of participants making it easier to have a nationally representative sample. Data on greenspace use by adolescents in Scotland does not yet exist and would be far more difficult with alternatives such as using observations. A major advantage of a nationally representative survey is the ability to generalise the results beyond just those taking part in the research, thus increasing external validity (Bryman, 2004; Fielding and Gilbert, 2006). An added benefit of a large-scale questionnaire is that associations between greenspace use and physical activity can be investigated statistically giving an indication of the strength and direction of the relationship, therefore indicating its level of importance. Such information helps guide policy makers on the factors of most importance to concentrate on in strategic plans. The inclusion of large numbers in the survey can also allow the influence of factors such as grade, gender and affluence to be investigated. A large sample increases the chances of observing if there is an effect or not (Argyrous, 2000; Fielding and Gilbert, 2006).

6.3.2 Combined use of GPS, Accelerometry and GIS – the GAG method

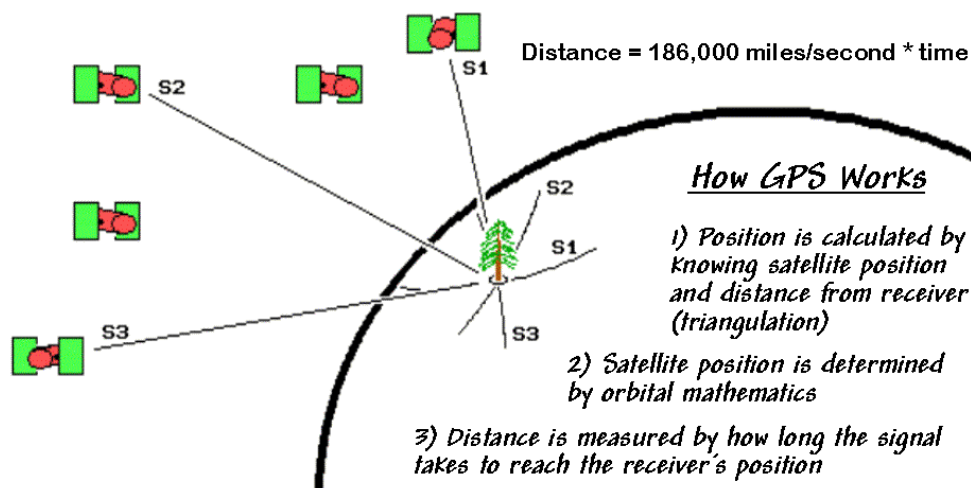
Questionnaire surveys are often criticised for the cross-sectional nature of any associations detected. Thus, if a relationship between greenspace use and physical activity is found, it is not possible to say if the physical activity actually occurred in greenspace and was, therefore, directly a consequence of the greenspace being present. These issues can be overcome by using the GAG method, an abbreviation used by the researcher in this study to refer to the combination of GPS, accelerometry and GIS.

GPS

GPS monitors, worn or carried by a person, assess a person's location and have been a recent addition to environment and physical activity research (Duncan *et al.*, 2009;

Maddison and Mhurchu, 2009; Quigg *et al.*, 2010; Wheeler *et al.*, 2010). The GPS records the location of the volunteer at regular time intervals. Figure 6.2 shows how GPS technology works to record a location. A set of 24 satellites orbit and send signals towards the Earth. Each signal from each different satellite states the exact time the signal was sent. A GPS receiver on the ground checks the time it receives the signal. There is a time difference due to the distance the radio wave has travelled. Knowing the speed the radio wave travels, the time-lag tells you how far away the satellite is. Knowing the position and distance to a set of satellites allows calculation of the position of GPS receiver (Berry, 1999; Schutz and Herren, 2000).

Figure 6.2 Diagrammatic representation of how GPS identifies a location on Earth using triangulation from several satellites



Source: The Precision Farming Primer (Berry, 1999)

GPS is probably the most accurate method currently readily available for gathering data on spatial movements of individuals in a free-living situation with the least likely impact on behaviour. In comparison, other possible alternatives, such as observation or ethnography, have several major disadvantages. Covert observation by an adult researcher observing adolescents would be problematic on ethical grounds. It would also be difficult in practice due to exclusion of the adult from the peer-group and therefore their unusual presence in many circumstances in public places where adolescents gather. Overt observation such as in an ethnographic study is highly likely to alter behaviour significantly because the adult researcher can never truly become a

part of an adolescent peer group (Punch, 2002; Wyness, 2006). It may be argued that there is the possibility of altered behaviour through awareness of being monitored. This is likely to be less of an issue compared to observation. For example, wearing accelerometers has been shown to make little difference to habitual physical activity behaviour in children (Rowlands, 2007). However, reducing the influence on typical behaviour was one consideration when choosing the most suitable unit for GPS data collection. Other considerations included: memory capacity, cost, acceptability to participants and battery life.

Adolescents can be a difficult group to recruit (Spigarelli, 2008). Therefore, it is necessary to pay particular attention to ways in which participating in research is as burden free and as attractive as possible. This is especially so if the adolescents are unlikely to see immediate benefits to them of taking part. Adolescents are entering a period of their lives when peer relations become paramount (Coleman and Hendry, 1999). They are particularly self-conscious at this stage and therefore it was considered that any research monitors used with this age group should be discreet. Of the variety of GPS units available, the handheld and most wrist-mounted GPS units are relatively large and obtrusive and it was deemed likely that their use would put adolescents off volunteering to take part. It was also felt that the handheld units would be easy to forget. They also required a supply of batteries. GPS bangles were also considered unacceptable because of their association with anti-social behaviour orders. A recurring theme in much research with adolescents and the use of public space is their sense of exclusion and harassment for behaviour they do not see as problematic (Tucker and Matthews, 2001; Valentine, 2004a). A type of GPS watch was encountered which was less obtrusive, however, this suffered from restrictions due to its memory capacity. Researchers in Norwich have used wrist mounted GPS units with primary age children and they found that the memory capacity only allowed data collection for four days, and this was only if set to record data only when a child was active for more than five minutes (Coombes, 2008). It was feared that this might not provide a very accurate impression of habitual movement in greenspace. The unit chosen was a GPS-enabled mobile phone. The memory capacity was good (1GB), providing more than adequate memory capacity for a week monitoring at very regular intervals. The battery life of the wrist GPS versus the phone GPS were comparable. Mobile phones are ubiquitous in the

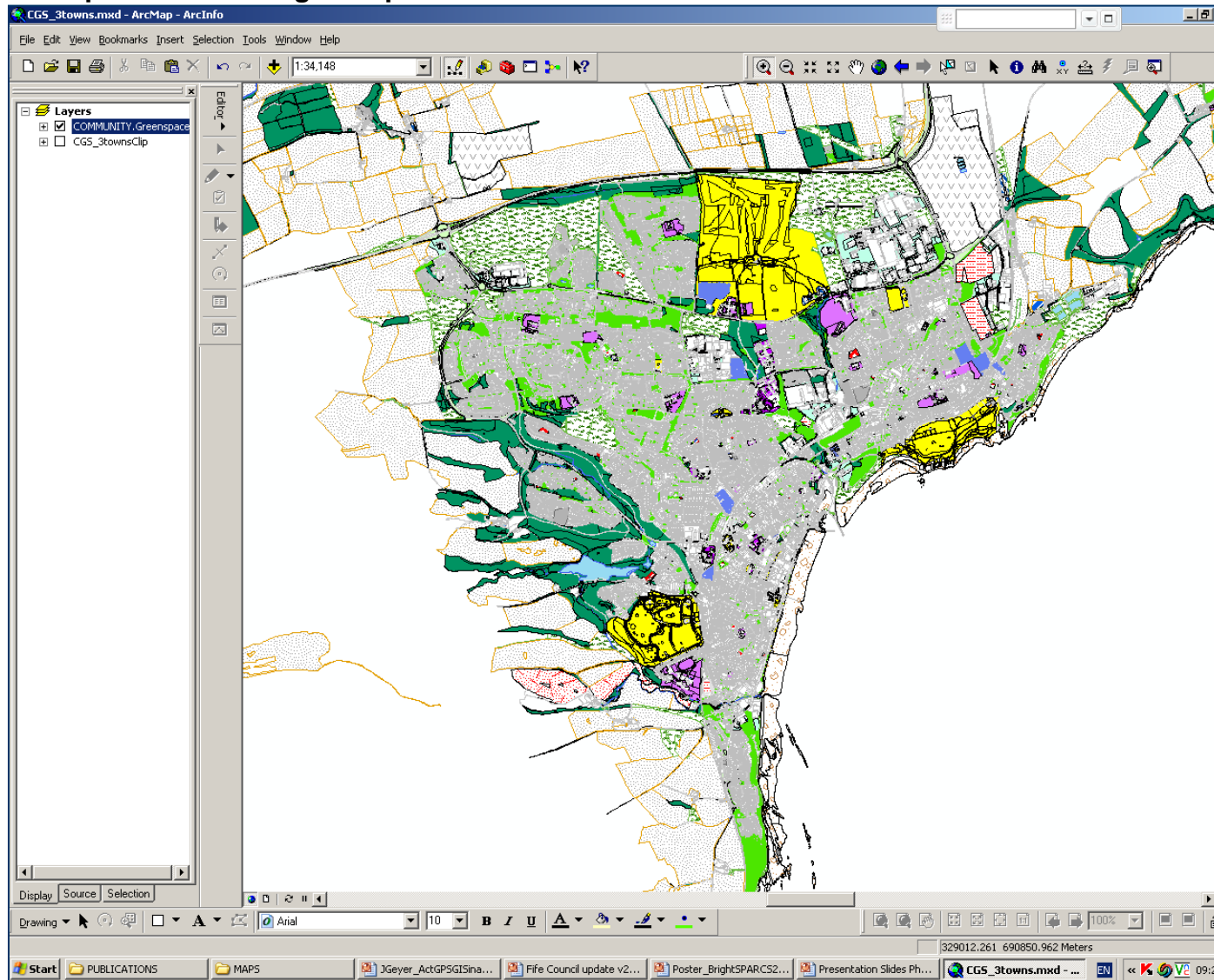
adolescent population nowadays. One study from several years ago estimated ownership amongst English adolescents to be between 79% and 90% (Madell and Muncer, 2004). It is likely that this estimate has now increased. The employment of a mobile phone as a GPS monitor provides an exciting and potentially very powerful tool for recruitment as well as for the research itself. In research with adolescent girls in America, Sarah Wiehe (personal communication, 2009) explained that the mobile phones acted as a big incentive to take part in her research. About half of her participants already had phones, but not smart phones, and enjoyed temporarily having the extra functionality they offered as well as the texting and call time provided. If they already had a phone they carried around both phones. The phone also had the added benefit of enabling administration of a daily questionnaire. Pilot research carried out for the current research indicated a similar response with notable enthusiasm for participating due to the inclusion of the loan of a mobile phone.

There are some well-recognised issues with the use of GPS. A key one is that of missing data which can be a result of loss of satellite signal leading to data loss for periods of time in areas that are built up, in vehicles or under dense foliage; Alternatively, this can also come from unit failure or non-compliance (Duncan *et al.*, 2009; Maddison and Mhurchu, 2009). Signals from satellites can also bounce and give erroneous readings (Maddison and Mhurchu, 2009). These issues are dealt with in more detail in Chapter Seven.

GIS

GIS are collections of computer-based databases that store information on various attributes of the environment and their location. They allow visualisation of such information and can be used for analysis (ESRI, 2012). For example, Google maps is a GIS which includes information about the location of road networks, various types of built environment and photographic data stored in one system. GPS can be used in combination with GIS data to identify the geospatial movements of the participant and determine contact with different types of land use, such as greenspace.

Figure 6.3 Visual representation of greenspace GIS.



Different types of greenspace are represented by different colours. Grey represents buildings and other elements of the built environment

Figure 6.3 presents a snapshot of the visual representation of a section of the greenspace GIS data used in this research. The Fife Council greenspace GIS was created using a methodology developed by Scottish Natural Heritage (SNH), the Forestry Commission Scotland (FCS) and Glasgow and Clyde Valley Structure Plan Joint Committee (GCVSPJC). This used aerial photographs to classify the land use represented on Ordnance Survey MasterMap (the national mapping base for the UK) according to the greenspace typology set out in PAN 65 (see Appendix A) (Aecom, 2011). More information about the methodology can be found in the *Urban greenspace mapping and characterisation handbook* published by Greenspace Scotland (2010).

Accelerometry

There are two key categories of physical activity assessment: objective and subjective. Accelerometers, deployed in physical activity research for some time, are small physical activity monitors that measure physical activity objectively (see Figure 6.4). Objective methods are considered better for measuring an amount or quantity (Corder *et al.*, 2008). Accelerometers measure the intensity, duration and timing of physical activity (Corder *et al.*, 2008).

Figure 6.4 An accelerometer



Accelerometers are about the size of a matchbox, can be worn under clothing and do not require recharging throughout the data collection period. The principal disadvantages with accelerometers are their cost and the complexity of data entry and reduction. Accelerometers (Actigraph model 7164) were kindly offered on loan at no cost to this project¹⁵ thus cost was not a disadvantage here. Accelerometers also lack the ability to capture context i.e. type of physical activity (mode), where it takes place (location or

¹⁵ Thanks to Professor John Reilly, previously at Division of Developmental Medicine, Human Nutrition, University of Glasgow and Dr. Laura Basterfield, Gateshead Millennium Study, Human Nutrition Research Centre, Newcastle University for the loan of accelerometers and associated computer interface equipment.

setting) and determinants (Corder *et al.*, 2008). These disadvantages can be offset through the inclusion of additional methods to capture missing aspects and the use of multiple methods can provide a more complete picture of physical activity behaviour (Dollman *et al.*, 2009). Location of the physical activity was covered by the use of GPS with GIS and physical activity mode by asking in interviews about activities undertaken in greenspace.

Accelerometers are unobtrusive and easy to wear and there is evidence to show they have little impact on habitual physical activity behaviour of children (Rowlands, 2007). They are low on participant burden making it more likely that participants comply with protocol. They are rapidly becoming the method of choice in both small and large scale research on free-living physical activity behaviour in youth (Corder *et al.*, 2008; Dollman *et al.*, 2009), and are appropriate in this research to quantify links between physical activity and greenspace use. Other advantages of the accelerometer include the time-stamping of activity data to allow integration with GPS data to provide location context to the physical activity. Time-stamping also allows identification of specific domains of physical activity such as during non-school or leisure time.

Three in One Combination – the ‘GAG’ Method

Increasingly the combination of GPS, accelerometry and GIS is being employed in research on physical activity and the environment (Duncan *et al.*, 2009). Examples of this kind of research include a study by Mackett *et al.* (2007) who used wrist mounted Garmin Fortrex GPS units in combination with hip mounted accelerometers in a study with primary aged children in England. Research by Jones *et al.* (2009), also on primary aged children in England, has already been referred to in Chapter Three, and the American study with adolescent girls using mobile phones (Wiehe *et al.*, 2008). The GAG method is regarded as promising in its ability to add objective contextual information about locations of physical activity during free living conditions (Maddison and Mhurchu, 2009). This avoids the issues of memory recall bias, whether this is by quantitative or qualitative means, and avoids the potential for misinterpretation of concepts. It also avoids the impracticalities of attempting to observe free-living behaviour. The GAG method can show the amount and intensity of physical activity occurring in greenspace. However, the relatively recent use of the GAG method means

that there is still much to learn about its application in different contexts and with different populations.

6.3.3 Qualitative Semi-Structured Interviews

As already highlighted, only a small amount of existing research has employed qualitative methods to examine the relationship between greenspace and physical activity. In contrast, more use of qualitative methods has been employed in examination of child and adolescent attitudes to, experiences and understanding of their physical environments (Davis and Jones, 1996; Lynch, 1977; Matthews *et al.*, 1998; Owens, 1994; Travlou, 2004; Tucker and Matthews, 2001), although there has been a tendency to rely on focus groups (Bell *et al.*, 2003; Comedia and Demos, 1995; Jones *et al.*, 2008; Travlou and Roe, 2009). Questionnaire surveys have also been used (Dunnett *et al.*, 2002; Greenspace, 2007; Progressive Partnership, 2007).

Qualitative methods are considered most appropriate for capturing the perspective of the participant allowing emergence of understandings and issues that may not have been apparent if researcher-directed (de Coninck-Smith and Gutman, 2004), such as is more the case when using questionnaires. Places are considered imbued with meaning (De Coninck-Smith and Gutman, 2004; Matthews, 1998; Rasmussen, 2004; Valentine, 2004b), which can often be hard to articulate (De Coninck-Smith and Gutman, 2004). The use of qualitative methods, allowing inclusion of aids to expression can help with articulation and garner a more comprehensive understanding of the participant's perspective. This is of particular relevance to the present study. Research by Sarah Wiehe *et al.* (2008) in the USA, referred to earlier, which used GPS-enabled mobile phones with adolescent girls in the investigation of health risk behaviours, used traces on maps derived from the GPS data as prompts in interviews. They found that the girls volunteered information the researchers had not sought and the girls were very interested and engaged by the phones and maps (Sarah Wiehe, personal communication, 2008).

Interviews were considered most suitable to explore the adolescents' perspectives. This was partly due the desire to match responses to quantitative GAG measurements. This would have been a much more difficult undertaking using an alternative method such as

focus groups. Also, a disadvantage of focus groups can be that normative views only are expressed, deviant ones suppressed and the most vocal can dominate proceedings and results (Bloor *et al.*, 2001; Bryman, 2004; Lewis and Lindsay, 2000; Ritchie and Lewis, 2003). This can make it difficult to argue that the views expressed are an individual's definitive personal views. There may be an element of conformity and expression of socially desirable opinions or behaviour (Bryman, 2004). Alternatively, respondents can set out to shock the researchers (Travlou and Roe, 2009). Interviews were anticipated to allow for a more diverse range of views to be expressed.

6.4 Summary

The literature review highlighted a marked absence of qualitative research in the field. Such research enhances understanding of a complex social phenomenon, enables expression of the adolescents' perspective and is increasingly viewed as important by policy developers. Policy makers were intended to be one of the key audiences for this research. As such, there was also recognition of the requirement for findings to have a broad application, within the limitations of the specified population group under investigation. Thus, including a large-scale questionnaire in the study was desirable. A mixed methods (MM) approach was thus considered most suited to provide a more comprehensive overview of adolescent greenspace use and its relationship to physical activity. In addition, the MM approach was taken with an understanding that either a wholly quantitative or qualitative approach has inherent weaknesses.

A questionnaire was used to assess patterns of greenspace use according to grade, gender or affluence and to establish the existence of associations between greenspace use and physical activity. Semi-structured interviews were included to explore attitudes to, behaviours and experiences in greenspace. In addition, an innovative method, the combined use of GPS, accelerometry and GIS, was included to quantify physical activity taking place in greenspace and the contribution this made to leisure time total physical activity.

7 Methods and Data Analysis

7.1 Introduction

This chapter sets out the procedures undertaken for this research and offers justification for certain protocol decisions. The chapter splits the research into two separate studies: Study 1 describes the HBSC questionnaire survey and the collaboration of the researcher with the HBSC Scotland team; Study 2 describes the implementation of the GAG method and interviews. A schematic overview of the two studies is presented in Figure 7.1.

7.2 Study 1 – HBSC Questionnaire Survey

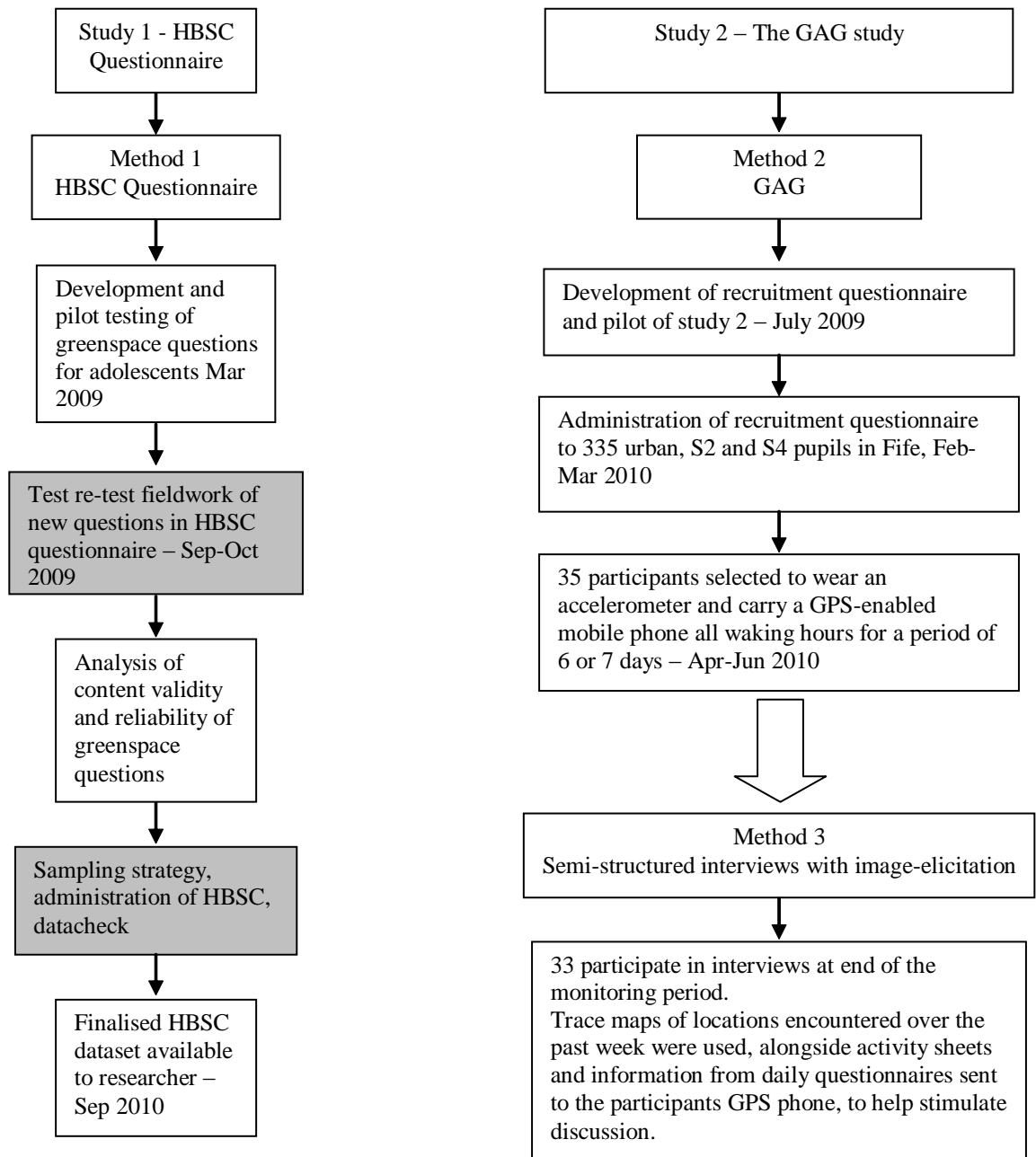
7.2.1 *Greenspace use measures*

No existing questions on greenspace frequency and duration of use aimed at children or adolescents were found in a review of relevant literature, therefore, two new questions were developed by the researcher for inclusion in the HBSC 2010 survey. Content validity and reliability tests of these questions were undertaken in collaboration with members of the HBSC Scotland team. The original question phrasing is presented below:

- 1) How often do you usually go to **local green space** areas during the summer time? (local greenspace means natural outdoor areas such as parks, gardens, play areas, canal paths, river or loch sides, beaches, woodland and waste ground within a 5 to 10 minute walk or cycle ride from your home).
 1. every day
 2. 4 to 6 times a week
 3. 2 to 3 times a week
 4. once a week
 5. once a month
 - 6 less than once a month
 - 7 never

- 2) How many **hours a week** do you usually spend in local green space during the summertime?
 1. None
 2. about half an hour
 3. about 1 hour
 4. about 2 to 3 hours
 5. about 4 to 6 hours
 6. 7 hours or more

Figure 7.1 Schematic overview of studies 1 and 2



The grey boxes refer to sections of the HBSC study which the researcher was not involved in.

The HBSC pilot questionnaire was completed by a convenience sample of 349 P7 to S4 pupils (age 11-16 years) from two High schools and three Primaries in Edinburgh. Performance of the greenspace questions was explored through focus groups, comments made during whole-class administration of the full HBSC questionnaire and ‘think alouds’. A think aloud is where a pupil fills in a questionnaire on their own alongside a researcher and talks out loud about how they are answering each question. Focus groups and ‘think alouds’ were digitally recorded, whereas queries by pupils and researcher comments made during whole-class completion of a questionnaire were written on recording sheets. The researcher assisted with the validation fieldwork by undertaking a six of the ten focus groups on the greenspace questions, three ‘think alouds’ and administration of the pilot questionnaire to two classes. The researcher extracted the comments relevant to the greenspace questions from the 20 class administration record sheets. The ten focus group recordings were transcribed by a third party and made available to the researcher for analysis and the researcher transcribed just the greenspace question reflections from a total of 18 ‘Think aloud’ recordings. Analysis included four P7 and nine secondary school ‘think alouds’ and five secondary school focus groups. Less data were provided from S3 and S4 pupils. All validation analysis of the greenspace questions was carried out by the researcher.

The following questions were used to guide assessment of validity and appropriateness of the greenspace use questions:

1. Are pupils able and willing to answer the greenspace questions?
(appropriate)
2. Were they understood as intended? (valid)
3. Were the answers likely to be a reasonable reflection of greenspace use?
(accurate)
4. Was there a reasonable variation in answers and adequate response rate?
(differentiation)

Understanding, appropriateness and validity

Understanding of the concepts of *local* and *greenspace* was of particular interest alongside general consideration of ease of answering the two questions. As previously mentioned, greenspace is considered to be natural spaces in urban settings. Part of the expected value of this research is in informing policy directions for management of

greenspace. Thus it is important to establish if pupils are referring to urban natural spaces. Responses indicated that 'local' was understood to range from close to where they lived (in terms of distance), to as much as a 30 minute car journey (in terms of time), see Table 1 in Appendix B. However, the predominant expressions were in the range 5 to 15 minutes' walk or cycle. For those pupils living in towns and cities, 5 to 15 minutes' walk or cycle would mean that the greenspace accessed is likely to be largely within the settlement boundaries (except perhaps for those living on the peripheries) and under the control of Local Authorities. Thus the use of 'local' was assessed as useful in the question.

When asked to describe the types of places they were thinking about when answering the questions, many places were mentioned spontaneously which were not present in the text of the question (see Table 2 in Appendix B). The vast majority of these places aligned well with the PAN65 typology of greenspace (Appendix A). This suggests that prompting for all types of greenspace relevant to PAN65 is not necessary to get reasonable recall. It also suggests that the question phrasing was able to adequately convey the concept of greenspace. However, whole class administration of the questionnaire and impressions from focus groups revealed that the actual term greenspace caused confusion. This resulted in an alteration in the final question phrasing to remove the term and just provide a range of examples of types of greenspace.

Accuracy to assess use of greenspace

The accuracy of the questions to assess use of greenspace cannot be truly ascertained through the type of piloting conducted. However, several issues were highlighted that indicated requirements to alter the questions, as well as pointing out potential sources of error. Firstly, there were instances where the questions were misread and response categories taken to be hours per day rather than hours per week, which led to inclusion of the relevant timescale in each response.

I thought it was a day, how many hours you spent a day in it and that's why I put two to three hours because I take my dog for walks, but then I realised it was weekly, so I think it could be a little bit clearer. (S1 pupil during a focus group).

A second issue was an indication that time spent in greenspace was recalled through specific activities. In response to the question asking about hours spent in greenspace per week, one S1 pupil, during a ‘think aloud’, replied “*I take my dog out for about one hour, so about one hour and then I do football for about another hour so that’s about two to three hours.*” There is the risk that more incidental or non-activity based contact may be less readily recalled. This has two implications: firstly, that the question may under-estimate contact with greenspace; secondly, that this type of responding may bias towards a stronger association between greenspace use and moderate and vigorous physical activity. This was borne in mind for interpretation of the main study results.

A final issue was the indication that estimations of time spent in greenspace were based on recent patterns of use, thus the timing of the survey was likely to be of importance. This is illustrated by comments made by a pupil in S4 during a ‘think aloud’.

***Pupil** - (I don't) really go. But, if it was, like, in the summer and that, I'd probably be at the beach, like, two or three times a week.*

***Researcher** - Yeah? So you think, again, it's dependant on when you're being asked?*

***Pupil** - Aye, what time of the year it is, or. But, the now, probably once a month.*

The timing of the HBSC survey administration is approximately the same for each survey round and therefore this issue is unlikely to influence looking at trends in data. However, there are implications with regard to how widely the findings may be generalised beyond the season in which it is conducted. The question was rephrased to ask respondents to recall summer-time behaviour. This potentially limits understanding for other seasons, however, summer may be expected to represent the period of greatest use and therefore indicate maximum level of importance.

Extent of missing data

Examination of responses revealed 7.4% and 6.0% missing for greenspace frequency of use and duration of use respectively. The question was altered, as already described, and missing responses were reduced to 3.8% and 4.4% respectively in the final 2010 dataset.

Revised Greenspace Questions

Based on the analyses conducted by the researcher, the questions were rephrased as follows:

1) Thinking of the summer months, out of school hours HOW OFTEN do you usually pass through or spend time in any of the following places IN YOUR LOCAL AREA:

Parks, play areas, public gardens, woods, playing fields or sports pitches, golf courses, beaches, canals, rivers or by lochs or other types of natural open space.

- Less than once a month
- About once a month
- 2 to 3 times a month
- 1 to 2 times a week
- 3 to 4 times a week
- 5 to 6 times a week
- Everyday

2) Thinking of the summer months, out of school hours HOW MUCH TIME overall in a week do you usually spend in the following places IN YOUR LOCAL AREA:

Parks, play areas, public gardens, woods, playing fields or sports pitches, golf courses, beaches, canals, rivers or by lochs or other types of natural open space.

- None
- Half an hour or less per week
- Between half to one hour per week
- Between 1 to 2 hours per week
- Between 2 to 4 hours per week
- Between 4 to 6 hours per week
- 7 or more hours per week

Reliability Test

A test re-test reliability pilot, which included the revised questions, was conducted by the HBSC Scotland team with a convenience sample of 337 S2 and 232 S4 pupils from two additional secondary schools in Edinburgh. Round one took place during September/October 2009 and round two took place approximately four weeks later in October/November. The researcher did not take part in the fieldwork for this but did conduct the reliability analyses for the greenspace questions.

Test re-test reliability of the greenspace questions was indicated by intra-class correlation co-efficient (ICC) (Shrout and Fleiss, 1979) to check for differences between time one and time two responses to the same question by the same pupils. ICC is the

ratio of variation occurring within pupils between time one and time two and the variation that occurs between any two random pupils. It takes into account the amount of agreement, how close to agreement an answer may be, as well as the ability of the measure to show variance in a population. ICC for all pupils was 0.54, $p < 0.001$ for greenspace frequency and 0.60, $p < 0.001$ for greenspace duration. Spearman's correlations were also conducted and produced very similar results. Separate analysis of S2 and S4 pupils indicated less agreement for the older pupils, indicative of more individual variation in patterns of greenspace use than for those pupils in S2. Values of 0.40 - 0.75 are considered fair to good and values over 0.75 are excellent (Fleiss, 1986). The results for the ICC, therefore, indicated fair to good agreement. Variation may be explained by weather differences, change in daylight hours between completion dates and (for some) occurrence of the October holidays just prior to the second completion. Ideally, further validation should be carried out to explore this measure but it was considered acceptable given the large sample size due to take part in the main study.

7.2.2 Physical Activity Measures

The HBSC questionnaire included three questions on physical activity that were used for analyses in the current research. These validated measures of physical activity (Iannotti *et al.*, 2010) asked about the frequency and duration of vigorous physical activity (VPA) and the number of days on which a respondent achieved at least 60 minutes of moderate physical activity (MPA).

1) OUTSIDE SCHOOL HOURS: How often do you usually exercise in your free time so much that you get out of breath or sweat?

- Everyday
- 4 to 6 times a week
- 2 to 3 times a week
- Once a week
- Once a month
- Less than once a month
- Never

2) OUTSIDE SCHOOL HOURS: How **many hours a week** do you usually exercise in your free time so much that you get out of breath or sweat?

- None
- About half an hour
- About 1 hour
- About 2 to 3 hours
- About 4 to 6 hours
- 7 hours or more

3) Physical activity is any activity that increases your heart rate and makes you get out of breath some of the time.

Physical activity can be done in sports, school activities, playing with friends or walking to school.

Some examples of physical activity are running, walking quickly, cycling, dancing, skateboarding, swimming, football and gymnastics.

For the next question, add up all the time you spend in physical activity each day.

Over the **past 7 days** on how many days were you physically active for a total of at least **60 minutes** per day?

- 0 days
- 1
- 2
- 3
- 4
- 5
- 6
- 7 days

7.2.3 Implementation of HBSC Questionnaire

The HBSC Scotland team administered the HBSC questionnaire to a representative sample by grade and gender of 13 and 15 year-old pupils (S2 and S4) across Scotland in February and March 2010. Details of the sampling strategy, response rates and other aspects of the study are published in *Health Behaviour in School-aged children: World Health Organization Collaborative Cross-National Study (HBSC) Findings from the 2010 HBSC Survey Scotland* (Currie *et al.*, 2011). The researcher was not involved in the administration of the main HBSC survey.

7.3 HBSC – Data Analysis

A checked and completed dataset was supplied by the HBSC Scotland research team to the researcher. This included data from urban and rural 11, 13 and 15 year-olds (P7, S2 and S4 school years). The researcher created a new dataset with only S2 and S4 respondents for further analyses. All analyses were conducted using SPSS v17.0.

7.3.1 Level of Greenspace Use

Descriptive statistics were used to describe levels of physical activity and greenspace use, including the proportion of young people who use greenspace at least once per week. This representation was chosen because it corresponds to that used by the Scottish Government for tracking progress on national outcome 12: ‘We value and enjoy our built and natural environment and protect it and enhance it for future generations’¹⁶. The associated national outcome indicator is the proportion of adults who visit the outdoors weekly¹⁷. In addition, other surveys, such as the Greenspace Scotland Omnibus survey of 2009, also report the proportion of adults who use greenspace at least once per week (Progressive Partnership, 2009).

7.3.2 Difference in Greenspace Use by Gender, Grade and Affluence

Patterns of greenspace use according to sex, grade and affluence were explored using design-adjusted Pearson’s chi-squared test for independence and logistic regression. Design-adjusted analysis was necessary due to the stratified nature of the HBSC sampling strategy. Random selection took place at the class level with all local authority-funded and independent sector schools included in the sample frame (with the exception of schools for pupils with special needs). This may lead to cluster effects which can act to reduce the effective number of independent responses. The chi-squared test checks the observed distribution of proportions against a calculated expected distribution of no differences between groups (Fielding and Gilbert, 2006). This was used to check for bivariate relationships to indicate requirement for further analysis. Affluence was measured using the validated family affluence scale (FASII) (Currie *et al.*, 2008). This is a measure that has been developed by and used in HBSC. It has been shown to be a valid and sensitive indicator of affluence in comparison to other measures such as parental occupation or maternal education (Boudreau and Poulin, 2009; Currie *et al.*, 2008). However, for future use it is recognised that further validation work is still required due to changing social circumstances and risk that the measure may be becoming outdated (Currie *et al.*, 2008). The total score for FASII ranges from 0 to 9 (see Table 7.1) and was reduced to create three levels with a score of 0-3 regarded as

¹⁶ Scottish Government website, <http://www.scotland.gov.uk/About/scotPerforms/outcome>

¹⁷ Scottish Government website, <http://www.scotland.gov.uk/About/scotPerforms/indicator/outdoors>

low affluence, 4-6 equivalent to medium, and 7-9 high affluence (Currie *et al.*, 2008). These are relative scores and have meaning in relation to each other, however, they do not relate directly to other measures of affluence. In other words, a FASII score cannot be equated to a range of income levels or educational attainment levels.

Table 7.1 Components and response categories used to create FASII

FAS item	Response range
How many computers (PCs, Macs or laptops) do your family own?	0-3
Does your family own a car, van or truck?	0-2
During the past 12 months, how many times did you travel away on holiday with your family?	0-3
Do you have your own bedroom for yourself?	0-1

7.3.3 Relationship between Greenspace Use and Physical Activity

Design-adjusted correlation analyses, using Spearman's rho for ordinal level variables, were used to examine differences in physical activity level by greenspace use on untransformed data. Simple and design-adjusted logistic regression, controlling for the influence of demographic factors on greenspace use and physical activity, were also conducted on transformed variables. Transformation created binary variables representing high and low levels of physical activity and greenspace use, see Table 7.2.

Table 7.2 Responses categories used to create high and low physical activity and greenspace use categories

Binary Measure	Frequency	Duration (Hours)
Low Greenspace Use	1 – 2 times per week or less (Response options 1 to 4)	1 – 2 hours per week or less (Response options 1 to 4)
High Greenspace Use	3 – 4 times per week or more (Response options 5 to 7)	3 – 4 hours per week or more (Response options 5 to 7)
Low VPA	Once per week or less (Response options 1 to 4)	2 – 3 hours per week or less (Response options 1 to 4)
High VPA	2 – 3 times per week or more (Response options 5 to 7)	4 – 6 hours per week or more (Response options 5 to 6)

7.3.4 Effect Size

The presence of a statistically significant effect does not necessarily mean that the effect is meaningful or important (Field, 2005). A large sample, such as that used in HBSC, may risk overstating the importance of a statistically significant result, and this is considered to be especially true for the chi-squared statistic (Argyrous, 2000). Effect size is a way to calculate the magnitude of an effect which is an objective, standardised method (Field, 2005). Effect size can also be used to compare effects across studies even though different methods and populations have been involved (Field, 2005). Correlation (r) statistics and odds ratios (ORs) are two widely used forms of effect size (Field, 2005), and ORs were used to demonstrate effect size for HBSC data.

7.4 Study 2 – The GAG Study

In its entirety, the GAG study included a questionnaire, primarily aimed at recruitment, the GAG method and interviews. Prior to pilot testing and undertaking of the full study in schools, ethical approval was granted by the University of Edinburgh, Moray House School of Education Ethics Committee. This phase of the current research was conducted entirely by the researcher.

7.4.1 Location

The GAG study took place in Fife in Scotland. There were several reasons why a single Local Authority (LA) area was included. Firstly, this was due to the nature of the GIS dataset used for determination of geospatial movements. At the time of the development of this study all LAs in Scotland were undergoing a process of auditing their greenspace and compiling a GIS database. Not all LAs had completed this, but Fife was one that had and had agreed to make this available for research. It was the understanding of the researcher at the time of designing this study that the audits by different LAs had been pursued in slightly different fashions such that the data were not directly comparable at that time (although this has since been resolved to create a single, nationwide dataset). A second issue was the intensive nature of the fieldwork which would have made it difficult to travel to multiple LAs to conduct the research. Thirdly, Fife has a web-based

GIS, the “KnowFife” dataset¹⁸. This is an information service which includes catchment boundaries of each secondary school in Fife thus enabling identification of target schools with catchments that lie in predominantly urbanised areas. This is important because greenspace refers to natural environments in urban settlements.

Adolescents were recruited via schools, since identifying urban adolescents can be problematic due to access to the type of data required, and because access to children is rarely possible except via ‘gatekeepers’ (Lewis and Lindsay, 2000). Schools provide relatively easy access to adolescents from a broad range of backgrounds which reduces the risk of respondent bias to the initial questionnaire based on characteristics such as socio-economic status. This may be problematic if approached via clubs and other organisations. Schools are also considered to be one of the best venues for recruitment because it is more likely that parents will consent if the research takes place within school time (Bloor *et al.* 2001).

Fife has several large urban settlements and a range of smaller ones. There is a good range of socio-economic status with datazones, categorized by Scottish index of multiple deprivation (SIMD), spread evenly from least deprived to most deprived. This is in comparison to Edinburgh and Glasgow which have a concentration of datazones in the least deprived and most deprived categories respectively, see Figure 7.2 (Scottish Government, 2009). Fife has a blend of coastal and inland settlements giving a broad range of greenspace types likely to be typical to many Scottish towns.

¹⁸ <http://knowfife.fife.gov.uk/> The Know Fife Dataset is a shared information resource for community planning partners and the public in Fife. The dataset brings together information on needs and outcomes, with activity, performance, spend and other resources at a variety of Fife geographies.

Figure 7.2 Local Authority bar code charts visual presentation of spread of SIMD datazones¹⁹

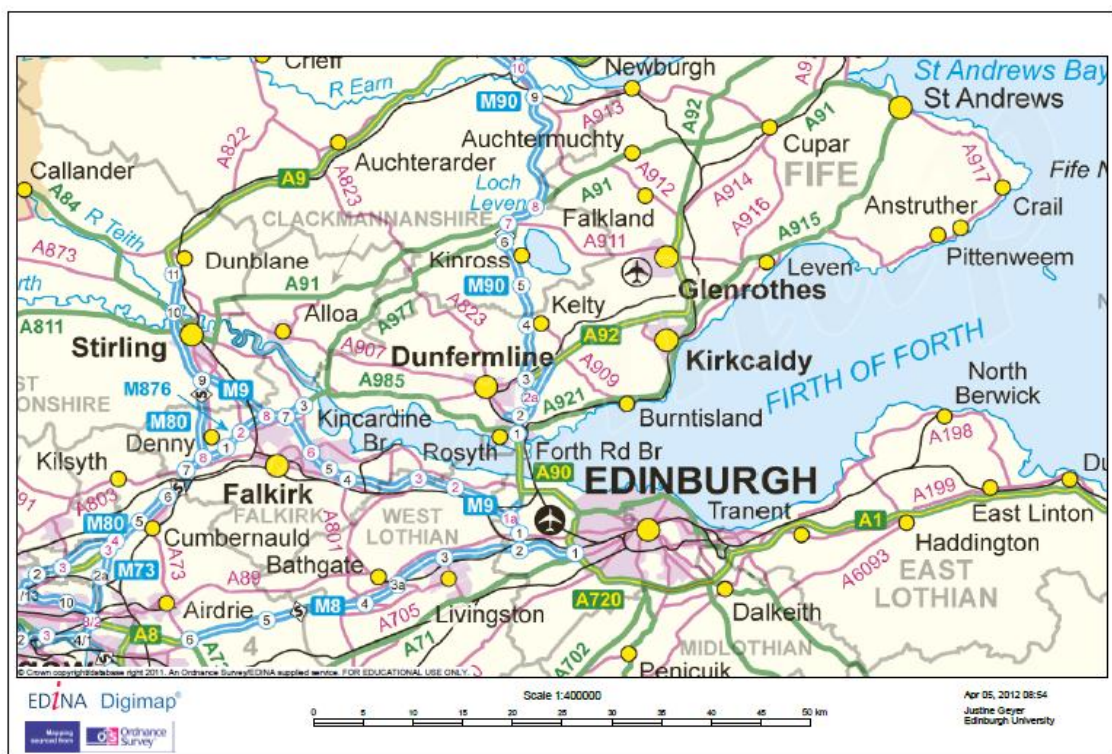


¹⁹ Scottish Government (2009) - Each bar represents a single datazone placed on a scale from most deprived to least deprived according to the SIMD 2009 rank. Concentrations of datazones in a Local Authority with similar ranks show up as dark blocks, for example at the most deprived end of the scale in Glasgow. Datazones in Fife are equally distributed among the most to the least deprived in terms of SIMD 2009 rankings, with fewer datazones in decile 1, the 10% most deprived, though the numbers in the most deprived decile has been increasing on each update to the SIMD.

Three schools, one each located in Dunfermline, Glenrothes and Kirkcaldy, were invited to participate in study 2. Pupils were included from these three different locations in Fife to ensure a range of greenspace access and conditions. These three towns are the largest in Fife as well as being in the top 15 largest settlements (by population) in Scotland. Estimates for 2008 indicated a population of 78,550 in the settlement of Dunfermline, 48,630 in Kirkcaldy and 47,280 in Glenrothes (GROS, 2008).

All three towns have large, established town parks. Kirkcaldy is located on the east coast of Scotland and therefore offers residents access to beach and shoreline within the settlement boundary and adjacent to Ravenscraig Park. Dunfermline is situated close to the Firth of Forth estuary, however, the closest shoreline is primarily of an industrial nature and more distant than in Kirkcaldy, see Figure 7.3.

Figure 7.3 Map showing location of Dunfermline, Glenrothes and Kirkcaldy in Fife, Scotland



Information on the nature of the greenspace in Fife had not been published at the time of development of the current research. At the time, data provided by Kevin O’Kane (Greenspace Partnership Officer for Fife Council) indicated that all three settlements were above a threshold of quantity of greenspace provision of at least 6 hectares per

1000 head of population (the average across Fife of publicly usable greenspace O’Kane, 2010); Dunfermline had 6.6ha, Glenrothes had 18.3ha and Kirkcaldy 13.0ha. Fife Council has since published more detailed information about their greenspace provision (see Table 7.3). Dunfermline is described as having a reasonable amount, of reasonable quality with a few high quality greenspace in the centre of the town, but access is below average. Kirkcaldy has a high amount but there is variation in different parts of the town. The town has quality greenspace but this varies between some of the best in Fife to some poor quality spaces. Access was also variable. Glenrothes was considered to have a high amount of greenspace of reasonable quality and high levels of access (O’Kane, 2010).

Table 7.3 Greenspace characteristics by location

Location	Quantity of GIS determined publicly accessible GS* (ha per 1000)	GIS determined access to GS (Percentage of settlement population within easy access to a GS**)	Quality of GS*** (average score)
Dunfermline	7 Average	59 Low	62 Reasonable
Kirkcaldy	13 High	65 Variable	61 Variable
Glenrothes	18 High	84 High	67 Reasonable
Fife	6	62	60

(Based on information in O’Kane, 2010)

*Publicly Usable Greenspace refers here to parks, amenity residential greenspace, play areas, sports areas, natural greenspace (such as woods, beaches) and allotments .

**Greenspace Access - Computer mapping software was used to assess proportion of settlement population within a distance of 250 metres from greenspace of at least ½ an acre (0.2 hectares) or more. 62% of the Fife’s settlement population living in domestic properties are within 250m walking distance of a 0.2 hectare publicly usable greenspace. 60% was used to rate settlements, with those below 60% seen as needing to improve access.

***Greenspace Quality – this was defined as how multifunctional a space was with 5 criteria used to create a composite score: Accessible and connected; Attractive and appealing; Biodiverse supporting ecological networks; Promoting of activity, health and well-being and Provision of community benefits. The average score was 60%. Sites that were below the 60% score were rated poor, which means that they need improved.

In comparison to urban Scotland more widely, urban Fife has a greater extent of publicly accessible greenspace per 100 head of population (20 ha) than the Scottish average (16ha). Publicly accessible greenspace in this context is all greenspace in settlements with 3000 residents or more and excludes only gardens. It differs, therefore, from the definition used by Fife Council to produce their audit figures.

Limiting the GAG study to a single LA, and including pupils from only three schools, arguably limits the representative nature of the resulting sample. However, although Fife appears to have a higher than the Scotland average of quantity of greenspace, it is evident from the more detailed data provided by Fife Council that quantity, access and quality can be widely variable even within a given settlement. The important issue is, therefore, to select a number of locations which represent a range of greenspace experiences. This was the intention underlying the targeting of three different settlements.

In addition, the adolescents in Fife were not expected to be markedly different from other urban adolescents in Scotland in their activity levels. A comparison of activity levels of 13 – 15 year olds in Fife compared to the rest of Scotland revealed that 58% in Fife were active on at least five days of the week compared to 60% for the whole of Scotland. These figures were provided by “knowfife” and based on data from the 2006 Scottish Adolescent Lifestyle and Substance Use Survey (SALSUS).

7.4.2 Sample Strategy

The starting point for consideration of the sample size was the numbers desired for the GAG and interview stages of study 2. As a rule of thumb, it is recommended that a sample frame generate approximately three to four times the number of potential participants that are required for a later stage of research (Ritchie and Lewis, 2003). The target for the monitoring stage was a minimum of 30 to allow comparisons between binary variables. Fifteen is the minimum number in a category suggested to enable statistics to be carried out in a comparative study (Cohen *et al.*, 2005). A total sample aimed for was approximately 40-50 to allow for some data loss. More precise estimates of sample numbers required for GAG were not possible prior to fieldwork, because no studies on differences in accelerometry by level of greenspace use had been published. A large scale pilot to establish this was prohibitive logistically and by cost. Thus, working back from the recruitment ‘rule of thumb’ a sample of *circa* 200 was required for the questionnaire. Approximately 50 from each year group and from three different schools was arrived at to achieve an even spread of pupils across grades and the three

different towns. This was expected to enable a purposive sample for monitoring that would have an even representation by grade, sex and location.

7.4.3 Recruitment Questionnaire

The researcher developed a questionnaire (see Appendix C), which was tested first on three adolescent girls who were known to the researcher. Adjustments were made before piloting with a convenience sample of one S2 class in Dunfermline in June 2009. This included 10 boys and 9 girls aged 12-13 years. A total of four pupils from this class (two girls and two boys) went on to test out the monitoring phase of the study.

Final adjustments were made and in February and March 2010 the questionnaire was administered to 335 S2 and S4 pupils across three urban schools in Fife (selection of these was mentioned earlier). The need to include a cross-section of the pupils in each year was emphasised to school staff to ensure representativeness in the research. Approximately 50 per year group per school were achieved although there was under representation of S2 pupils in school 1 (see Table 3 in Appendix C). Permission to contact schools was granted by Fife Council Education Department and assistance was also sought from Fife Council Active Schools Coordinator. Head teachers of the selected schools were contacted in the first instance and subsequent communications were either with the Head teacher or appointed contact. Information packs (Appendix C) were sent out to parents and pupils. Consent was assumed unless an opt-out form was completed and returned within a week. Arrangements were made for questionnaires to be administered by teachers and school staff in two of the three schools. The researcher assisted administration in the third school. Where the researcher was not present, an information pack was provided to teachers and staff describing the administration protocol and how to deal with any issues that may arise (Appendix C). To ensure confidentiality, each individual questionnaire was placed in a sealed envelope by the respondent and returned to the administrator of the survey. All surveys from each school were collected in person by the researcher and stored in a secure location prior to data entry and processing. A total of 289 questionnaires were completed, response rate 86%. Reasons for non-response are listed in Appendix C. The questionnaire contained a section asking respondents to provide home contact details if they wished to be sent further information about taking part in the GAG and interview stage of the research.

Information packs (see Appendix D) were requested by 140 pupils and 43 returned consent forms completed by both prospective participants and a parent or carer.

7.4.4 The GAG Method

A purposive sample was selected to achieve, as much as possible, equal representation in number by grade, sex and town. Those indicating a history of, or currently suffering, significant mental or physical health problems that could potentially impact on their ability to use greenspace were excluded. This was applied to ensure that ability was not a contributing factor to greenspace use or activity, thus focusing the research on intent and opportunity.

All field work for GAG and interviews took place during the school summer term. Ideally, the summer holidays would also have been included, however, expense associated with the mobile phone contract and problems experienced during the pilot led to a decision to restrict monitoring to the school summer term. The pilot for the GAG study was conducted during the 2009 summer holidays. However, it was difficult to arrange meetings due to participants going on holiday. Also the intention was to try to gather data from participants during a reasonably “typical” week at home. Some participants, however, declared they had not had typical weeks because friends were away or they, themselves had gone away at the weekend. Also, clubs and other activities were off over the summer.

Participants were contacted by phone and/or email to confirm interest, to arrange a meeting to answer further questions and to get the adolescents set up with the accelerometer and GPS phone. This “drop-off” meeting took place at participant’s homes, generally on a Wednesday evening with “pick up” and interview taking place the following Tuesday to allow time for data download and resetting of the phones before they were handed to the next group of participants. Due to the limited number of phones and accelerometers, only four participants took part during any one week. This necessitated a stringent phone ‘cleaning’ process to ensure confidentiality between participants. The protocol for the drop off, pick up and phone ‘cleaning’ is detailed in Appendix D.

During May and June 2010 a total of 35 pupils took part. They were loaned a GPS-enabled Blackberry (8900) with unlimited texts and approximately 60 minutes of free talk time and 500MB of free data download. At the same time they were asked to wear an accelerometer for six or seven days from when they got up to when they went to bed (excluding water based activity or where the accelerometer may have caused harm). They were asked to record all 'on' and 'off' times in an activity monitor diary, see Appendix D. Monitors were requested to be worn over the right hip, which is the currently accepted method (Trost, 2005). The output of the accelerometer is an activity count per time period (epoch). The standard epoch used has been 60 seconds, however one study has suggested this may underestimate the higher intensity levels of activity in young children (Nilsson *et al.*, 2002). Adolescent casual leisure time activity may well occur in a similar fashion to young children, in small concentrated bouts that a longer epoch setting may affect. This was indicated by data from one of the pilot participants in which the two different epoch lengths (60 second and 30 second) were compared. The 60 second epoch underestimated the amount of more intense physical activity in comparison to the shorter epoch length, therefore, the 30 second epoch was used.

Participants were asked to keep the Blackberry switched on at all times and take it with them wherever they went. They were given a phone instruction sheet emphasising the need to charge the phone every night and detailing other information about the phones (see Appendix D). They were also asked to fill in a short questionnaire (minisurvey), which contained both open and closed questions, including questions regarding daily activities and greenspace contact during leisure time. This was sent to their Blackberry every evening at 9:15pm commencing the evening following the drop-off. The minisurvey was developed by the researcher and was designed to be quick to fill in (5 to 10 minutes at most) and easy to complete using the Blackberry supplied (see Appendix D). The minisurvey was administered via the3rddegree, an online company that provides a web-based platform for designing, setting up and sending out a survey to mobile phones. Data were automatically stored on a central secure server and only accessible to the researcher via password protected access. The information from the minisurvey provided additional guidance for questions during interviews. Accelerometers were set to start recording every 30 seconds at 8am the day after the drop-off. The GPS was switched on just prior to handing out the phone and also set to

record every 30 seconds. GPS points were recorded using a combination of live tracking and logging to the phone. Live tracking was provided by Trackaphone. An open source piece of software called 'GPSlogger', available online from emacberry.com, was downloaded to each phone which enabled logging of data onto the phone every 30 seconds. Access to GPSlogger was password protected after experiencing data loss with several of the early participants. Live tracking data were accessible only by the researcher through a secure web service. All participants were clearly made aware they were being tracked and had consented to this.

7.5 GAG Data Analysis

Data obtained from the GPS and accelerometers required a considerable amount of processing before they could be used in analyses. This section first explains key processing steps before continuing on to describe the statistical analyses carried out on data from the GAG method.

7.5.1 GAG Data Processing

Accelerometer and GPS data from only those with at least one day of GPS data were imported into SPSS. This included data from 31 of the 35 participants. Three from the first group accidentally switched off GPSlogger on their phones and one participant from another group went away from the local area for most of monitoring period. Data from these four participants were, therefore, excluded due to being insufficient. The GPS 30 second epoch timestamp was standardised to be on the minute and at 30 seconds past the minute to allow later merge with the accelerometer data. This was required because the timestamp was only approximately every 30 seconds. For example, this could be at 17 seconds past and then 47 seconds or 23 and 53 seconds past the minute. This process resulted in the creation of duplicate and triplicate times. Duplicate and triplicate times refer to instances where the same timestamp was allocated to two or three different sets of location co-ordinates. These were removed before merging with the accelerometer data and resulted in the loss of 4% of the GPS data.

Accelerometer and GPS data were merged based on matching the timestamps, and only leisure time data were retained. Secondary schools in Scotland finish at approximately 3:30pm, therefore, leisure time was taken to be from 3:30pm until midnight on

weekdays and from 8am until midnight at weekends. The matching process assigned an activity count to each set of GPS recorded geographical location co-ordinates. However, not all activity counts had location co-ordinates matched to them. This resulted in gaps where location of physical activity was unknown. This was because the accelerometer records every 30 seconds no matter the conditions, whereas the GPS can suffer signal loss, be switched off or run out of power, as mentioned in the methodology chapter.

A physical activity level was assigned to each recorded location point based on published cut-offs; sedentary behaviour was taken as <1100 accelerometer counts per minute (cpm) (Reilly *et al.*, 2003), light physical activity (LPA) as between 1100 and <3200 cpm, and moderate and vigorous intensity physical activity combined (MVPA) as >3200 cpm (Puyau *et al.*, 2002). Accelerometer output is related to intensity of activity through use of these cut-offs (Freedson *et al.*, 2005). The research on these thresholds is limited and the exact cut point for each level of physical activity contentious (Corder *et al.*, 2008; Freedson *et al.*, 2005). Despite the criticism of them, the cut points have been widely used in physical activity studies. Absolute intensity was not a requirement for this research and therefore the contentious relationship between cut points and energy expenditure was considered of less importance than the relative intensity of low, moderate and high.

Matched-only data were imported to ArcGIS v9.3 and joined to the greenspace data provided by Fife Council. This assigned a greenspace code to each location. A series of assumptions and quality checks were then made.

7.5.2 Quality Checks

Actigraph

On weekdays the accelerometer 'on' time was assumed to be 3:30pm if an activity count greater than zero occurred within 10 minutes of this time. Where this was not the case, the start time was taken to be the start of the first group of readings after consecutive zeros signifying when it was likely to have been put on. At weekends, the 'on' time was taken to be the start of readings. 'Off' times were identified as the last of the significant readings when followed by prolonged consecutive zeros occurring at night. If this did not occur clearly before midnight then the last time was noted as

midnight. For a day to be included in the final aggregate dataset, accelerometer data for at least 60% of leisure time was required to be present (5 hours on weekdays and 9.5 hours on weekend days).

There is no established protocol for deciding on whether a day should be included for analysis (Masse *et al.*, 2005). Often studies do not state this decision and there is a large amount of variability when they do. A relatively common approach is to apply a minimum of 10 hours as a threshold (Masse *et al.*, 2005). It is not possible for this to apply to weekday leisure time (total 8.5 hours) and is applied to studies assessing physical activity over an entire day (all waking hours). Assuming waking hours equates to 16 hours in a day, 10 hours represents approximately 60% of the day, thus the 60% rule was applied in the present study.

Participants may remove the accelerometer without noting this down in their diary. Prolonged series of consecutive zeros occurring within the measurement period in the accelerometer data is indicative of removal of the unit and possible non-compliance (Corder *et al.*, 2008). Diaries can be checked but if the removal was not noted down or the correct time not recorded then this can pose a problem and a system is required to deal with such instances. There is no universally accepted or validated way of handling possible non-compliance or periods of extended zeros (Corder *et al.*, 2008; Oliver *et al.*, 2011; Wheeler *et al.*, 2010). Wheeler *et al.* (2010) adopted the approach used by the US National Health and Nutrition Survey which reclassified any continuous sections of zero data of ≥ 60 minutes as missing, allowing for up to two minutes of non-zero values each hour. A similar approach was taken in the current research but no allowance was made for the presence of any non-zero values. Any sections of consecutive zeros over one hour were treated as missing, unless a reason was provided from the diary.

GPS

Missing Data

As explained previously, GPS data invariably comes with gaps. Several approaches have been taken to deal with missing data. One approach has been to regard missing sections as being indoors (Jones *et al.*, 2009; Wheeler *et al.*, 2010). An alternative approach has been to impute missing data according to a set of rules (Maddison *et al.*,

2009). The latter approach was favoured for data processing in the present study. This was because gaps appeared in the data during greenspace exposure, although these were minimal and rarely above 30 seconds in duration. Also, it was clear from pilot work, and during the main study, that the Blackberrys were regularly picking up (or attempting to detect) signals indoors and in vehicles, although they tended to be less consistent or accurate resulting in substantial amounts of ‘jitter’. This is a term that has been used to describe the messy nature of GPS data when the signal is frequently bounced and erroneous due to being near or in buildings. A recent review of the use of GPS in physical activity research explained that newer receivers are more sensitive and interpret even weak signals (Krenn *et al.*, 2011). This may explain the data from the Blackberrys. Another issue was that, because the GPS unit was a phone, this was not attached to the volunteer in the same way as an accelerometer and other types of GPS receivers. Therefore, non-compliance from leaving the phone at home or it running out of charge was potentially more of a problem. As a result it was not assumed that gaps were indoors. This required establishment of quality criteria with which to accept or reject the GPS data. To date, very minimal quality criteria have previously been applied to GPS data due to the assumption that missing means indoors. For example, Wheeler *et al.* (2010) included all participants with ≥ 1 minute of GPS data. In other research, it is not clear what, if any, quality criteria have been applied. A more stringent threshold was deemed necessary in the current research due to the compliance issue already highlighted. However, a less stringent one than is applied to accelerometry data was thought reasonable due to the issue of signal problems when indoors. Therefore, GPS data were checked for large gaps that might be indicative of non-compliance. Continuous gaps in the GPS data of more than two hours duration were recorded as missing. Gaps for durations below two hours were considered feasible due to being in buildings and in vehicles where signal frequency can be more sporadic, but experience with the data suggested that gaps were not commonly as large as two hours or more. Once missing data had been identified according to the above criteria, each day was checked manually to assess if the first and last recorded co-ordinates covered at least 50% of leisure time with reasonable regularity of points in between. If this was not the case and large sections were missing the day was excluded from the final dataset.

Erroneous Data

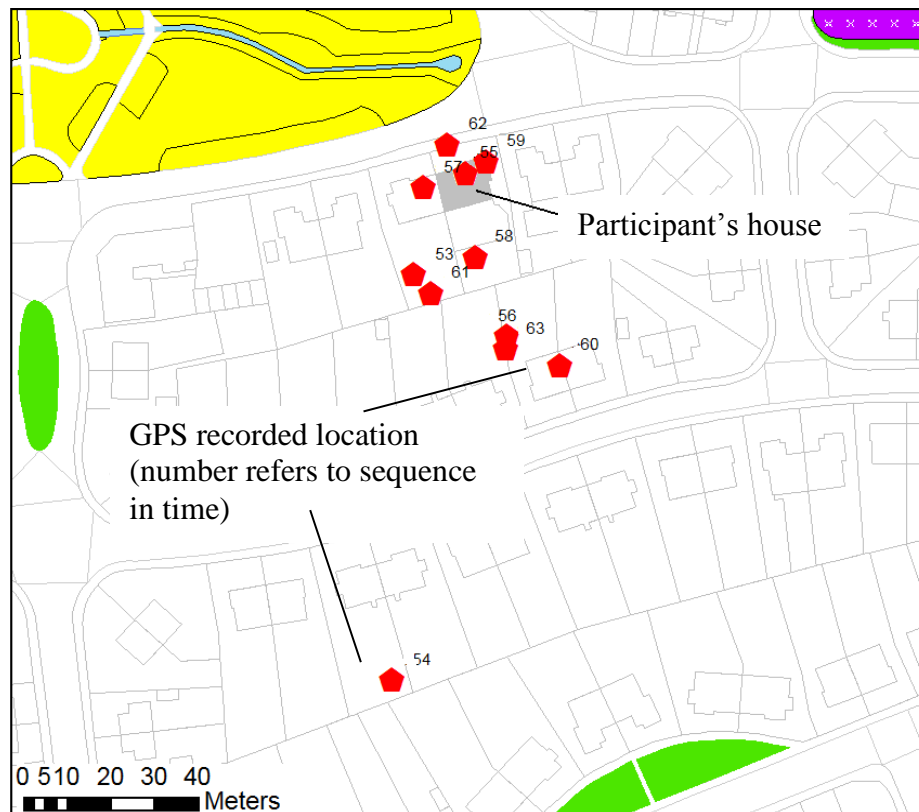
A second issue with GPS data, highlighted previously, is the potential for erroneous data. Research has shown a range of handheld GPS receivers used in physical activity research are only accurate to within several metres (Rodriguez *et al.*, 2005). This accuracy can vary widely dependent on the location conditions, including being in or even near buildings and under dense foliage.

Whilst in ideal conditions precision is of the order of a few metres (Rodriguez et al., 2005), misclassification of datapoints at the edge of land parcels is still possible, and this error may vary with urban structure (e.g. tall buildings vs. open spaces). (Wheeler et al., 2010)

Pilot test of the units did reveal good level of identification of land use and routes taken by the researcher. However, it was noted that whilst walking along a path or road the GPS reading oscillated between amenity greenspace and the path or road. Amenity greenspace refers to landscaped areas separating different buildings or land uses for environmental, visual or safety reasons which can also be used for leisure activities (Scottish Government, 2008c). The primary contact was with the road but greenspace contact was recorded intermittently. If all such fleeting greenspace contact had been included this would have falsely increased the level of greenspace contact. In addition, “jitter” in data surrounding a participant’s home sometimes made it difficult to confidently state if a person was in their garden, in their street or in the home, see Figure 7.4.

The locations were recorded at night over a period of 10 minutes before the accelerometer was removed and it was assumed the participant had gone to bed. In those 10 minutes they had been sedentary. Instead of locating the participant in their house, the GPS signal bounced substantially, up to as much as circa 115 metres. One participant’s data were eventually excluded precisely because of this issue. Their house was directly adjacent to a large greenspace which they frequently used, but it was difficult to define clear episodes of contact. Thus, ‘jitter’ adds to potential error in results.

Figure 7.4 GPS recorded location demonstrating bounce or “jitter” when inside the home



There is no defined way to deal with erroneous data. Speed thresholds have been previously applied, for example, Wheeler *et al.* (2010) used a speed limit of 15 km/h to eliminate all data associated with vehicular travel or bouncing. However, there can be limitations with this approach. The participant's speed was calculated to be 13 km/h for the furthest bounced point. Applying a speed limit of 15 km/h would not have eliminated any of these points, yet it was highly likely that the GPS was recording incorrectly. Other alternatives include applying complex algorithms to detect patterns of GPS and accelerometer data that signify indoor location. An example is the development of PALMS: Personal Activity Location Measurement System by researchers at the University of California, San Diego. This is a web-based system that supports data collection and analysis of GAG studies. This was beyond the scope of this study and the level of complexity involved may introduce further sources of error, the impact on results of which may be difficult to identify. It is still an area requiring considerable research.

The approach used in the current research was to identify bouts of contact with local²⁰ greenspace of five minutes or greater. This was intended to eliminate the fleeting contact associated with GPS measurement error. The occasional missing co-ordinates during bouts of sustained greenspace contact were imputed based on the last known location. In addition, some non-greenspace land use codes required to be recoded to greenspace because paths and roads ran through greenspace, however, data indicated the primary contact was with the greenspace.

7.5.3 Physical Activity Occurring in Greenspace

Descriptive statistics were used to describe levels of physical activity (median of mean activity counts per minute), levels of greenspace use (median of minutes per day spent in greenspace), proportion of different intensities of physical activity when in greenspace compared to when not, and proportional contribution of greenspace use to total leisure time physical activity. Difference in proportions of different intensities of physical activity when in greenspace or not was tested using chi-squared. Non-parametric Mann-Whitney (MW) tests were performed for independent samples to assess for differences between girls and boys, by grade and between greenspace users and non-users. Wilcoxon test for dependent samples was used to explore differences in physical activity in greenspace users according to when in greenspace or not. Effect size for MW and Wilcoxon was calculated as $r=Z/\sqrt{n}$ (Field, 2005).

7.6 Interviews

7.6.1 Interview Method

Arrangements were made to interview monitor participants, in their own homes, on the evening that equipment was retrieved. This was set up at the time of the drop-off and confirmed one day before pick up was due. Interviews were requested to be between the participant and the researcher only to ensure confidentiality and enhance openness. However, it was made clear that a parent, carer or friend was welcome if desired by the adolescent. The evening before interviews were conducted the live tracking GPS data for an individual were downloaded and used to create visual maps of the participant's

²⁰ Local was taken as being within the settlement (town) boundary based on data provided by EDINA UKBORDERS - Scottish Settlements, 2003 - with the support of the ESRC and JISC and used boundary material which is copyright of the Crown and the Post Office.

geospatial movements over the past week. In addition the minisurvey data were downloaded and examined for information that could help prompt discussion of certain places or activities that had occurred in the past week. Two activity sheets were also included (AS1 and AS2) to help discussions, see Appendix D. AS1 asked respondents to name and describe greenspace they used (or didn't use) and write down what activities they undertook there or why they didn't go there. Attitudes to greenspace were elicited, either through spontaneous discussion and/or use of AS2. Attitudes contribute to intentions (whether a person wants to do something or not) and behaviour (whether a person does something or not) (Darnton, 2008; French *et al.*, 2005; Valois *et al.*, 1988), and are thus linked to motivations (reason or justification for carrying out a behaviour or not). The young people interviewed were shown AS2 which consisted of a list of words describing feelings or attitudes that might be held towards greenspace (both positive and negative). They were asked to think about the places they knew and/or used and circle those words they felt applied to them. Multiple words could be circled.

Interviews were approximately 15 to 20 minutes in duration and commenced with showing the GPS created maps of certain journeys to stimulate general discussion before referring to the semi-structured plan (Appendix D). All interviews were digitally recorded after first seeking verbal permission to do so. Recordings were later downloaded to a computer and transcribed by the researcher. At the end of the interview the researcher went through the phone with the adolescent to remove all personal files and details and reset it for the next participant. In addition, if the participant had not already deleted their list of contacts, all their contacts were sent a text informing them that the phone was no longer in the possession of their friend or relative and to remove the number from their own list of contacts. Accelerometer and GPS data were downloaded to the researcher's computer and the monitors reset for drop-off to the next group of participants.

7.6.2 Interview Analysis

Analysis of qualitative data is not as clearly defined a process as the analysis of quantitative data (Ritchie and Lewis, 2003). A variety of different approaches and techniques have been described, but often qualitative data analysis revolves round the identification of codes or concepts and themes as a way of managing and reducing the

large volumes of data generated during qualitative research, and looking for connections and meanings (Boyatzis, 1998; Creswell and Plano Clark, 2007; Ritchie and Lewis, 2003; Saldana, 2009). Codes, concepts and themes may be informed by previous research with identification of *a priori* themes, but can also incorporate emergence of new themes, particularly in more exploratory forms of research (Boyatzis, 1998; Saldana, 2009). In the current research *a priori* themes informed the interview schedule structure and formed the basis for analysis. In addition, the researcher remained open to the emergence of new themes.

A criticism of thematic analysis, and of analysis of qualitative data in general, is the potential for bias from the interpretation and understanding of such data through the subjective tool of the researcher and the previous knowledge and prejudices they may bring to bear on such analytical processes (Creswell and Plano Clark, 2007). This threatens reliability, regarded here as consistency in interpretation and ability for others to replicate similar findings in a similarly conducted study with similar participants (Boyatzis, 1998). It would also have an impact on validity and generalisation (Boyatzis, 1998). A recognised method to guard against this is to use inter-raters, people other than the researcher, who provide a check on the researcher's interpretation and presentation of the data (Bartlett and Burton, 2007; Boyatzis, 1998; Creswell and Plano Clark, 2007; Ritchie and Lewis, 2003). The interview transcripts were, therefore, sent to two separate non-academic inter-raters. They were asked to read through the transcripts and identify their own key themes and make an overall comment on what they thought the adolescent participants were trying to say about greenspace. In addition, they were then asked to read through the researcher's interview results chapter and comment on whether the interpretation of the transcripts agreed with their own, whether appropriate quotes had been used and whether there were any areas of disagreement. Very few disagreements arose, but where they did they were discussed and all fully resolved. Where comparisons have been made between adolescent sub-groups, for example girls compared to boys, or non-users compared to high users, the inter-raters were only able to comment from a general impression as they had not been involved in these more detailed analyses.

8 Quantitative Results - HBSC Questionnaire and GAG

8.1 Introduction

This chapter presents the results from the quantitative elements of this research, the HBSC survey and the GAG method. Descriptions of the samples are followed by results for physical activity and greenspace use, the relationship between the two and an exploration of the influence of grade, sex and affluence.

8.2 HBSC Questionnaire

8.2.1 Sample Details

The HBSC sample included a combined total of 4697 S2 and S4 participants. There was equal representation by sex, however, the sample required weighting by grade and an adjustment was made to ensure appropriate representation of private schools for national representativeness (Currie *et al.*, 2011). The combined class and pupil response rates were 63% for S4 and 66% for S2 (Currie *et al.*, 2011). More details on the sample can be found in the *HBSC Scotland National Report: Findings from the 2010 HBSC survey in Scotland* (Currie *et al.*, 2011). Table 8.1 presents an overview of the sample and comparison to Scottish Pupil Census data.

Table 8.1 Description of HBSC Sample S2 and S4 only (n=4697)

HBSC sample characteristics	Proportion of respondents (%)	Scottish Pupil Census Data* 2010 (%)
Boy	49.4	50.3
Girl	50.6	49.7
S2	45.4	49.5
S4	54.6	50.5
FASII level 1 (low affluence)	7.1	
FASII level 2 (mid affluence)	47.4	
FASII level 3 (high affluence)	45.5	

* Figures for publicly funded schools only. Sourced from Pupils in Scotland 2010 – supplementary data to the Summary Statistics for Schools in Scotland compendium released on the 1st December 2010. <http://www.scotland.gov.uk/Topics/Statistics/Browse/School-Education/pupilsupdata>

Using FASII as a measure of affluence at the household/individual level (see section 7.3.2, p94-5 for details) revealed that the vast majority of pupils were equally split

between levels two and three (medium and high affluence respectively); Only a small percentage (7%) were in the low affluence group.

8.2.2 Levels of Physical Activity in HBSC S2 and S4 Respondents

Analysis by the researcher revealed that, across 13 and 15 year-olds in Scotland, 72% self-reported high levels of leisure time participation in vigorous physical activity (VPA) of at least two to three times per week or more (see Figure 8.1). Approximately one in ten (12%) reported doing at least seven hours of VPA a week with 31% participating in four or more hours a week (see Figure 8.2). A third (36%) reported achieving 60 minutes of moderate physical activity (MPA) on at least five days over the previous week, and 12% met the current recommendation of 60 minutes of MPA on all seven days.

Analysis conducted by the Scotland HBSC team showed that, across Scotland, leisure time participation in VPA was higher amongst boys than girls, with 51% of boys compared to 37% girls reporting participation in VPA at least four or more times a week (Currie *et al.*, 2011). Also they found frequency was greater for S2 compared to S4 pupils. Duration of VPA showed a different pattern to that of frequency. While frequency of participation decreased with age, regardless of sex, duration increased, but only among boys (Currie *et al.*, 2011).

Figure 8.1 Self-report frequency of VPA per week (n=4308)

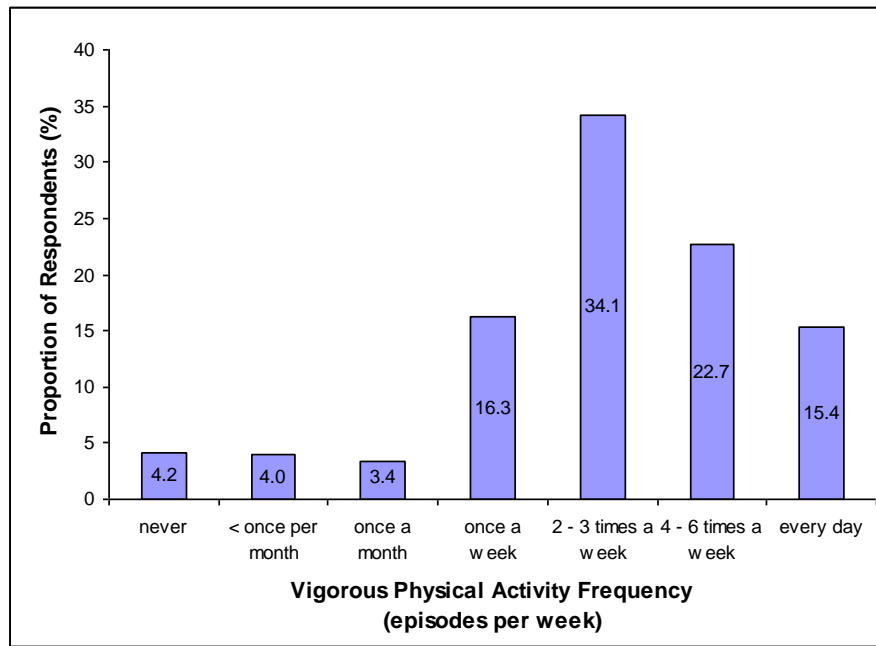
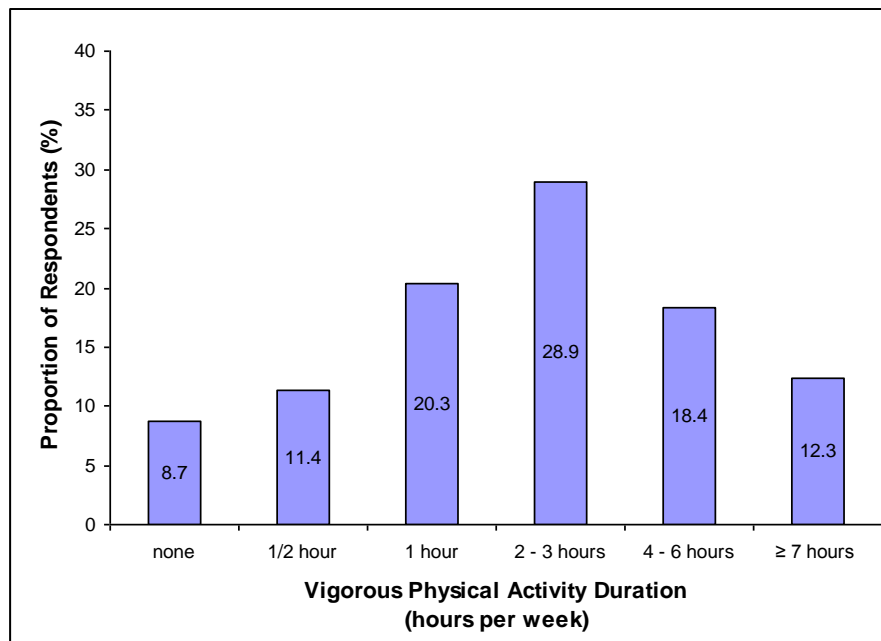


Figure 8.2 Self-report duration of VPA per week (n=4281)



8.2.3 Level of Greenspace Use

Analysis by the Scotland HBSC national team revealed that a large majority of 13 and 15 year-olds (71%) reported greenspace use at least once a week, 19% occasional use (1-3 times per month) and 11% infrequent use (less than once a month) (Currie *et al.*, 2011). When asked how many hours a week they spent in their local greenspace during summertime leisure time, 40% responded more than four hours a week, 32% between one and four hours a week and 28% one hour or less per week (Currie *et al.*, 2011).

Further analysis by the researcher demonstrated that 54% of respondents reported visiting greenspace during leisure time at least three to four times in the week, see Figure 8.3. More than half (58%) reported spending three to four hours or more of their leisure time in greenspace per week, with more than a fifth (22%) reported being in greenspace for seven hours or more, whilst 10% claimed no time at all on a weekly basis (see Figure 8.4).

Figure 8.3 Frequency of visits to greenspace during summer months leisure time (n=4520)

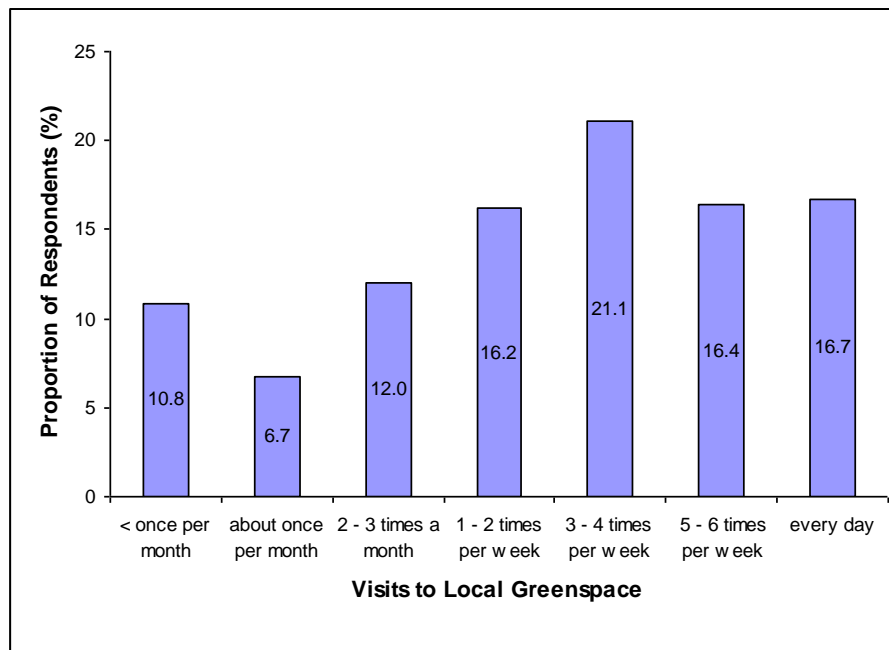
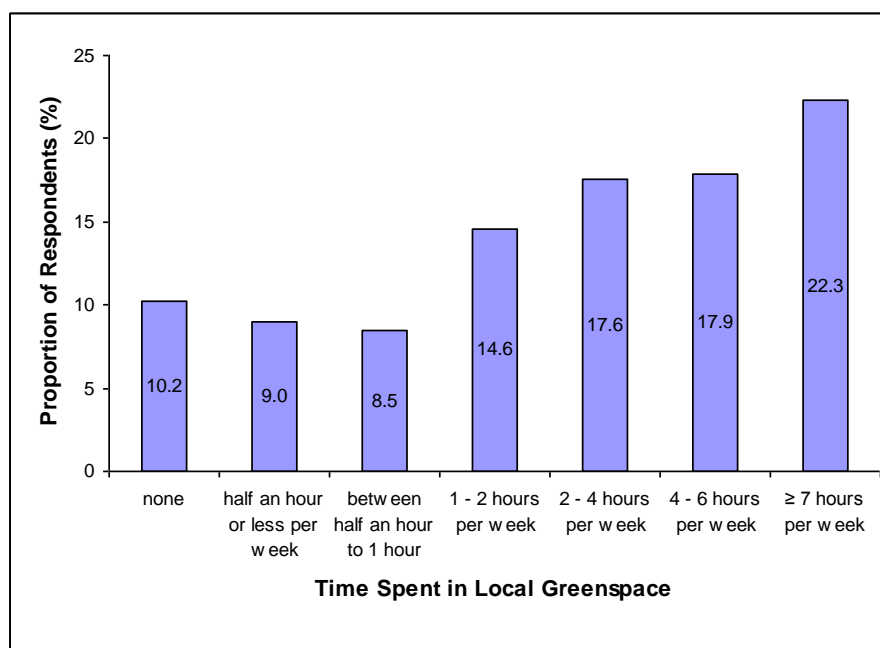


Figure 8.4 Duration of time spent per week in greenspace during summer months leisure time (n=4490)



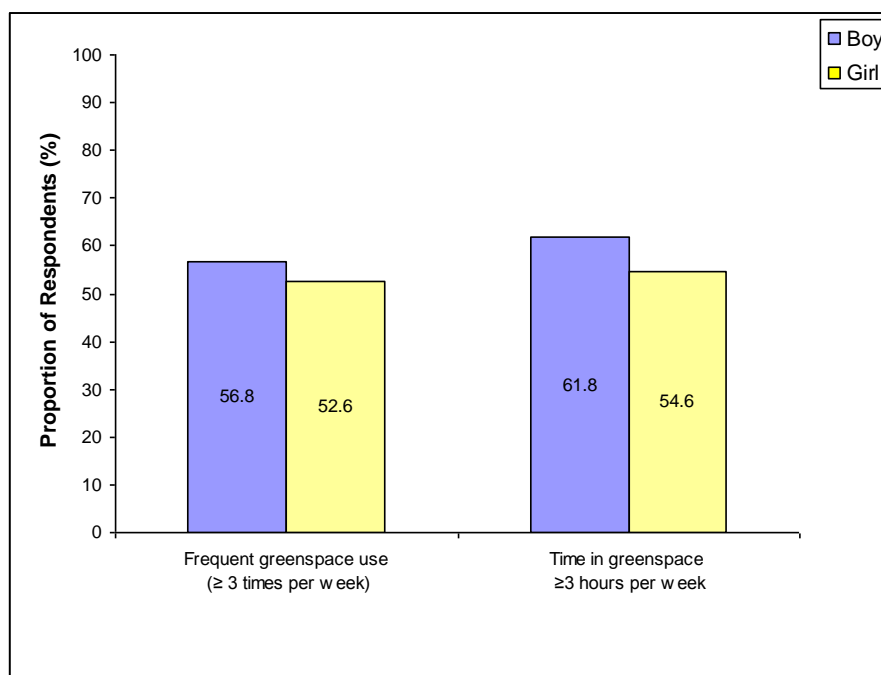
Levels of Greenspace Use by Sex, Grade and Affluence

Analysis by the Scotland HBSC national team revealed a difference in greenspace use between girls and boys in S4 (Currie *et al.*, 2011). Analysis by the researcher also demonstrated a difference in greenspace use by level of affluence. The researcher conducted further analyses to explore these differences and expand on the work published by Currie *et al.* (2011).

Sex

A greater proportion of boys (57%) compared to girls (53%) reported using greenspace frequently (three or more times per week), see Figure 8.5. Design-adjusted Pearson chi square analysis revealed a statistically significant difference, $\chi^2=8.856$ (df1) significant at $p<0.05$. The difference in proportions between girls and boys was only 4% suggesting that the sex difference in an aggregate group of 13 and 15 year-olds is not large and of debatable relevance. A more marked difference was observed with the amount of time spent in greenspace per week. Proportionally more boys (62%) claimed to spend three hours or more in greenspace per week than girls (55%), $\chi^2=25.828$ (df1) significant at $p<0.001$.

Figure 8.5 Proportion of girls and boys who were high-level users of greenspace



Grade

Significant grade differences were found for both frequency and duration of greenspace use. A greater proportion of S2 than S4 pupils were high frequency and high duration greenspace users (59% versus 51% for greenspace frequency and 61% versus 56% for greenspace duration), see Figure 8.6. Design-adjusted Pearson chi-squared analysis revealed a statistically significant difference, $\chi^2=27.525$ (df1) significant at $p<0.001$ for greenspace use frequency, and $\chi^2=12.251$ (df1) significant at $p<0.001$ for time spent in greenspace.

Affluence

Greenspace use was found to be associated with affluence, see Figure 8.7. A greater proportion of those in the highest affluence group (level 3) compared to the lowest (level 1) reported frequent greenspace use (58% compared to 49%) and also high duration of use (62% compared to 49%). Design-adjusted Pearson chi-squared analysis revealed statistically significant differences, $\chi^2=22.192$ (df1.957) significant at $p<0.001$ for greenspace use frequency, and $\chi^2=31.209$ (df1.990) significant at $p<0.001$ for greenspace use duration.

Figure 8.6 Proportion of S2 and S4 pupils who were high level users of greenspace

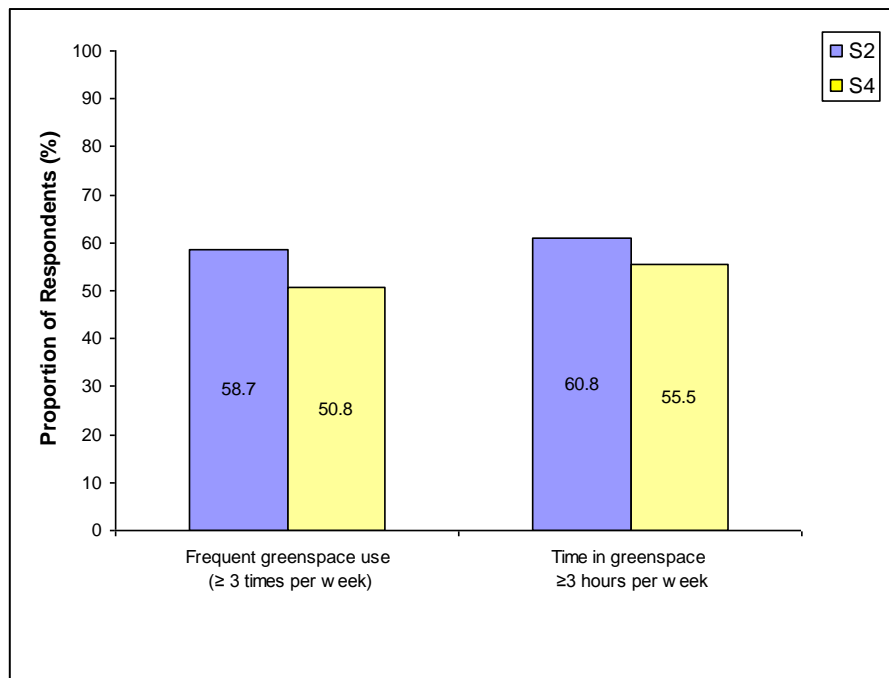
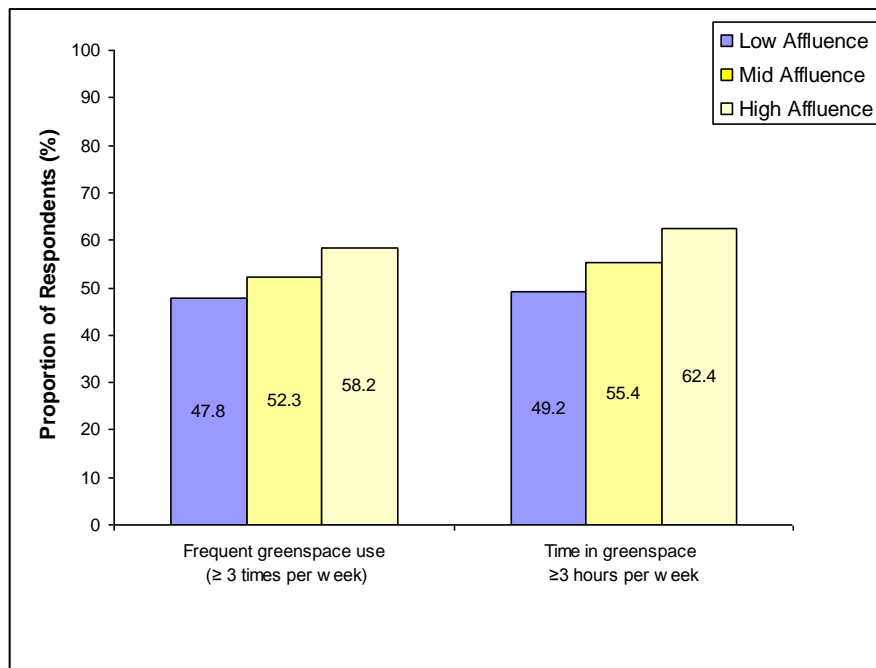


Figure 8.7 Proportions of pupils with different levels of affluence who were high level users of greenspace



Logistic Regression

Non-design adjusted models and design-adjusted ones, taking account of stratification by Local Authority and clustering by schools, were conducted by the researcher. In non-adjusted models sex, grade and affluence were each independently associated with frequency and duration of greenspace use whilst controlling for the other factors. Boys were more likely than girls and S2 more likely than S4 to report frequent and longer greenspace use. Those in the most affluent group were more likely to report frequent greenspace use than those in the lowest group, but there was no significant difference between those in the mid affluent group compared to the lowest group. However, those in both mid and high affluent groups were significantly different from those in the lowest affluence group for duration of greenspace use. In design adjusted models the mid-affluence group was found to be significantly different from the low-affluence group for frequency of greenspace use, where it had been non-significant in the non-adjusted model. Addition of an interaction effect between sex and grade in the design-adjusted models resulted in independent sex and grade effects becoming non-significant, see Table 8.2.

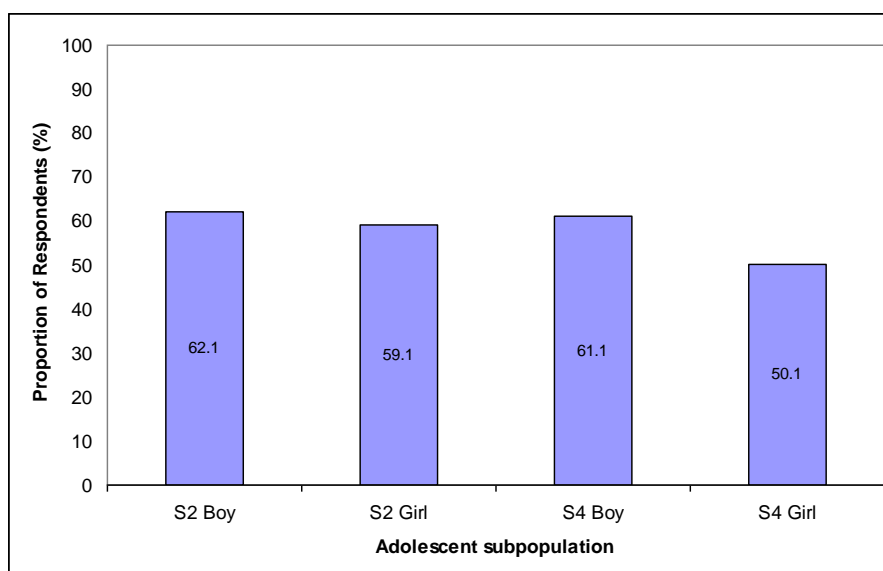
Table 8.2 Results for design-adjusted mixed logistic regression analyses for relationships between greenspace frequency of use and duration of use and demographic variables**

Greenspace Use	Predictor variable	Odds Ratio (OR)	Lower 95% CI	Upper 95% CI
Frequency	Male	1.04	0.87	1.23
	S2	0.89	0.75	1.06
	Mid Affluence	1.27	1.11	1.45
	High Affluence	1.55	1.24	1.94
	Interaction grade by sex	1.47	1.15	1.87
Duration	Male	0.88	0.72	1.08
	S2	0.96	0.80	1.15
	Mid Affluence	1.32	1.15	1.52
	High Affluence	1.74	1.37	2.22
	Interaction grade by sex	1.40	1.08	1.81

**Reference is Female, S4, lowest affluence (FASII level 1), comparing likelihood of being a comparatively high greenspace user

This demonstrated that S4 girls were the least likely to be high greenspace users. A boy in S2 was 47% more likely to be a frequent user of greenspace and 40% more likely to spend more time in greenspace compared to a girl in S4. Figure 8.8 illustrates the difference in S4 girls.

Figure 8.8 Proportion of different adolescent sub-populations reporting comparatively high duration of greenspace use (≥ 3 hours or more per week)



Affluence retained an effect in the design-adjusted models. Those with the highest level of affluence were 55% more likely to be frequent users of greenspace and 74% more likely to spend more time in greenspace compared to those with the lowest affluence. This indicates that affluence has a more marked effect on greenspace use than sex or grade.

8.2.4 Relationship between Greenspace Use and Physical Activity

Correlations

Bivariate Spearman's correlations were conducted by the researcher for the relationship between greenspace frequency and hours of use per week and VPA hours and frequency per week (see Table 8.3). All results were significant at $p < 0.001$ and positive with weak to moderate association. The strongest relationship was found between hours of physical activity and hours of greenspace use $r^2 = 0.29$ ($p < 0.001$).

Table 8.3 Spearman correlation coefficients for relationship between greenspace use and VPA level

	Frequency of VPA	Hours of VPA
Frequency of GS use	0.19	0.25
Hours of GS use	0.16	0.29

GS = greenspace

Logistic Regression

Non-design adjusted models and design-adjusted ones were conducted by the researcher to further test the relationships. There was very little difference between non-design adjusted and design adjusted results. Results for design-adjusted analysis are presented in Table 8.4.

Table 8.4 Design adjusted odds ratios for likelihood of being physically active according to level of greenspace use

Physical Activity Variable	Greenspace use predictor variable	Odds Ratio (OR)	Lower 95% CI	Upper 95% CI
VPA Frequency	frequency of GS use	1.53	1.22	1.89
VPA Duration	duration of GS use	1.71	1.39	2.11
Meet PA guidelines	frequency of GS use	1.42	1.02	1.98
	duration of GS use	1.35	.94	1.94

All models adjusted for sample design, sex, grade, affluence and sex by greenspace use interaction.

The results reveal that frequent users of greenspace (three or more times per week) were 53% more likely to be classified as having high frequency of VPA (two or more times per week) compared to infrequent users. Those who spent more time in greenspace (three or more hours per week) were 71% more likely to also report spending more time in VPA (four or more hours per week). A weaker, but still significant, relationship was found between frequency of greenspace use and meeting physical activity guidelines for MPA. A high frequency user of greenspace was 42% more likely to meet the guidelines compared to a low frequency user. However, no significant relationship was detected between time spent in greenspace and meeting the guidelines.

8.3 The GAG Method

8.3.1 Sample Details

After data quality checks a total of 27 from 31 eligible participants submitted at least one day of data for analyses. There were an almost equal number of girls and boys and slightly more S2 than S4 participants, see Table 8.5. Two were classified as FASII level 1 (low affluence) which equates to 7% of the sample, 18 (67%) were mid-affluent, and 7 (26%) were high affluent. This compares to 7.1% who were in low affluence group, 47.4% in mid-affluence group and 45.5% in the highest affluence group in the HBSC sample.

Table 8.5 GAG study sample

	Number in sample (%)	Total no. of days monitored	Total quality days included
Total	27	147	112 (76.2%)
Girls	14 (51.9%)	78	64 (82%)
Boys	13 (48.1%)	69	48 (70%)
S2	15 (55.6%)	83	61 (74%)
S4	12 (44.4%)	64	51 (80%)

A total of 147 days were monitored (excluding days where equipment was provided or retrieved), and 112 were retained for analyses (76.2%). There were more girls in the S4 group than boys (7 versus 5). There were more from S2 in the boys group than S4 (8 versus 5). There was an equal number of S2 and S4 in the girls group.

Girls contributed more days of data in total through more days monitored and a greater quantity of quality data, but a similar number of weekend days to boys (20 versus 19). More than half of the quality days provided came from participants providing four or more days of data, see Table 8.6.

Table 8.6 Number of participants providing different number of days of combined GPS and accelerometer data

Total Quality Days Included	Frequency	Total
1	2	2
2	2	4
3	5	15
4	3	12
5	11	55
6	4	24
Total	27	112

8.3.2 Participant Physical Activity Levels

Median average physical activity count per minute (cpm) for the total GAG sample was 515.0 cpm (range 1415.3). Boys had a significantly higher level than girls, and those in S2 were significantly more active than those in S4, see Table 8.7.

Table 8.7 Accelerometer recorded physical activity

	Median average physical activity (cpm) (range)
Total (n=27)	515.00 (1415.26)
Girl (n=14)	422.16 (450.2)
Boy (n=13)	789.16† (1415.26)
S2 (n=15)	547.20‡ (1415.26)
S4 (n=12)	426.84 (724.94)

† significantly different to girls at $p < 0.05$

‡ significantly different to S4 at $p < 0.05$

8.3.3 Participant Greenspace Use

A median of nine minutes per day was spent in greenspace during summer (term-time) leisure time, equating to approximately an hour a week. Due to evidence of a grade and sex interaction in HBSC results, the distribution of time in greenspace by grade and sex was explored in the GPS data (see Table 8.8). This revealed that S2 boys had the highest average duration of contact and S4 girls the lowest. The only significant difference was found between S2 boys and S4 girls, Mann-Whitney $U=13$, $p < 0.05$.

Table 8.8 Median number of minutes per day spent in greenspace during term-time summer months' leisure time

Grade	Girls no. of minutes (range)	Boys no. of minutes (range)
S2	6.8 (26.9)	36.0 (113.0)**
S4	0.0 (21.3)	15.2 (105.9)

** Significantly different from S4 girls at $p < 0.05$

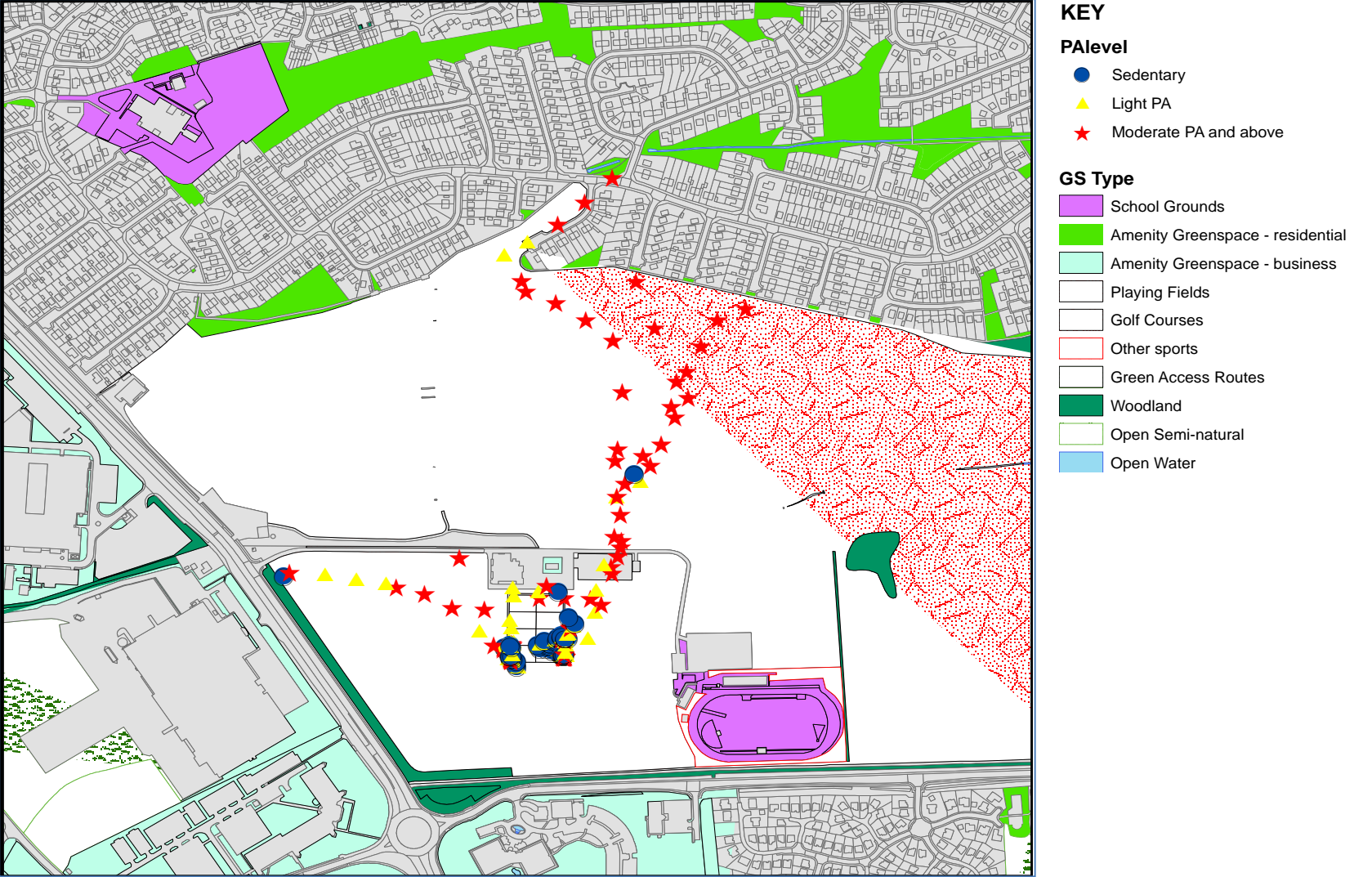
8.3.4 Greenspace Use Relationship to Total Leisure Time Physical Activity

Total leisure time physical activity levels were significantly higher in those that used greenspace during the monitoring week ($n=17$) than those that did not ($n=10$) (Mdn 607.04 versus 422.16 cpm, Mann-Whitney $U=38.0$, $z=-2.38$, $p < 0.05$, $r=-0.46$). Considering just those that did use greenspace ($n=17$), average total leisure time physical activity count was significantly higher when in greenspace compared to when they were not (Mdn 564.64 versus 290.99cpm, Wilcoxon $Z=-2.769$, $p < 0.05$, $r=-0.67$). These results indicate a strong link between greenspace use and physical activity level.

Activity Levels in Greenspace

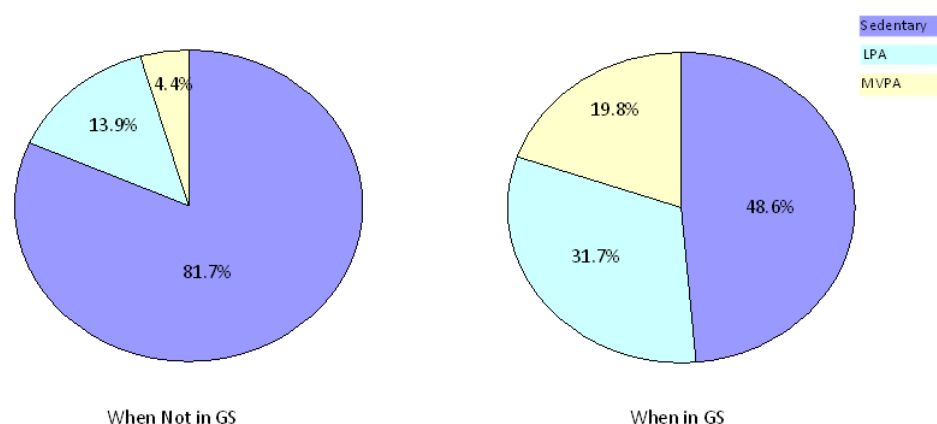
Figure 8.9 illustrates the physical activity intensity of an S2 boy from town 1 during a single episode of greenspace use. Using such data from the 17 participants who accessed greenspace, it was possible to demonstrate that, when in greenspace, compared to when not, the proportion of time spent sedentary was less and the proportion of time spent in either light intensity physical activity (LPA, such as walking) or moderate and vigorous intensity physical activity (MVPA, such as running or playing football) was more. Half the time (51.5%) was spent in LPA and MVPA when in greenspace compared to only 18.3% of the time spent active to any level when not in greenspace, $\chi^2(2) = 3826.6$, $p < 0.001$ (see Figure 8.10).

Figure 8.9 Physical activity intensity of S2 boy from town 1 when in greenspace (golf course and sports field)



0 40 80 160 Metres

Figure 8.10 Proportion of time spent at different intensities of physical activity during leisure time



Proportional Contribution of Greenspace Use to Leisure Time Total Physical Activity and MVPA

Physical activity taking place in greenspace accounted for 8% of the total amount of physical activity undertaken by these participants during their leisure time, with 11% of their leisure time MVPA undertaken in greenspace. In those who used greenspace during the monitoring period 13% of their total leisure time physical activity took place in greenspace and 17% of their leisure time MVPA (see Table 8.9).

Table 8.9 Proportion of leisure time (LT) total physical activity and MVPA taking place in greenspace

	Proportion of total LT PA taking place in greenspace (%) (SD)	Proportion of LT MVPA taking place in greenspace (%) (SD)
Total (n=27)	8.3 (12.6)	11.1(16.5)
Girl (n=14)	4.7(6.0)	7.1(12.7)
Boy (n=13)	12.2(16.4)	15.5(19.5)
S2 (n=15)	9.1(10.6)	12.8(15.5)
S4 (n=12)	7.2(15.1)	9.0(18.1)
GSusers (n=17)	13.2(13.7)	17.6(17.9)

8.4 Summary

Results from the HBSC survey demonstrated that a majority of 13 and 15 year-old adolescents in Scotland reported using greenspace at least once a week. Greenspace use was found to be lowest in S4 girls. Also, affluence was shown to make a difference, with those classed as having a relatively high level of affluence more likely to be frequent users of greenspace and to spend more time in greenspace compared to those classed as having relatively low affluence.

Results from the GAG method reinforced HBSC findings by demonstrating that S4 girls had the lowest level of greenspace contact, although this was only found to be a significantly different when compared to S2 boys.

Only around one in ten adolescents in HBSC reported meeting the current guidelines of 60 minutes of moderate physical activity daily, and no significant relationship was detected between time spent in greenspace and meeting physical activity guidelines. However, most results indicated a positive relationship between greenspace use and physical activity. The HBSC survey results revealed that:

- Frequent users of greenspace were more likely to be classified as having high frequency of VPA compared to infrequent users.
- Those who spent more time in greenspace were more likely to also report spending more time in VPA.
- Frequent users of greenspace were more likely to meet physical activity guidelines compared to less frequent users.

The association between greenspace use and physical activity was further supported by results from the GAG method which demonstrated that:

- Total leisure time physical activity was significantly higher in those that used greenspace during the monitoring week than those that did not.
- In those that did access greenspace, less time was spent sedentary and a greater proportion of time spent in LPA or MVPA when in greenspace compared to when not.
- Across the whole GAG sample, physical activity taking place in greenspace contributed to over a tenth of total daily leisure time MVPA.

These results indicate a strong link between greenspace use and physical activity in adolescents in Scotland.

9 Interview Results - Understanding Greenspace Use

9.1 Introduction

This chapter draws out the main themes from the interviews with the young people taking part in the GAG study. A total of 33 of the 35 participants agreed to be interviewed. Twenty-four interviews were fully transcribed and notes only taken from the remaining 9 because no new themes arose. The interviews were provided by an equal number of girls and boys in S2. There were more S4 girls than S4 boys, and S4 girls comprised the group with the largest number of respondents, see Table 9.1. There were 12 respondents from town one, 11 from town two and 10 from town three.

Table 9.1 Distribution of interview sample by grade and sex

Grade	No. of Girls	No. of Boys
S2	8	8
S4	11	6

The interviews explored young people's motivations, attitudes, experiences and activities in their local environments with a particular interest in their use of greenspace. Results include analysis of two activity sheets (AS1 and AS2, see Appendix D) used to stimulate discussions. This chapter initially concentrates on factors associated with intention to use greenspace and four types of adolescent greenspace user are described. Factors associated with opportunity are then discussed. The complexity of understanding greenspace use follows and a consideration of physical activity in greenspace precedes the chapter summary.

9.2 Intention

9.2.1 *Motivations to Use Greenspace*

The adolescent participants described a multitude of reasons for using greenspace during their leisure time. These reasons included: meeting up with friends; to have fun; to play football; walk the dog or take a younger sibling to play at the park; relax with friends, think or "chill out"; to "get out of the house" or go for a walk; or a sense of "nowhere else to go" or "nothing else to do". In many instances more than

one reason was given. In addition, reference was made to a sense of freedom associated with greenspace use, the weather and 'attractiveness' of greenspace. This array of reasons has been grouped under several broader themes and expanded on below: social, entertainment, freedom, activity, retreat, weather and attractiveness.

Social

The adolescents described how they used greenspace to meet friends or be with friends, because that is where their friends went or because they knew lots of people who went.

Girl, S2, town 2

I²¹ Why do you go to those places [greenspace]?

V When my friends are going out I go because of them.

Boy, S2, town 3

I Where do you spend most of your free time when you're not at school, and at the weekends?

V Well, here at home really or. And then on Saturday I would usually go to the football but then the season's finished now so. I don't know just sometimes just out and about the local area and that you know with my friends and that.

I What sort of places in your local area?

V Well the park up at Crook Street, [we] play [and] hang round there quite a lot. Um [there's] pitches up there as well, football pitches.

One S4 girl, when asked why she goes to a certain park, mentioned that it's where everybody lives, all her friends go there because it is local for everybody. It is a big area and she and her friends know most people that go. Conversely, one reason given for not going to greenspace was because either no-one they knew went there or they had no-one to go with. A couple of girls mentioned that their friends did not live locally and therefore they had no-one to go anywhere with.

Girl, S4, town 1

V I usually stay at home when I don't have anyone to go out with so. I don't like going out on my own.

²¹ **I** refers to the interviewer, **V** refers to the volunteer

Girl, S4, town 2

I Why do you spend it [free time] mostly in the house do you think?

V Not really anything to do and lots of my friends live out of [town] so its kinda, I ask them to organise it for a school night because like if they're back and forwards and it's just kinda involves like parents like driving, and one of my friends lives in [X] and the other one in [Y] so its kinda hard to get out so.

Another girl (S4, town 1) claimed to spend most of her free time at friends' houses. There were no places in the local area that she used and when asked why, she replied that “no-one goes anywhere really”.

On AS2 the most frequently circled phrase that the adolescents associated with greenspace was “good place to be with friends” (chosen by 26 out of 29). This emphasises the importance of greenspace for friends and social interactions, see Figure 9.1.

Entertainment

One of the motivations for going to greenspace was to have fun, to find something to do or out of a sense of boredom.

Boy, S2, town 1

I So why do you like going there [the park]?

V Um mostly just cause it's fun and it just gets you out of the house really.

Girl, S2 town 1

I So why do you like to go to the spiderweb park?

V I don't know it's just a place to go and do something.

I So why there rather than somewhere else?

V I don't know. I just we're always wanting to go out and do something so we just always [go] in the park rather than going out walking or shopping or whatever. We just decide to go to the park for something to do at night or that.

Girl, S2, town 2

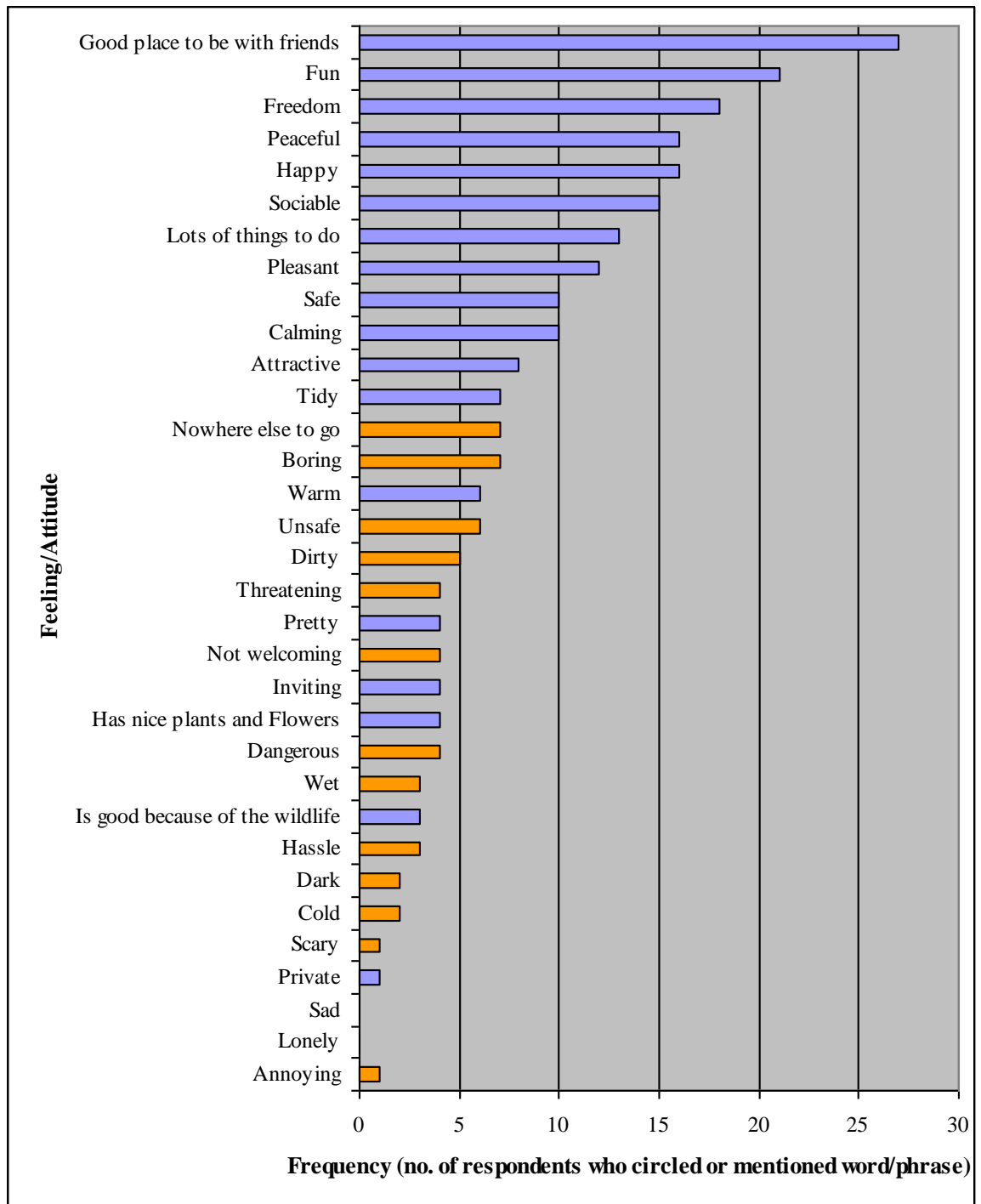
I Why do you go to town park with friends?

V When we're bored to have a laugh, hang around and stuff I suppose go on the swings and stuff.

This association of greenspace with fun was further emphasised by the relative frequency with which the word “fun” and phrase “lots of things to do” were circled on AS2, see Figure 9.1.

Figure 9.1 Frequency of words circled on AS2 describing feelings/attitudes to greenspace (n=29)

blue bars are positive associations, orange bars are negative ones



“Nowhere else to go”

There were, however, varying opinions as to whether greenspace offered suitable entertainment value. For some, their use of greenspace was motivated by a sense that there was “nothing else to do” or “nowhere else to go”. In such cases greenspace was seen as the only form of entertainment available, the default option. However, greenspace may not be their first choice if alternatives exist. One of the S4 girls from town 3 commented that she used certain greenspaces because they were nearby and because there was nowhere else to go. She said she could not be bothered to go further away to other places. If she and her friends hang around on the streets they get moved on by the police. They go to the park because this is less likely to happen. This perception of having no alternatives was echoed by others.

Girl, S4, town 1

I And why go there [playing fields] rather than anywhere around here?

V ‘Cause there’s not really anywhere to go.

I When you say there’s nowhere really to go?

V Not anywhere that I’m really interested in.

The most frequent negative attitudes circled on AS2 also reflected the lack of entertainment value of greenspace and included “boring” and “nowhere else to go”. Some of the adolescents claimed to spend most of their time at home or perhaps at a friend’s house. This was because they did not think there was much to do outdoors, there was more to entertain them at home or at a club.

Boy, S2, town 3

[Answer to question about where he spends his free time]

V Either here [home] or one of my friend’s house.

I Why?

V ‘Cause here’s got an x-box and my friend’s house, I just go there to see them.

Girl, S4, town 1

I In your free time where do you spend most of that free time?

V Yeh here [at home].

I Why is that?

V Just cause I like it here and I have more to do here than outside.

Newness and Novelty

Discussions revealed that “newness” was important to perceptions of entertainment value of a greenspace. There was an appreciation for facilities that had recently been refurbished and a desire for new things, something different to do that increased variety and novelty. This was further indicated by mention that repetitive use of the same places led to them being perceived as boring.

Boy, S4, town 3

I So why there rather than anywhere else?

V Dinnae ken it's just ever since [it] started getting done up we just started meeting there cause its like.

I Ever since you started getting?

V Like ever since the park like all the new climbing frames and that we usually just like meeting there, cause like it's just boring everywhere else.

Girl, S2, town 1

[Circled boring on AS2]

V Basically all of them [greenspaces are boring] because I like walking about there 'cause it's good to hang about with my friends because we just kind of mess about and do cartwheels and run and sort of talk. We talk and we walk but [it] gets to the point when there's nothing really left to talk about because we go there every day.

However, as pointed out by one 15 year-old boy, the desire for constant novelty and variety, and therefore dissatisfaction with leisure provision, may be more a characteristic of being an adolescent rather than a problem with facilities.

Boy, S4, town 2

[response to question asking whether there is enough to do in the local area for young people]

V No. Well everybody says that but there probably is, it's just that we don't, we're never happy are we? We're just always wanting better things to do. When you get something like the [sports centre] it's like got the swimming pool it's got the football pitches but then you're just getting bored of it and you want something new all the time.

Freedom

Freedom was the third most frequently circled word on AS2, refer back to Figure 9.1. It was clearly associated with greenspace use and an appreciated quality once in greenspace and is, therefore, regarded as an important motivational factor. Freedom had several different meanings. For some, it was that greenspace offered autonomy,

i.e. no-one stopping them from doing what they chose to do, being able to do anything they wanted.

Boy, S4, town 2

I Why did you circle freedom?

V There's a lot of freedom in all the places 'cause there's no-one stopping you with anything. You can do anything you want so you can play football if you wanted to play football, you can play rugby if you've wanted to play rugby, you can play hide and seek in the trees if you wanted to, which is what most kids do when I walk by. So, but you get the feeling you can do what you want 'cause you're parents aren't there to stop you from what you do as long it's within safe parameters.

For others, it meant a sense of spaciousness, freedom from spatial constraints in contrast to being in the house. This is illustrated by the following explanations given for why they had circled freedom.

Girl, S2, town 2

V [The] paddock cause you start at the very top and just run.

Girl, S2, town 2

V 'Cause it's like really spacious. Like town park's really spacious, [you can] run about and stuff [and] just have a good time. That's what I think.

Freedom was also discussed in terms of being able to “express yourself” or “be your own person again”. There was a sense that going out to greenspace allowed adolescents the freedom to be themselves and express their own identities without the interference or demands made on them by parents or family.

Boy, S2, town 2

I You've circled freedom. Can you tell me why?

V It's just like if you walk through there on your own, you just, [it] seems there's a lot of space, you just watch people [and] you feel like your own person again. If you're on your own you're like no-one wants to know what you're up to and stuff so you just feel yourself.

Activity

The adolescents described going to greenspace to undertake a specific activity, for example to walk the dog, play football or to entertain a younger relation.

Boy, S4, town 2

I So where do you spend most of your free time after school or at weekends?

V I probably just play football out on the grass there outside at nights, that's about it. [Large central amenity grass area with small play park in one corner].

Girl, S4, town 2

I Where do you tend to spend most of your free time?

V Probably in the house or walking my dog.

One S2 boy from town 3, when asked why he had spent such a long time at the playing fields one Saturday, replied “*I stay there I like to keep training to keep my fitness up.*”

Retreat

Several comments suggested that greenspace was used as a form of retreat. One of the S4 boys mentioned going to a greenspace to clear his head . This was echoed by a girl from town 2.

I You mentioned going somewhere on Monday, to playing fields/sports fields?

V I went out on that bit, on the grassy bit out front [amenity greenspace].

I You said you went alone.

V Yeh

I Can you tell me a little bit about that trip out?

V It just helps me, like sometimes I go out and it just helps me think. Like my mind's full of things and it helps me clear my mind a bit.

The association of greenspace with providing space to think and relax was reinforced during discussion about attitudes. On AS2, ‘peaceful’ was the fourth most frequently circled word. When respondents were asked to explain what they meant by peaceful, greenspace was described as a place to relax with friends, to calm down after a hard day, somewhere to go and think and to begin to feel better.

Girl, S2, town 2

V Like say you've had a hard day or something at school or that and go out [to the park] and it's peaceful. [It] just calms you a bit and you just feel better.

Weather

Weather arose as an issue in relation to just going outside, as well as going to greenspace. Going to greenspace was associated with warmth, sunshine and the weather being good. Rain and the cold acted as deterrents.

Girl, S2, town 3

V If it's like really pouring then we usually go into somebody's house but if it's [not] like it doesn't matter really we just walk about.

Girl, S4, town 3

V... Mostly at the weekends we'll go down there [the park]. But we started going during the week cause of the nicer weather that's coming in so we'll go down more often during the week so.

Attractiveness

The adolescents made reference to how inviting a place was. They described the characteristics that they felt made it a nice or unpleasant place to be, whether it was welcoming or not. These aspects have been condensed under the concept of attractiveness and include reference to aesthetic features, maintenance and facilities, all of which contribute to the quality of a place.

The presence of trees, flowers and plants was viewed as a favourable feature. One 15 year-old girl thought a particular park was “nice looking” because “*It's really really green and there's loads of flowers and stuff like daisies and it's always really nice to go to*”[42A21]. Plants and flowers were also noted as attractive features by others.

Girl, S4, town 2

V I just think it's like, as you go in it, it's all like plants everywhere. 'Cause it's [...] put the plants up and it looks really attractive and that. I really don't know how to describe it um, it just looks like a nice place to be and that.

There was appreciation for a “groomed” look with the grass being cut, and the greenspace appearing “tidy”. Tidiness was mostly mentioned in reference to whether litter was present or not. These aspects were seen as evidence of a place being cared for or “looked after”, which was welcomed. If not cared for a place appeared “old”. One 13 year-old boy had circled “tidy” as one of the words he associated with a particular greenspace he used. When asked what he meant he replied “*[I] just think there's no litter dropped and it's all cleaned up*”. Other comments included:

Girl, S2, town 1

I You've got attractive down for [a field – amenity greenspace].

V Yeh it just always seems really well groomed. The grass is always cut, and it's always like, a lot of dogs go there but there's never any dog poo or that it's always clean. I mean there's never ever any litter, like ever and it's huge.

Girl, S2, town 2

I Pleasant?

V Well some places are pleasant, others, only some of them are though like you get some old parks that aren't very pleasant but

I In what way?

V They're old and like been all [?].

I So what's good about the places you say are pleasant?

V Well just like cause no-one's [?] them. They've been looked after.

Attractiveness was also about what was present in a greenspace, whether it looked exciting, what facilities there were or the quality of certain features such as a football pitch:

Boy, S4, town 2

I Attractive, which bit were you thinking of for attractive?

V er the [sports centre]. Their like football pitches are really good down there.

I When you say really good?

V Like the grass is good it's not like all, like out there [amenity greenspace out front], half cut up and all that and like bits of grass and all that.

Girl, S2, town 1

I Attractive, why attractive?

V... I don't know. I think it looks nice in the area [play park section] just like it's like got wood bits around it and like wood chips inside I just think it looks like just like a nice park. When you look at it, like a lot of parks are just don't look that exciting, but I just think it like looks quite nice.

The presence of graffiti and other sorts of vandalism and broken glass were a deterrent to use. They were perceived as unattractive aesthetically, as well as threatening.

Girl, S2, town 1

I You've [circled] not welcoming?

V Yeh. It's just the whole glass bottles thing [the park]. There's always this really really bad chewing gum and there's graffiti all over, like all over the climbing walls.

9.2.2 Reasons for Non-Use of Greenspace

The adolescent participants described a multitude of reasons for non-use of greenspace during their leisure time. These included: experiencing “hassle” from older teenagers, neighbours, and occasionally the police; fear and concerns about safety; lack of time; dissatisfaction with and lack of interest in provision.

“Hassle”

Some of the adolescents described how they have experienced “hassle” from police, neighbours and other users, or have heard how others have been told off. This deterred them from using greenspace in general or certain greenspaces.

Girl, S4, town 3

I So at weekends and in your free time after school, where would you tend to spend most of that free time?

V In the house. Like we used to go down the park but we well [we] stopped going down, so [we] basically just sit in other people's houses.

I Why's that?

V 'Cause the police [?] annoyed us so. [They] just like came in and stopped[us]. But then there was people just like ruining it for us as well just.

I In what way?

V 'Cause they would like vandalise so we'd get the police to come, so like then the police would just have to like accuse us all of it and then stop us going down.

One S2 girl from town 1 explained that she did not use the local school playing fields because she had heard that others had been told-off for going there. One S2 girl from town 3 described how neighbours discourage use of their local amenity greenspace.

V Well like I don't usually like hang about here [local amenity greenspace] because there's quite a lot of people like telling me to get away and that although I live here.

I When you say people telling you off, what sort of people?

V Like well like old people and that they just don't want us to be there, to be here. They tell us to get away and play somewhere else.

Safety, Fear and Undesirable Others

The adolescents described how they wanted to be safe. Perceptions of safety were contributed to through reputation and rumour and direct or indirect experience. One boy preferred to stay at home and not go outside despite a newly refurbished park existing just a short distance from his house.

Boy, S2, town 2

I So where do you think you spend most of your free time?

V In the house

I Why's that?

V Just I feel safe in the house rather than outside.

This boy had been attacked on one occasion leading to the involvement of the police, and did not feel safe going out. A girl explained how she did not use one of the main parks, despite describing it as nice, because friends of her mother had been attacked in it.

Girl, S4, town 2

I Can you tell me a little bit about Town Park, is it somewhere that you've been before?

V I have been once and that was because there was a festival on but my mum doesn't really let me go down there because there's usually like broken glass and stuff and there's usually people like that have been drinking or something. My mum knows a couple of people that have been mugged and she doesn't obviously want that to happen to me so she'd prefer if I didn't go down there so, I'd rather not but there's a nice park down there but I don't yeh.

This also reveals how use of this greenspace was restricted due to her mother's wishes, and as such placed a limit on the girl's "independent mobility" (Kyttä, 2004). One S2 also described how she was not able to use a more distant, more attractive park because her friends were not allowed to go there.

One S4 girl from town 1 reported not using the park right next to her Gran's house because every time she goes there "*they shout stupid stuff at you.*" Another S4 girl, from a different part of the same town, described how she had been threatened by other users at her local park so she no longer goes there. In one case, awareness of a serious incident near to where they lived contributed to a reluctance to go out at all.

Girl, S2, town 2

I On the rare occasions that your friends would call for you [is there] nothing in this local area whatsoever?

V No cause there's been incidents and

I What sort of things?

V Well a couple of months ago a girl was raped on the road in broad daylight. She goes to my school. So unless it's the share thing where I have to go to the post box or the shop I tend to stay in.

One 15 year-old girl from town 2 used a nearby greenspace only during the day to walk the dog, but not at night because she had heard there had been a 'flasher' there. Another S4 girl from town 3 explained how she hardly ever went to one specific park because she did not feel safe there. She explained this was because it was in a rough area and had a reputation for being unsafe with stabbings and other problems, even though she had not personally experienced any problems there.

A few of the adolescents found that certain aspects of greenspace were scary, such as dark woods. Fear was mainly associated, however, with the presence of "undesirable others", a recurring theme throughout the interviews. In other words, mention of problems with other park users, the presence of "Neds", "Weirdos", "Drunks" and other teenagers drinking.

Girl, S2, town 2

V at town park sometimes like when it's late at night you'll get some weirdos and stuff.

This was a particular problem after dark. One girl reported not using the parks because "*just people older go there and drink and stuff*". The adolescents described experiencing verbal abuse from other users, as already referred to. Whilst some were able to negotiate when they used certain greenspace or chose to use a different one, others were deterred from using greenspace at all because of the presence of these "undesirable others".

Girl, S2, town 1

V I remember one time we were walking home and, this was a wee while ago. We'd like had dancing at school so it was really dark and we come out and we were walking up past the spiderweb park. It was just like right up, there's a little shelter thing where there was people drinking, and so one of my friends walks past and we'd went away cause we'd seen them there, but we didn't have time to tell them but then they started like talking to them and like trying to chase them and that so we were pretty scared that day. So yeh we try not to walk up that way when it's dark now.

Safety concerns also took account of potential for injury.

Boy, S2, town1

V [Playground described as safe] 'cause like [it's got] soft ground kinda like the wee plastic ground. It's quite safe if you land on it, trust me I know.

The adolescents expressed a mixture of concern and dismay over the presence of needles, broken glass, graffiti and vandalism. This impacted both on their perceptions of safety, as well as aesthetic quality. Concerns about safety tended to be on behalf of others, such as the elderly or young children, rather than perceived necessarily as a personal risk.

Boy, S2, town 3

[Response on being asked about any bad experiences in the local neighbourhood or greenspace]

V No, except for finding a needle outside there [amenity greenspace]Me and my friend were staying here, we walked well we ran across. Luckily I just lifted my foot upand I seen the needle just out the side of it.

[When asked how it made him feel]

V Sad and angry because people are leaving it about the public and if somebody falls that is younger or older, and takes a fall they can fall on it and it could seriously hurt them.

Girl, S2, town 1

[Description of park]

V There's some swings and a play area. It's OK, it's OK, but there's a lot of glass and it's not really suitable for younger children, it's not safe, especially at night.

Those with an interest in football appeared particularly concerned with playing surfaces and how they influenced their prospects of getting injured, but this was

weighed up against other desirable features for improving the playing experience, such as goals and lighting. One 15 year-old boy preferred the astro-turf because it had goals even though landing on it was more painful because the surface was hard.

Feeling safe in greenspace appeared to be enhanced by increased levels of surveillance such as when places were surrounded by houses, or had security cameras present, or it was known that there would be regular checks by police or security wardens or if relatives lived nearby. Areas that were more secluded, in general, were felt to be less safe and less desirable to go to. However, for some the more secluded places offered a respite from police 'hassle'.

Girl, S4, town 2

V Well the only park that's near here is [X]. 'Cause there's one in them woods there but that's been disused now for a good couple of years now. Like up in the woods across the road there, there's a park in the woods but nobody goes there.

I Why's that?

V It's completely enclosed and that there's no houses near it or that so it's been disused for a couple of years now.

I So why do you think people don't use it?

V I don't know it's just like it's not near any houses or that I don't think anyone would hear them like if something happened and that.

Lack of time

The S4 participants were in the middle of revising for and sitting exams so it is understandable that time was found to be an issue. However, it was not just personal time but also time constraints on other family members that had an influence.

Girl, S4, town 3

V Well, I go when I'm taking my wee sister down [to a park].

I How old is your sister?

V Three.

I How often do you take her down?

V Well just like after school and that, but I've not done it in a wee while cause like. I used to take her down every night after school just on her bike and that but I've not went down in a wee while now cause my exams have started.

Boy, S4, town 2

V I have to be home if there's any homework or studying that I have to do, so it's difficult now but I used to do it on the way home from school [play in the park].

This S4 boy had a keen interest in golf and described many positive aspects of the local golf course and clearly enjoyed playing. However, it transpired that trying to co-ordinate with his father's work schedule was hampering efforts to get out and play.

V it's hard 'cause my Dad works back shift and dayshift and it's trying to get the time for him to play as well, but I'm trying to arrange for myself and my sister to go up as well to play.

Several of the adolescents mentioned in passing that they had a job. In a couple of instances, the adolescents worked with animals in a type of job that actually led to an increased exposure to greenspace or natural environments. One walked dogs and another worked in a deer and animal park. However, working can also reduce the total amount of leisure time available and thus act as a hindrance to greenspace use.

9.3 Types of Adolescent Greenspace User

Analysis of the interviews suggested the existence of four types of adolescent greenspace user based on the range of motivations expressed. These types were: The Social User, the Reluctant Social User, the Activity-Driven User and the Non-User. Creation of these groups allowed further analysis to examine the influence of factors such as memories, experiences, grade and sex on how these adolescents used greenspace.

9.3.1 Social User

A Social User was one who primarily went to greenspace to be with friends and to seek entertainment. Greenspace was perceived as a place where a group of friends could meet more easily due to the space provided when compared to the inside of someone's house. Greenspace provided space to run about as well as a sense of autonomy. One of the 15 year-old boys typified this type of user. He mentioned parks and amenity residential greenspace as places he went to with friends. They would 'chill', walk, play football and do other activities.

For the Social User, there was a sense that they remained largely satisfied with local greenspace provision and perceived lots to do with friends in greenspace as illustrated by this quote from one of the girls.

Girl, S2, town 1

V Even though I go there a lot it just doesn't get boring I don't know why maybe it's just cause it's like when you go with different people and there's lots of other things you can do like just like playing games with your friends around the park and playing on all the stuff.

Although negative perceptions of greenspace did exist in Social Users, these centred on the presence of undesirable others and the reputation of a park as being a “bad place to go at night”. These perceptions did not appear to put them off using the affected greenspace, and the Social Users negotiated their way round this by steering clear of certain routes as and when necessary, or going before dark.

9.3.2 Reluctant Social User

A Reluctant Social User was one who, although also socially driven to use greenspace, appeared to be going to greenspace because there was felt to be a lack of suitable alternatives. Quotes from two of the S4 girls illustrate this type of user.

Girl, S4, town 1

I Can you tell me about the park that you use.

V It's not really that good.

I Why not?

V 'Cause it's somewhere to go just cause it's got somewhere to sit like benches and stuff but [there's] not really anything to do.

Girl, S4, town 3

[Response to being asked about if there was enough to do in the local area for young people]

V There's only that one local park just down there and that's not very nice and [there's] not really much else to do round here apart from the big park, but sometimes that can get a bit boring as well.

That's really it. It's either the park or Asdas so there's not much.

Reluctant Users still perceived that greenspace had many of the same positive attributes as for Social Users in terms of places to be with friends, to seek some form of entertainment and as a way of achieving a sense of freedom. However, they were driven more by a sense of lack of choice. To use greenspace was better than the

alternative of staying in the house all the time. However, given other leisure options such as youth clubs, cinemas, swimming pools etc. they might well desert the greenspaces in favour of the indoor or commercial settings.

There was again the issue of undesirable others, especially at night, such as drunk teenagers. In addition, mention was made of evidence of incivilities such as graffiti, swings wrapped round top poles, chewing gum on the ground, broken glass, 'Buckfast' bottles²², and used needles. The Reluctant Social Users appeared to be more critical of the condition of the greenspace they used.

One negative perception that Reluctant Social Users ascribed to greenspace that Social Users did not was that greenspace could be boring, especially if certain places were used repetitively. In contrast, Social Users might go to greenspace if they were bored in order to entertain themselves.

9.3.3 Activity-driven User

Activity-Driven Users, in keeping with Social and Reluctant Social Users, were appreciative of the capacity for greenspace to support being with friends, for fun, a sense of freedom, peace and quiet. They also perceived and experienced many of the negative attributes of greenspace. But an Activity-Driven User was one who had a specific activity-based interest or reason to seek out greenspace and included dog walkers and keen footballers. This type of user is exemplified by one of the 15 year-old boys, who played football during his leisure time and sought out those places that best suited this interest. His preference was dictated by the features of the place to support football and he preferred the astro-turf pitch to the playing field because it had goals, despite recognition that it hurt more to fall on the astro-turf. One of the younger boys, another football enthusiast, used a variety of different greenspaces, each with the express intention of playing football. When asked *where* he spent his leisure time his response was "*playing football*". The place was only of interest if it was able to support playing football. This younger boy preferred playing in

²² Buckfast, also known as "Buckie", is a tonic or fortified wine produced by Buckfast Abbey in Devon. In Scotland it has a particular association with under-age drinking and anti-social behaviour. Lyall, Sarah (February 3, 2010). "[For Scots, a Scourge Unleashed by a Bottle](#)". *New York Times*.

greenspace to the astro-turf because it hurt less to fall, but lighting was an issue as it was not possible to play a game of football in the dark.

9.3.4 Non-User

Non-User describes those who either claimed not to use greenspace at all or only occasionally. There were Non-Users present across the range of adolescents included in the study. A variety of reasons were encountered for why they did not use greenspace, and for some, several existed in combination:

- Having alternative interests
- Feeling threatened or fearful in greenspace or their more general neighbourhood
- No time
- Having little interest in greenspace, perceiving greenspace as boring

9.3.5 Comparing Different User Types

A comparison was made between Non-Users and High-Users. Participants were classified as either High-Users or Non-Users using a combination of responses to the recruitment questionnaire, GPS results and interview comments. A high, medium or low category was assigned for responses to: frequency of greenspace use, hours of greenspace use, a standardised measure for GPS recorded greenspace use (where the data existed), and an impression gained from interviews. Those consistently in the medium or high grouping for each of the four assessments were assigned as High-Users. Those consistently in the lowest group were assigned as Non-Users. Comparison between High and Low Users revealed that Non-Users tended to have had direct bad experiences such as injury or experience of verbal abuse directed at them. In contrast, the High-Users spoke only of being aware of vandalism, perhaps some problems with anti-social behaviour in their general neighbourhood, and one S2 girl mentioned how her friends had been “hassled” by drunks in a park, but she had managed to avoid the problem. When asked about what they would like to see provided for young people in their local area, greenspace was mentioned by the High Users but not by the Non-Users.

Most of the adolescents in this study were either Social or Reluctant Social Users. There was also a tendency for the 15 year-old girls to be either Reluctant Social or Non-Users.

9.3.6 Memories

It has been suggested in the literature that early experiences in natural environments help to shape current attitudes and use (Hinds and Sparks, 2008, Ward-Thompson *et al.*, 2008). The adolescents in the current study were asked if they remembered being taken to greenspace as younger children and to describe any specific memories they had of those times. All those interviewed reported having been taken to greenspace, although not all could necessarily conjure up a specific memory. A mix of positive and negative associations was encountered, but, in general, the adolescents' memories of greenspace were primarily positive. One S4 girl from town 1 remembered trips to the woods "*There's woods at [X] and there's a tree swing in the woods and Mum used to always take us there for picnics and stuff*". She also remembered going on the cycle path with her brother and Dad. This mostly happened in the summer holidays. Other memories portrayed greenspace as places associated with fun; play and happiness; of being with grandparents; other family members or friends; of enjoyable experiences such as having picnics; playing on swings or slides; playing with a dog or other people; feeding swans; getting ice-creams; going to a café and playing on boats, pedalos or trains; an association with the summer, good weather and holidays.

Boy, S4, town 2

I Do you remember being taken to parks, woodlands, greenspaces as a child?

V Yeh

I Who did you go with?

V My Gran would take me. There's a park up the road there where she lives. I used to go quite a lot.

I What do you remember about that park?

V It was just lots of kids there at the time. It was good place to hang out and then there was lots to do and there still is.

Boy, S4, town 3

I do you remember being taken to greenspaces?

V My Dad used to take me down to Beveridge Park. I think that's why I started going, 'cause like the boats and that on the big loch, so he used to take us on them and that.

Girl, S2, town 2

I What other places can you remember being taken to?

V Like parks in Kirkcaldy, like Beveridge Park. Even the town park we used to go and feed the swans, and because I can remember going to get ice-cream.

Boy, S4, town 2

V Well my Gran and Granddad usually when I was young they'd have me in a little paddling pool in their garden, they'd play in there with me and then they'd take me down to the park and play on the swings with me. That was a while [ago] 'cause my Gran died in 2004 so that's kind of the things I try and remember. The golf course my Dad used to take me and he'll still take me now and it's fun playing with people there, but you know so it's those are the memories I try and keep as well so.

V I like the memories in which I can actually relate to the people so town park I'd actually relate to my Gran or Granddad cause they took me there.

There were also mentions of specific unpleasant incidents in greenspace:

- getting stung by a wasp
- falling from a swing or another younger family member falling from a swing
- cutting a hand on glass at the park
- fearful that the dogs would bound right into their pram/pushchair

However, memories appeared to have little bearing on current use and attitudes. Positive associations were distributed across the range of adolescents interviewed, including those who appeared to use greenspace infrequently, if at all. Negative memories were not isolated to the infrequent users and were also found in those who reported regular greenspace use. For example, the memory about dogs bounding towards the pushchair was from a girl who appeared to be out almost every night with friends in the local parks and walking her dog. Conversely, the boy who described fond memories of his grandparents felt there was little to do in his local area or at the town park he so fondly remembered.

9.4 Opportunity

Several reasons cited for not using greenspace were related to issues of provision of opportunity, such as quantity of greenspace, age appropriateness of playground equipment and vandalism. There was either felt to be little provision in the first place or that provision was inappropriate. Vandalism and other incivilities, such as broken glass and graffiti, deterred use and contributed to a sense of limited opportunities. Size of greenspace and proximity, additional aspects of provision, were also encountered as either influential on use of one greenspace over another, or a generally appreciated aspect of greenspace. These are expanded on below along with a description of the desires for what the adolescents would like to see provided for them in their local areas.

9.4.1 Quantity

The adolescents were not specifically asked about whether there was enough greenspace in their local areas and there was only limited reference to quantity of greenspace. One 13 year-old girl, who was a Non-User, commented that there were not many parks in her area. However, references were made about there being nowhere to go and nothing to do in the wider neighbourhood.

Girl, S4, town 2

I When you come back from school, or at the weekends, where do you tend to spend most of your free time?

V With my friends.

I And whereabouts would that be?

V Probably in my friends' houses.

I Why would you tend to go to their houses?

V Cause there's nothing to do round here?

Greenspace tended to be viewed as the only place available in some cases, with little sense that quantity of greenspace was an issue. When asked about what they would like to see provided for young people in their area, the responses were mixed in terms of quantity. Some expressed a desire for more parks, whilst others stated there was enough greenspace already. This contrast in views appeared to be more a matter of personal preference rather than being related to possible different levels of provision in the different areas studied. This is illustrated by comments from two 13

year-old girls who came from the same town, were friends and who spent a lot of their free time together.

Girl, S2, town 3 – friend 1

[Desired provision for young people]

V More parks and that that you're free to hang about with, I'd say for areas without like glass and that on the ground and more bins.

Girl, S2, town 3 – friend 2

I Do you think there are enough things for people of your age to do in this general area?

V Like parks and stuff do you mean or just anything?

I Just anything

V Well parks yeh but yeh I think they should have like [a community centre/youth club], cause the nearest community centre to me is in [X, 20 minutes away].

9.4.2 Age Appropriateness

One reason given for not using greenspace or certain types of greenspace was because such places were not considered age-appropriate or the playground equipment was not age-appropriate.

Girl, S4, town 3

V if I've got my wee sister with me she'll play at the park but I dinnae go to it, cause it's just for children.

Girl, S2, town 1

[Talking about why she used fields or amenity greenspace near her house but not the parks]

V 'Cause we don't like have a park or anything and then the park that we have's really little and you can't get on it cause it's little baby slides. It's been vandalized as well so''

9.4.3 Vandalism

Vandalism had multiple influences including affecting aesthetics and being threatening, as already referred to. In addition, it was seen to reduce choice and thus affect provision.

Boy, S2, town 1

I Is there enough to do for young people in the area?

V No, cause really like all there is is a park and the school, and at the park it's not really. It's got like a chute but everybody ruins it. It's all been peed down and it's been spray painted and really there's only like two swings for us and a witches hat but it's been burnt so we've

only got two swings and there's nothing else to do. That's why we play [games] 'cause that's all we've got to do in our free time 'cause there's nothing else to do.

A couple of the girls highlighted the fact that even if new facilities are built or a place is refurbished then there is the risk that continued anti-social behaviour may substantially detract from any potential positive perceptions and use. There is a difficulty in attempting to provide new and improved facilities without first dealing with such problems.

Girl, S4, town 3

V The park just up the road, it's only like 2 minutes up the road from me. We never go there. It's not very nice, the area around it's not very nice and the park itself's not too nice. It's been vandalised so nobody like really goes there. It's been all done up but it's just been ruined again.

Girl, S2, town 1

V I'm sure that if they built somewhere new they'd just trash that as well.

9.4.4 Proximity

Proximity was mentioned as influencing choice of where to go. Places that were closer were favoured over more distant ones, and the fact that a place was nearby or local to friends appeared influential in choosing to use certain greenspace.

Boy, S2, town 2

V ah well it's just well it's close to my house so if I just wanted to go on a walk it's not that far it's just like across the road a bit...

Girl, S4, town 1

I Why do you go to the golf course?

V I don't really know I think it's cause it's closer to her house and her dog likes it there so really I just go to the golf course.

However, distance travelled also depended on the quality of a place, the facilities and opportunities offered. An effort was made to travel to a more distant greenspace if it was thought to be worth it or the quality of the nearest greenspace was not suitable. One 15 year-old boy mentioned how he chose to go to a more distant park. This was because it had better ramps for bikes than a closer one.

9.4.5 Size

There was an apparent preference for greenspace that was big. The adolescents commented on the size of the greenspace they used when explaining why they chose to go to a specific one. Bigger allowed for gathering of large groups of friends and was perceived to be better for games of football. Also, as already mentioned, the spaciousness of greenspace was associated with freedom and space to run around and good for being left alone by other people. There was a sense that small was associated with fewer things to do, although it could also be seen to be quiet, due to restrictions on the number of people that could fit into the space. All of the following quotes were in reference to why these adolescents went to a certain or alternative greenspace.

Girl, S4, town 1

V 'Cause lots and lots of people can go to hang out, like more than in your house.

Boy, S4, town 2

V [the sports centre pitches] it's a better place to play than out there [amenity greenspace].

I Why is it better?

V [It's a] bigger area and well there's less cars so we don't get told off as much.

Girl, S2, town 3

[Why describes a park as boring]

V 'Cause there's no like much things for you to do cause it's that small.

When describing what they would like to see provided in their area, the active boys suggested bigger and better sports facilities such as bigger pitches, parks and basketball courts.

9.4.6 Desires

The adolescents were asked about what they would like to see provided for young people in their local areas, and some of these desires have already been touched upon in relation to size and quantity. The adolescents were not always able to articulate what it was they desired, even when they felt that provision for young people was poor. Where suggestions were offered, girls commented specifically on a desire for

better quality parks, well maintained and with age-appropriate playground equipment. However, despite mentioning a desire for more age appropriate equipment, it is uncertain to what extent this would be used by the 15 year-old girls. None of them actually mentioned this as an activity, and indeed several mentioned they didn't play on the equipment as they were "too old for that". The impression gained was that the older girls, when they did use greenspace, primarily sat or walked and chatted. Boys talked about wanting more playing fields and better quality playing fields and parks, but there was more of an emphasis on playing fields. This resonated well with the indication that boys often went to greenspace to play football or to be with friends and play football.

Although there was an interest in better provision and maintenance of greenspace, there was also widespread desire for more organised events, activities and clubs such as social or youth clubs, activity and non-sports clubs. One of the S2 boys from town 3 mentioned a free, organised activity session that happens about once per week in the Easter and summer holidays. At this there was the opportunity to play dodgeball, handball, football and Nintendo wii. This boy planned to go along to this. He also mentioned a desire for a regular youth club arrangement and how there was provision elsewhere but this was too far away:

V maybe an activity night twice a week that we can go to so we're off the streets, but there's nothing even like that. The only thing there is is the YMCA and that's down at the [X – about 10 to 20 minutes away]. It's like 7 till 9 and you get to do football, hockey, they get to cook, they get to go on the computers and we get to watch the telly. I just want to see something more up here like that.

This sentiment for more organised activities was echoed by others.

Girl, S4, town 3

V I think like we would like people to be there to like to do stuff with us. Like last year I went to Alton Towers with the Council and that was like good. But even like they did this thing and they were like down the park once and they had like DJ in and the Wii out and that like the big screen and that. But they didnae come down this way anymore really, they've only been once and like everybody enjoyed it.

There was also desire for more availability of commercial facilities such as swimming pools, shops, café, McDonalds, cinema, skating rink and (ten-pin)

bowling. One 15 year-old girl from town 1 also mentioned a desire for access to gym facilities - “Most people my age want to go to the gym and stuff but we can’t ‘cause we’re not 16.”

9.5 Complexity

One of the findings from the interviews was the amount of complexity involved in the relationship between these adolescents and greenspace. In addition, to the factors influencing intention and related to opportunity already described, use of greenspace was further influenced by “type of person”. Predicting use was made more difficult also because, for the same greenspace, different adolescents held widely different opinions. Furthermore, comments were made suggesting that these adolescents were negotiating ways round some of the challenges they faced and continuing to use greenspace in spite of the problems that were described.

One reason cited for not going out, using greenspace or certain types of greenspace was an adolescent’s perception of themselves as “not that type of person”. One S2 girl explained she was not the “type of person” to go to woods alone. One of the S4 boys described himself as not the type to go out much, either by himself or with friends.

Girl, S2, town 2

[Response to being asked whether she would go to the woods behind her house on her own at all]

V No not on my own. Even though I like to be safe I still [?] I’m quiet. I like to keep things to myself sometimes. I’m not the one, I’m not adventurous. I wouldn’t go out, like when we’re out at the club, I’m not the one to like start dancing to a random song I just stand, I just stand there. So I’m not the one. Like people’ll say “oh have you been in the woods?” and I’ll go “no I don’t go in the woods” and they’re like “why?” and I’m like “‘cause I don’t want to”. I’m just not that type of person. I’m more quiet.

Boy, S4, town 2

V Well I’m not really a person that would normally go out much by myself or with friends.

Adolescents had different perceptions of the same greenspace even when within the same area or even the same friendship group. In one instance a park was referred to as dangerous and with a reputation for stabbings, whereas other adolescents had

described the same park as being a more desirable one because it had been newly done up and was less boring than others. Two friends described the same park differently, with one perceiving it as untidy and the other as tidy and clean.

Girl, S2, town 3 – friend 1

I What's the chippy park like then?

V It's got like quite a lot of litter in it and the council doesn't like clean it up as much so.

Girl, S2, town 3 – friend 2

I You've put tidy, tell me a little about why you've put tidy?

V Well some parks are usually like full of rubbish and stuff. People just dinnae bother but like they parks are always usually like really really clean. [They've] got the odd bit of rubbish going about, and especially like you'd think that the chippy park would be worse cause there's a chip shop right next door to it but it's always like usually really clean.

One of the main parks in one of the towns was perceived by one S4 girl as interesting with a variety of places to go to, pretty and relaxing. However, a different S4 girl from the same town viewed it as unsafe and was not allowed to go there and one of the boys did not think there was much to do at this same park.

Despite descriptions of problems with greenspace, such as vandalism, graffiti and other threatening behaviour and incivilities, it was not always the case that these prevented use. It was clear that they were not welcomed and there were concerns about safety and risk of injury. However there was evidence to suggest that these young people found ways of coping with these and negotiating their way round such problems such that they continued to use greenspace that perhaps would not have been expected. Alternatively, they avoided certain places and used others instead. They seemed to have an understanding that different places were for different groups. In other words certain groups were seen to have their own “territories” (Childress, 2004).

Girl, S2, town 1

[Referring to a specific park]

V I don't even know if that's how you spell it. But just we usually, we don't go there that much, we just sometimes go there at like after school cause it's just like 2 seconds away from the school. It's a bit, like a lot of weirdos hang about there at night, but there's nothing

ever wrong with it during the day. We just go in there and it's got quite a fun little thing, I don't really know what how to describe it, but we just sometimes go on there and just have a laugh I don't know.

Girl, S2, town 1

V I don't really go over there a lot 'cause, just like if we're over there then the boys shout at us or something stupid like that. We don't really go over there that's why we go to that field 'cause it's just us and there's not really a lot of people, 'cause I think like we have separate fields.

Adaptation may also manifest itself in a different way. One of the S2 boys quoted earlier, who preferred to stay in or be at a friend's house and play computer games, mentioned using a nearby field to practice a bit of golf but the impression given was that this did not occur often. He also passed through greenspace on the way to elsewhere, as a short cut. However, his comments suggested he was someone who did not use greenspace and he was very critical of the local parks.

The park's rubbish. It's just not good. All there is is just swings and a climbing frame for like 5 year-olds.

He had also experienced being pushed off a piece of playground equipment when he was in first year and broke his ankle as a result, which may go some way to explain his negative attitude to such facilities. An S4 boy from town 1 also expressed negative perceptions of the local greenspace with a preferred indoor interest.

I Where do you spend most of your free time when you're not at school, or at the weekends?

V I think mostly here cause I find that if I go to the park its always swamped with teenagers and people I don't get on with so. And plus I can get on with like revision here, school work and I can also. So I like to write stories and stuff so I can always do my writing here.

It is understandable that different adolescents have different interests and some of these may be better served by staying at home or going to a club. However, these adolescents also expressed other problems associated with going out. It may be that the development of other interests may be a mechanism to avoid these problems out in the local environment and greenspace.

These nuances illustrate that there is no typical adolescent and they all have unique interests, experiences and perceptions of the area and greenspace around them. Even

though the purpose of this research is to try to identify general themes that can be acted on in a practical fashion, it should be remembered that this variety and complexity makes the planning and prediction of what will work to increase greenspace use a difficult process.

9.6 Physical Activity in Greenspace

The adolescents were motivated to use greenspace to “have fun”. They perceived greenspace as a location for and source of entertainment. Although some were motivated to undertake a specific activity, for others activities were not necessarily a part of the initial motivation to use greenspace. Instead the primary motivation was to meet friends and have fun. It is this motivation to seek entertainment, as well as engaging in specific interests such as football and dog walking that links greenspace use with physical activity in these adolescents. A wide variety of activities were described in interviews, see Table 9.2.

Table 9.2 Activities in greenspace

Type of activity	Range of activities
Active	
Sport/Fitness	Football, Running, Rugby, Golf, Softball, Rounders, Exercise
Games/General Play	Hide and seek, tig, doing cartwheels and stuff, dancing, play, mucking about to music, taking siblings to play
Use of Playground Equipment	Play on swings, the climbing frame, witches hat, ‘free-running’, assault courses
Using natural features	jumping burns, climbing trees, playing on bike jumps (in the woods), swimming in the sea, playing on the rocks, collecting shells
Walking	Walk, walk& chat, walk and play with the dog
Cycling	Going for a cycle, playing at bike ramps in the park and general mucking about on bikes
Sedentary	
Feed the ducks and swans, picnics, BBQs, sit & chat, relax on the grass, think, clear head, sunbathe	
Other (intensity of activity uncertain)	
Hanging out with friends, having fun, exploring	

Football was almost entirely exclusive to boys. A couple of S4 girls mentioned playing football down at the park but otherwise it was not something the girls tended to do. Boys referred to keeping fit, exercising and playing other sports such as rugby, golf and running. A couple of the S4 girls mentioned playing rounders and softball, but there was a strong impression that the girls were far less interested in or less likely to be taking part in vigorous sporting activities in greenspace. Another notable difference was that all groups mentioned play on playground equipment except S4 girls.

9.7 Summary: Friends, Fun and Freedom

The interviews revealed a complex picture of greenspace use by these adolescents, with attitudes and behaviour influenced by a wide variety of factors. The adolescents were positively motivated to use greenspace primarily to meet with friends, take part in a specific activity, seek some form of general entertainment or for respite. In other words, these adolescents used greenspace mainly for friends, fun and freedom. An important attribute of greenspace was that it afforded the adolescents spatial freedom, freedom from parents and freedom to “express themselves”. Early childhood memories indicated a predisposition to view greenspace positively with memories of greenspace largely associated with fun, family, good weather and holidays. However, this did not appear to have any substantial influence on their current use of greenspace.

Seeking some form of entertainment or taking part in a specific activity led to a variety of activities taking place, many of which were physically active in nature supporting the link between greenspace use and physical activity. This was particularly the case in the boys who appeared to engage in more vigorous activities such as football and other sports.

The adolescents could also be negatively motivated to use greenspace through a sense of “nowhere else to go” or “nothing else to do”, in part contributed to by a perception of lack of provision for young people in their area. There was widespread desire for commercial and organised forms of entertainment, as well as a desire for more and better quality sports facilities by boys, and better quality greenspace with

more age-appropriate playground equipment by girls. Provision was also seen to be limited because playground equipment was not age-appropriate or facilities had been vandalised. Entertainment value was increased through perceptions of newness and variety. This could be difficult to achieve where greenspace was used repeatedly. It was also recognised that the tendency to always want something new and different to do may be a trait of adolescents rather than a comment on provision *per se*.

Fear of “undesirable others” and safety concerns, vandalism and poor quality facilities as well as experience or rumour of being “hassled” were cited by the adolescents as reasons for not using greenspace or certain greenspaces. For the older adolescents, a lack of time could also be an issue. In addition, it was evident that the weather was influential.

Decisions to go to greenspace or not or to use certain greenspace or not were made through a complex cost-benefit analysis of different factors. Despite quality or safety concerns, it was evident that less desirable places still got used, or places where bad experiences had occurred were still frequented. The adolescents negotiated their way round issues or were restricted to using a less desirable place through lack of time or restrictions placed on their friends’ choices of where they were allowed to go. This complexity makes it difficult to predict what will work to increase greenspace use, however, the evidence does indicate that there are certain attributes that would likely be widely welcomed.

- Greenspace that is well maintained
- Greenspace that is aesthetically attractive with flowers, trees and absence of vandalism, graffiti, broken glass, dog faeces and needles
- Greenspace that has age-appropriate play equipment aimed at older adolescents and good quality, well equipped features and facilities for playing sport such as football
- Greenspace that feels safe through increased levels of surveillance but without increasing perceptions of persecution or harassment
- Greenspace that is free from problem drinkers, both adults and other adolescents
- Greenspace that is of a size that is large enough to allow a variety of users to use it simultaneously without creating tensions
- Greenspace that has a variety of areas or natural features that enable different activities to take place

10 Adolescent Greenspace Use and its Contribution to Physically Active Leisure Lifestyles

10.1 Introduction

This chapter combines results from HBSC and the GAG study to discuss the influence of greenspace use on the physical activity levels of adolescents in Scotland, and the contribution current greenspace use makes to their physically active leisure lifestyles.

10.2 Greenspace Use and its Link to Physical Activity

The present study demonstrated a positive relationship between greenspace use and physical activity for adolescents in Scotland aged 13 and 15 years, controlling for grade, gender and affluence. Those who were higher users of greenspace also reported higher physical activity levels. This relationship was further supported by objective methods demonstrating that greenspace users had higher average total leisure time physical activity than non-users. Furthermore, amongst greenspace users, physical activity levels were higher when in greenspace compared to when not, with less time spent being sedentary. Evidence from the interviews showed that the adolescents saw greenspace as a location for and source of entertainment, much of which was physically active.

It has been suggested that people are mostly sedentary in parks (Godbey *et al.*, 2005), although it has been noted that there has been little investigation into physical activity behaviour once users are actually in parks (Godbey *et al.*, 2005; Kaczynski *et al.*, 2011). The findings from the present study support other research indicating that greenspace is an important location for physical activity for adolescents. One American investigation revealed how adolescents aged 12-18 years viewed greenspace as one of the top destinations for physical activity (Grow *et al.*, 2008). Another American study of 11-14 year-olds found that self-report greenspace use was positively associated with taking part in different types of physical activity and with bouts of moderate and vigorous physical activity (Chomitz *et al.*, 2011).

Recently published research adds further confirmation of physical activity taking place in greenspace. A UK study of 10-11 year-olds in Bristol, using GAG, found that a third of moderate and vigorous physical activity taking place outside took place in greenspace, with a greater proportion (46%) at weekends (Lachowycz *et al.*, 2012).

One of the difficulties with much of the research on the relationship between physical activity and greenspace is demonstrating the direction of causality. Does having greenspace in a community, or being in greenspace, encourage greater levels of activity? If so, it might follow that provision of more greenspace should lead to the surrounding community increasing their physical activity levels. Alternatively, is it that those who are already motivated and physically active are the ones who seek out the greenspace to engage in their activity? It has been suggested that perhaps it is the case that more active people (or households) move into a high greenspace area to ensure the opportunities exist for them (Cohen *et al.*, 2006; Lee and Maheswaran, 2010).

At face value, the quantitative results presented from the current study suffer the same causality dilemma, inevitable from the cross-sectional nature of the research. The indication that physical activity is of greater intensity in greenspace compared to when not in greenspace could be explained by those consciously seeking to be active in greenspace. The finding that physical activity levels are higher for greenspace users than non-users could equally be expressed as those with higher physical activity levels use greenspace more. Thus, the relationship could be explained by the individuals' physical activity interest, needs and motivations. It may be difficult to demonstrate a difference between these two situations and it may also not necessarily be helpful because greenspace is important in both cases. However, the implication is that promotion of active lifestyles might be best served through interventions focusing primarily on individual psycho-social factors rather than on environmental provisions.

The relationship between physical activity and greenspace is a complex area and it is unlikely that alteration to environment alone will have a large impact on individual behaviour (Lee and Maheswaran, 2010). Some research suggests that individual and

social factors explain more variance in physical activity than environmental ones (Croucher *et al.*, 2007). However, there is strong support from NICE and WHO for environmental interventions to promote physical activity (Anderson *et al.*, 2009; NICE, 2009). A recent systematic review of reviews of correlates of physical activity in young people found that neighbourhood recreational facilities were consistently positively associated with physical activity, and apparently more important than interpersonal and societal correlates (De Vet *et al.*, 2011). Research on the impact of environmental interventions on physical activity, as opposed to only associations, are small in number and show limited effect. A NICE (2006) review of interventions to change natural environments to increase physical activity failed to find any studies that met their inclusion criteria. They did encounter two small-scale local studies on two specific environments (woodland and coastal) and found weak evidence that alterations increased visitor numbers (NICE, 2006), but there was no indication given of the impact on physical activity. A later evidence review for cost-effectiveness of environmental interventions also found very little evidence to support natural environment interventions for promoting physical activity (Beale *et al.*, 2007). Other research has been more positive. An American study tracked changes in use and physical activity in two parks (and a control) prior to and post playing field renovations (Tester and Baker, 2009). One park also had changes to event programming. They found that numbers of visitors increased (including teens) in the improved parks, although the increase for female teens was only significant in the park that also had the programming changes, suggesting less of an impact on use for this group from environmental changes alone. Numbers of moderately and vigorously active visitors also increased. In a similar study, park use and physical activity of users was monitored at baseline and 12 months post improvements to a park in Australia. A significant increase in users was observed along with a significant increase in the number of people observed to be walking or taking part in moderate or more vigorous physical activity (Veitch *et al.*, 2012). These two studies indicate an effect on physical activity of the surrounding population through increasing greenspace use via making environmental changes.

Although the current research was cross-sectional, addition of concurrent qualitative interviews with the quantitative methods enabled exploration of the motivations for

using greenspace. This was able to indicate whether it was active people who sought greenspace or use of greenspace led to physical activity. Findings demonstrated four types of adolescent greenspace user: Social User, Reluctant Social User, Activity-Driven User and Non-User. The dominant types were the Social and the Reluctant Social Users who went to greenspace primarily to be with friends, to have fun and to do something. Once in greenspace, the adolescents described a range of activities, including many physically active ones. This suggests that the act of going to and being in greenspace positively influenced the physical activity levels. However, some of the Activity-Driven Users were adolescents who were already very active and interested in sport and who did seek out greenspace to realise their interests. This demonstrates the dual role of greenspace as opportunity as well as encouraging greater levels of physical activity in those whose primary intention was social. This lends support to the argument that environmental factors are just as important as psycho-social influences. Undoubtedly this will remain an area of continued debate and would benefit from more research.

10.3 Physical Activity Intensity in Greenspace

The results from HBSC demonstrated that use of greenspace was positively associated with vigorous physical activity. The GAG method also demonstrated a strong relationship between greenspace use and being more active during leisure time. Also, when in greenspace the adolescents spent less time being sedentary and proportionally more time engaging in light (LPA) or moderate and vigorous physical activity (MVPA) than when not in greenspace. When in greenspace, the adolescents spent approximately half the time being sedentary, 30% in LPA and 20% in MVPA.

The results are consistent with (Lachowycz *et al.*, 2012), who demonstrated the same approximate proportions of time in greenspace spent at the three different intensities of physical activity. Using a slightly different measure, an observational study of physical activity in parks, conducted in the USA, demonstrated 52.6% of child and teen users were sedentary, 34.2% engaged in walking and 13.2% were vigorously active (Floyd *et al.*, 2011). Wheeler *et al.* (2010) showed that 10-11 year-olds were four times more active when in greenspace compared to being outside, not in greenspace. They were five times more active compared to being inside.

The link between greenspace use and physical activity has implications for achieving recommended levels of activity. Recently revised physical activity guidelines for 5 to 18 year-olds across the UK now recommend 60 minutes a day minimum spent in moderate intensity physical activity, with vigorously intense activity on at least three days a week and a reduction in time spent sedentary (Department of Health, 2011). Moderate and vigorous physical activity is particularly associated with benefits to cardiovascular health and lower levels of risk of a range of other health conditions. In addition, reduction in sedentary behaviour and contribution to total physical activity is important in helping to prevent obesity, a major area of interest to the Scottish Government (Scottish Government, 2011). All physical activity, including LPA, contributes to overall energy expenditure. For example, walking (probably the most common form of LPA) is associated with lower levels of obesity (Croucher *et al.*, 2007). There are some researchers who advocate that even incidental forms of activity, such as standing instead of choosing to sit, contribute to energy expenditure and are important in preventing obesity development (Lanningham-Foster and Levine, 2011; Levine, 2007). Levine describes this sort of activity as non-exercise activity thermogenesis (NEAT), referring to all activity contributing to energy expenditure, over and above basal metabolic functions, which is not related to intentional sport and exercise (Levine, 2007). The evidence from the present study indicates that encouraging greater amount of time spent in greenspace can help towards the reduction in sedentary time and contribute to MVPA targets. It is also of note that the amount of activity involved in travelling to greenspace was not included in this study, and thus the results presented here potentially underestimate the amount of activity more broadly associated with greenspace use.

10.4 Levels of Adolescent Greenspace Use

Results from HBSC have, for the first time, demonstrated levels of greenspace use amongst a nationally representative sample of young adolescents in Scotland. The results showed that a large majority of 13 and 15 year-olds reported regular use of greenspace, thus demonstrating that greenspace is a major resource for them.

The closest comparable results come from two national surveys conducted on behalf of Scottish Natural Heritage. The first, which was previously referred to in Chapter

Four, investigated visits to the *natural environment* by 10 to 17 year-olds (Progressive Partnership, 2007). A more recent second survey investigated visits to the *outdoors* defined as “*open spaces in and around towns and cities, including parks, playing fields, woods, canals and nature areas; we also mean the coast, beaches and seaside; and the countryside including farmland, woodland, hills and rivers. These places might be quite close to your home – or they might be further away.*” (Scott Porter Research & Marketing, 2011). Both surveys referred to a broader range of environments than was used in the present study and, therefore, greater levels of use may have been expected. However, in the 2007 survey it was found that 56% of 10 to 17 year-olds reported visiting *natural environments* at least once per week, fewer than in the present study. In the more recent 2011 survey, 69% reported at least one visit per week to the *outdoors*, a figure comparable to that from the HBSC survey.

These two studies are not directly comparable with the present research because of differences in the age ranges used, reference to a different range of natural environments and a difference in the emphasis of the three surveys. HBSC primarily focused on health and the SNH surveys focused on environmental issues. However, the results from the present study and the latter SNH survey do raise the question of whether there may have been an increase in use of greenspace since 2007. In the USA, research demonstrated an increase in park use by adults between 1992 and 2008 (Mowen, 2010). In Scotland, there was an increase in the proportion of adults claiming to use greenspace at least once per week between 2007 and 2009 but a decline between 2009 and 2011 (Progressive Partnership, 2009, 2011). There is concern that the time spent by young people outdoors has decreased over recent decades (Gill, 2007; Comedia and Demos, 1995; Mannion *et al.*, 2006; Travlou, 2006; Ward-Thompson *et al.*, 2008). A decrease in the ability to go places unsupervised (independent mobility) and have control over the places used (spatial autonomy) have been noted, particularly for young adolescents between the 1970s and the 1990s (O'Brien *et al.*, 2000). It has been suggested that this may be as a combined result of parental and children's own personal fears over safety (Bell *et al.*, 2003; Dunnett *et al.*, 2002; Godbey *et al.*, 2005; Korpela, 2002; Loukaitou-Sideris and Stieglitz, 2002; Travlou and Roe, 2009), increasing opportunities for

entertainment within the home in the form of TV, gaming and the internet (Grow *et al.*, 2008) and an increase in organised activities (Babey *et al.*, 2007). It is unclear to what extent the changes observed apply to adolescents compared to younger children. Considering the link between greenspace use and physical activity levels in young people, it would be desirable to track trends over time in a robust fashion, such as through the use of the HBSC survey.

Whilst it may be uncertain whether adolescent use of greenspace is declining or increasing, one indication from the present study is that adolescents may indeed be one of the main users of greenspace in Scotland. There are four national surveys that demonstrate adult use of greenspace in Scotland: The Scottish Household Survey (SHS), Greenspace Scotland (GSS) Omnibus Survey, the Scottish Environmental Attitudes and Behaviours Survey (SEABS) and the Scottish Social Attitudes Survey (SSAS). SHS 2009 showed that 42% of adults in Scotland reported using parks/greenspace at least once per week in 2007/2008 (Scottish Government, 2010b). SEABS 2008 showed that 55% of adults aged 18+ years reported having made visits to greenspace at least once per week in 2008 (Jones *et al.*, 2008). In 2009 the SSAS reported 52% using greenspace at least once per week (Scottish Government, 2010c) compared to 63% by GSS (Progressive Partnership, 2009). This had decreased to 54% in the 2011 survey (CABE, 2010). Although the proportions are somewhat variable and not directly comparable to each other or HBSC data, due to differences in question phrasing, different study purposes and timing, the indication is that a greater proportion of young people than adults are using greenspace on a weekly basis.

The review of previous literature was unable to clearly demonstrate the relative use of greenspace by adolescents compared to other user groups. The findings from the present study contrast with research based on observations indicating relatively low use by adolescents and young people (Bell *et al.*, 2004; Bell *et al.*, 2003; Kipke *et al.*, 2007). More recently, a study from the USA found that adolescents made up a smaller proportion of young park users than younger children, see Table 10.1 (Floyd *et al.*, 2011).

Table 10.1 Proportion of children and adolescents observed to be using parks

Age group	Proportion of users age 18 years or younger
0 - 5	42.6%
6 - 12	41.0%
13 - 18	16.4%

Table based on data from Floyd *et al.* (2011).

Also, adolescents were one of the least observed groups using a local greenspace network²³ in England (Tzoulas and James, 2010). These newer studies also relied on observations. As previously discussed in Chapter Four, observations risk missing the periods of time when adolescents use greenspace. Indeed, one participant in the present study was observed to be out and about in the neighbourhood till beyond midnight, well past times at which observations are usually made. In addition, some of these studies focused on types of greenspace that may be less appealing or accessible to adolescents (Bell *et al.*, 2004; Bell *et al.*, 2003; Tzoulas and James, 2010), hence explaining low levels of use. The findings from the present study are consistent with research based on methods where the young people themselves reported their levels of use and where the focus was on parks or generic greenspace (Dunnett *et al.*, 2002; Grahn and Stigsdotter, 2003; Comedia and Demos, 1995). Given the reservations about the contradictory research, the findings from the present study support the understanding that adolescents are substantial users of greenspace.

10.5 Contribution of Greenspace Use to Adolescent Physical Activity

Physical activity taking place in greenspace contributes only approximately a tenth of daily total leisure time physical activity. This finding is similar to the only other comparable research published, to date. Wheeler *et al.* (2010) found that 7% of 10-11 year-old boys' total non-school physical activity took place in greenspace (5% for

²³ Defined by Tzoulas and James as including “physically and/or functionally interconnected formally designated greenspaces as well as informal natural areas irrespective of their size, composition or use.”

girls). In New Zealand, a study found a very small amount (2%) of *total physical activity* took place in parks with playgrounds (Quigg *et al.*, 2010). This much smaller amount may be explained by the fact that the researchers examined total daily rather than leisure time physical activity. Also, the study is less comparable because the population group were 5-10 year-olds and the study only looked at one specific type of greenspace.

It is perhaps surprising that greenspace use appears to make a relatively low contribution to total leisure time physical activity, given the demonstrated influence of using greenspace on physical activity and the indication that adolescents are amongst the primary users of greenspace. It must be noted, however, that there is considerable scope to increase levels of use. Physical activity targets, discussed earlier, recommend a minimum of 60 minutes of MPA in 5 to 18 year-olds *every day* of the week (Department of Health, 2011). HBSC results revealed that only 17% of young adolescents reported using greenspace daily. Only 22% spent seven or more hours a week in greenspace. Greenspace is just one of the places adolescents frequent and they use a wide variety of places (Lynch, 1977; Owens, 1994). A study of physical activity locations of 9-10 year-olds in East Anglia, showed that a large majority of objectively measured MVPA took place in locations other than greenspace, with gardens and the street of primary importance (Jones *et al.*, 2009). This may well be just as applicable to adolescents. Recent research in the USA demonstrated that the home, garden and street environment were the main locations for physical activity reported by adolescents aged 11-14 years (Chomitz *et al.*, 2011). This ranked alongside playing fields/courts but above neighbourhood parks. A recent qualitative American study with 9-11 year-olds identified the home, school grounds, parks and playing fields as key locations for physical activity, however, the majority of it appeared to take place very close to home (Beets *et al.*, 2011).

Although the contribution greenspace use makes appears relatively small, it should be placed in context with other contributors to physical activity accumulation, such as school physical education (PE) and extra-curricular (EC) activities. It is recognised that provision of physical activity at school is important, particularly as young people spend a considerable amount of their time in education (Bass and Cale,

1999; Fairclough and Stratton, 2005; Gidlow *et al.*, 2008). The contribution that PE makes to total daily physical activity and MVPA is unclear, although PE may be particularly important for adolescent girls in Scotland (Kirby *et al.*, 2012). Other research has shown that more physical activity is accumulated out with the school day, especially for secondary school pupils (Gidlow *et al.*, 2008; Wegis and Van Der Mars, 2006). A survey of PE and EC provision in secondary schools in Scotland, conducted in May 2000, revealed an average of 108 minutes per week compulsory PE for S2 and 90 minutes per week for S4 pupils (Littlefield *et al.*, 2003). These figures have not changed significantly according to more recent research (Kirby *et al.*, 2012; Scottish Executive, 2006). Four hours were undertaken if standard grade PE was followed, however, despite being one of the most popular choices, only 30% of pupils took this option (Littlefield *et al.*, 2003). Provision of EC activities (mainly sport orientated) has decreased compared to 1989 with only approximately a quarter of pupils taking part in one or more activities a week. This suggests that the majority of pupils receive only the PE provision. Thus, although PE can contribute to total physical activity (Fairclough and Stratton, 2005) and MVPA (Nettlefold *et al.*, 2011), PE provision is restricted by the structured school day limiting its potential to increase physical activity to meet guidelines (Fairclough and Stratton, 2005; Steele *et al.*, 2010). The median time the adolescents in HBSC reported they spent in greenspace per week was two to four hours per week. This is comparable to time spent doing PE, however, there is more scope to substantially increase the amount of time spent in greenspace, especially at the weekends.

Active transport (AT), i.e. walking or cycling to and from school, can account for further accumulation. Research in the UK on primary school children has indicated that up to 40% of daily MVPA accumulation is achieved by some pupils during AT (Van Sluijs *et al.*, 2009). Provision of greenspace is thought to be associated with increased levels of physical activity by encouraging greater participation in AT. Higher levels of AT were found in the USA where the percentage of parkland was found to be higher (Zlot and Schmid, 2005). The evidence of the impact of greenspace on AT in young people is limited, however, the existence of multiple destinations and good “walkability” of the neighbourhood can contribute (Giles-Corti *et al.*, 2009). It is possible that greenspace helps to improve “walkability” and the

current research shows that parks and playing fields are important destinations. Having said this, secondary school pupils may be less likely to actively commute to and from school due to the more centralised geographical nature of secondary compared to primary schools and consequent increased commuting distances. This again limits the scope to increase this aspect, although it is still recognised as important.

The results from the present study indicate that physical activity in greenspace may contribute more to leisure time MVPA than overall totals of physical activity. This has also been found in other research. Lachowycz *et al.* (2012) demonstrated that a third of weekday non-school MVPA took place in greenspace and 46% at weekends. This suggests a particularly important role for greenspace in promoting more intense levels of physical activity.

10.6 Summary

The present study has demonstrated a clear link between use of greenspace and physical activity in adolescents in Scotland. Direction of causality can be an issue in cross-sectional research, however, the addition of interviews was able to demonstrate the bi-directional nature of the relationship. The association was both a result of active people seeking out greenspace to engage in their chosen sport or exercise, and also a by-product of being in greenspace primarily for other reasons, such as to meet friends and find some form of entertainment.

This research supports an understanding that young adolescents in Scotland may make up one of the primary groups using greenspace, although this is an area that would benefit from more research. This has implications for greenspace design and management. However, despite being one of the main user groups, there is considerable scope to increase levels of greenspace use.

The contribution of greenspace use to leisure time physical activity is comparable to that made by compulsory PE classes in school, but offers more scope to increase the contribution to total accumulations of physical activity, and especially to MVPA, and therefore should be encouraged.

Given the relationship between greenspace use and physical activity and the need to increase adolescent levels of physical activity, attention should focus on understanding greenspace use and how to improve it. This is the focus of the next chapter.

11 Understanding and Promotion of Greenspace Use

11.1 Introduction

This chapter explores the use of greenspace by adolescents in Scotland and what can be done to increase use. This draws more fully on the results from the interviews. The first section discusses how greenspace can appeal to adolescents. This is followed by a look at the range of influences on greenspace use and the role of opportunity. The possibility that different groups of adolescents may differentially benefit from greenspace use is examined before discussing ways to promote use.

11.2 The Appeal of Greenspace

A variety of appealing aspects of greenspace was described by the adolescents interviewed. Even those adolescents who were essentially non-users of greenspace were able to identify positive attributes. The adolescents were motivated to use greenspace for friends, fun, freedom and to have time to relax and reflect. This is entirely consistent with prior research into adolescents' attitudes and experiences of greenspace and wider public space in Scotland, the UK and internationally (Matthews *et al.*, 1998; Owens, 1994; Travlou, 2003). These motivations and positive perceptions have been previously compared to the 'developmental needs' of this life stage: namely autonomy, social relatedness, identity, competence and retreat (Clark and Uzzell, 2006; Coleman and Hendry, 1999; Furlong and Cartmel, 2007; Hendry, 1993). Autonomy and identity aligns with freedom from parents and to be oneself, social relatedness with a place to be with friends and retreat with the affordance to relax. In Korpela's review of children and young peoples' place preference, the author comments on the emergence of understanding that place use and preference are understood through the developmental stages of young people. On the one hand, place use was thought to be a factor of developing cognitive and conceptual understanding of the physical environment. Alternatively, use of place is both a requirement for development of identity as well as an expression of the developmental stage and interests at certain ages (Korpela, 2002). The current research supports the understanding that greenspace use contributes to development of identity as well as the association with developmental needs of this life stage.

However, although it is clear that the appeal of greenspace centres primarily on meeting these developmental needs, meeting them is not sufficient alone to guarantee substantial levels of use.

It is important to recognise that the developmental needs are similar across a variety of different types of public space and, therefore, can be met by places other than greenspace. However, greenspace appears well-suited as a place for retreat or relaxation. This agrees with Owens (1988) who found that adolescents regarded greenspace as one of the best places to go for making them feel better and for getting perspective on events (Korpela, 2002). It also resonates with an increasing body of literature on the positive association between greenspace and mental well-being in both adults and young people (Croucher *et al.*, 2007; Douglas, 2007; Health Council of the Netherlands and Dutch Advisory Council for Research on Spatial Planning Nature and the Environment, 2004).

11.3 Influences on Intentions to Use Greenspace

A wide variety of factors contributed to negative perceptions of greenspace, which could act as deterrents to use of greenspace. The primary issues encountered were; weather, personal safety, social exclusion, greenspace quality (or attractiveness) and self-concept. There were multiple facets to several of these issues. Personal safety was concerned with fear about others, rumours and reputation, injury and levels of surveillance. Quality referred to the features and facilities present, newness and novelty, the aesthetics of the greenspace including greenery, maintenance, litter and visual evidence of vandalism and other anti-social behaviour.

11.3.1 Weather

The weather was both a motivator and a deterrent to greenspace use. The influence of weather agrees with findings from a recent survey of Scottish adolescents which found that 38% reported that good weather and fresh air motivated them to spend time outdoors (Scott Porter Research & Marketing, 2011). One study, however, found that objective assessment of greenspace use of 11-12 year-olds indicated no difference by season, inferring that weather may not be that influential (Lachowycz *et al.*, 2012). However, this same study did note less use of parks in the colder

seasons and proposed that the lack of seasonal difference noted across all greenspace may be due to increased use of sports fields for hockey, football and other sports that take place in the colder months.

Whilst the weather cannot be controlled, it is worth noting its influence and how this may affect conclusions drawn about greenspace use from overseas research or even that conducted further south in the UK, a sentiment also expressed by Land Use Consultants (2004). In addition, the weather could be borne in mind in design of some greenspace facilities to broaden the range of weather conditions in which such features and facilities may be used. For example, adolescents in Scotland have expressed a desire for shelters in parks so they can still gather even when it is raining (Travlou and Roe, 2009).

11.3.2 Personal Safety

Fear of undesirable others was a key issue, as well as concern over the presence of broken glass, discarded needles, drink bottles and cans creating fear of injury from the debris. A substantial number of the adolescents interviewed had had direct experience of incidents involving undesirable others, but also they were influenced by rumours and reputation. Concern was expressed over the lack of surveillance associated with less desirable places. A perception of increased surveillance, through the use of security cameras and the physical presence of wardens and the police, was associated with increased confidence in the safety of a place.

Concern about personal safety has been a consistent factor in relation to the use of parks, as well as other public places, by adolescents in Scotland and more widely. A variety of studies have described tensions between users, both youth to youth as well as inter-generational, and the issue of anti-social behaviour (ASB) such as drinking, littering and vandalism as increasing the sense of threat and intimidation from undesirable others (Davis and Jones, 1996; Day and Wager, 2010; Dunnett *et al.*, 2002; Godbey *et al.*, 2005; Comedia and Demos, 1995; Jones *et al.*, 2008; Loukaitou-Sideris and Stieglitz, 2002; Travlou, 2007; Travlou and Roe, 2009; Wals, 1994; Wridt, 2004). However, the recent SNH survey of adolescents in Scotland showed that only 7% reported “I don’t feel safe in my local area” as one of the

reasons for not engaging in outdoor activities (Scott Porter Research & Marketing, 2011).

There was evidence from the interviews that parental concern for safety added to restriction on greenspace use. This is common with findings from other research, albeit some of it dated now. McKeeking and Purkayastha, (1995) revealed that parks can be set as off limits to children fuelled by safety fears associated with other users. Other authors have also encountered restrictions by parents on the kinds of places that young people are allowed to go to, reducing their independent mobility (Davis and Jones, 1996; Korpela, 2002; Kytta, 2004; Lynch, 1977; Matthews *et al.*, 1998; Percy-Smith and Matthews, 2001). These restrictions have been found to be influenced by age and sex with younger children and girls experiencing greater restrictions (Davis and Jones, 1996; Matthews *et al.*, 1998; McKeeking and Purkayastha, 1995).

Despite the apparent importance of personal safety, it was not entirely clear how much this influenced use of greenspace. The reason for this is twofold. Firstly, there was evidence to suggest that the adolescents in this study negotiated their way round known problem areas and still managed to frequent greenspace and other public space. This has also been shown in other research. In Travlou's study of the experience of teenagers in Scottish public space, there was awareness by participants of how other groups of teenagers were using public space resulting in certain areas they avoided and development of their own "microgeographies" (Travlou, 2004). Such safe routes and places suggest an adaptive strategy to risk, with the motivation for freedom, friends and fun overriding safety considerations. The second reason relates to what extent parental restrictions affect teenagers' independent mobility. From the interviews it appeared the parental restrictions were indeed heeded, however, there is some evidence from other research to suggest that teenagers do not always do this (Bell *et al.*, 2003; Davis and Jones, 1996).

11.3.3 Social Exclusion

The adolescents described being harassed or moved on by police and shouted at by neighbours to stop playing on local residential greenspace. It was clear that, at times,

their presence in certain public spaces and greenspace was unacceptable and they were viewed as a problem both by adults, as well as by other young people. This is consistent with prior literature describing the social exclusion of young people from public space (Comedia and Demos, 1995; Travlou, 2003; Valentine, 2004a). These researchers comment on how public space is increasingly regarded as an adult domain with young people perceived as out of place, a lack of tolerance of their presence and sense of being intimidated by them. More recent research found that the young teenagers were being coerced into using places that no-one else wanted to use, such as derelict sites (Day and Wager, 2010). The authors expressed concern that, due to the importance of place use for identity development, use of such degraded places may have detrimental effects on how the young people perceive themselves. The way the teenagers in this current study valued well-maintained and well-provisioned greenspace emphasises how use of poorer quality space may not be their primary choice. The implication is that to promote use of a variety of greenspace, provision alone is insufficient, there is also a need to work with different user groups to encourage responsible use and tolerance. There is a role here for youth and community services to facilitate greenspace use, as well as perhaps a place for the return of the park keeper (Lambert, 2005).

11.3.4 Greenspace Quality

The adolescents demonstrated awareness of and were critical of greenspace quality (see Figures 11.1 and 11.2). They found litter, lack of maintenance and repair, low aesthetic quality and old, tired-looking, play equipment unappealing. In addition, there was felt to be a lack of age-appropriate play equipment for adolescents. The attractiveness of greenspace was improved by evidence of maintenance such as cut grass, tidiness (meaning no litter), the presence of flowers and trees, no weeds and the absence of graffiti and other forms of vandalism. Refurbishment of old play equipment was generally seen as a positive improvement, although for some this was not welcomed as it increased the numbers visiting the area. For those keen on sports such as football, the pitch quality, size and presence of specific facilities such as goalposts and lighting was of importance. Newness and novelty were aspects welcomed by the adolescents. However, there was recognition that repeated use would quickly lead to such facilities and provision being perceived as boring. Quality

issues have been a consistent theme in other research with concerns expressed by adolescents about such issues as dog mess, litter, vandalism and inappropriate provision for adolescents (Dunnett *et al.*, 2002; Comedia and Demos, 1995; Jones, 2008; Travlou and Roe, 2009).

Figure 11.1 Examples of high quality, attractive greenspace



Pedaloos, Beveridge Park Kirkcaldy©Duncan



The Glen, Dunfermline©Danielle Boyle Photography



Games area and teen shelter©JGeyer

Figure 11.2 Examples of low quality, unappealing greenspace



Unappealing water feature©Jennifer Gaillard



Graffiti©©Informatique



Evidence of vandalism©Edinburghgreens



Play area, Dunfermline©Fife Council



Unappealing greenspace©Edinburghgreens

The impact of quality on adolescent greenspace use was, however, not clear. Despite quality concerns, it was evident that less desirable places still got used. This was partly through lack of time or restrictions on where they or their friends were allowed to go.

Seeking entertainment is a key issue for adolescents, and contrasts with adults where desire to exercise or seeking relaxation are the primary motivations for using greenspace or the outdoors (Greenspace, 2007; Progressive Partnership, 2011; Scott Porter Research & Marketing, 2011). Variety appears to be an important element of entertainment and related to the quality and attractiveness of greenspace as well as regularity of use. Variety is difficult with a resource that is used regularly and repeatedly and innovative ways of tackling this are required. It is unlikely that even the most varied arrangement of greenspaces, or zones within a greenspace, can cater to the level of variety required when a place is used frequently. One approach may be to install temporary play structures that are rotated between different greenspace sites. This could maintain a sense of novelty in contrast to a major investment in a one-off refurbishment that will quickly become old and passé. Another approach may be to arrange for more organised events and activities. The adolescent participants in this study themselves suggested they would like to see more events organised in greenspace, or that they would appreciate the involvement of youth leaders in facilitating activities and events. There is some evidence to suggest that events do encourage park use. An American study of interventions to improve parks found that use and physical activity declined in both the intervention and control parks. This may appear contradictory at first, however, the decline was largely attributed to a decrease in the number of organised activities (Cohen *et al.*, 2009). In another study, it was found that improvements to playing fields had no effect on male teen levels of use. Only the park with concomitant increased programming saw a change and this was a statistical increase in the number of female teens observed to use it (Tester and Baker, 2009). It has been suggested that music festivals, markets and other such relatively large events in greenspace may attract large numbers at one time but infrequently, and are not successful in maintaining sustained greenspace use (Jones *et al.*, 2008). It has been proposed that smaller, more local “get to know your park” activities may have more impact (Comedia and Demos, 1995; Jones *et al.*,

2008). Such activities could take place across a variety of greenspace and be used to attract users, as well as increase physical activity. In addition, they may well increase confidence and creativity to use greenspace more actively and independently and serve a dual purpose to also contribute to reduction in anti-social, or perceptions of anti-social behaviour. Such spill-over effects could be a focus for further research.

11.3.5 Memories

Positive memories of greenspace in earlier childhood were predominant. This was the case even for those who had experienced verbal abuse, being scared or injured in greenspace and/or were current non-users. Despite a predisposition to view greenspace favourably, this did not appear to have much impact on whether an adolescent was a current user or not.

This contrasts with previous research which suggests childhood experiences are influential on adolescent attitudes to greenspace (Travlou and Roe, 2009). However, problems were previously identified with this earlier study, as discussed in Chapter Four. Both the study by Travlou and Roe and the section of the current study which examined the influence of memories in adolescents were small and qualitative. Given the indication from other research that memories may be the most influential factor on later adulthood engagement with woodlands (Ward-Thompson *et al.*, 2008), this is an area that warrants more research. A possible difference in influence between adolescents and adults may be related to differing motivations to seek out greenspace (Greenspace, 2007; Progressive Partnership, 2007). Alternatively, it may be related to the types of greenspace under investigation in these studies.

11.3.6 The Role of Opportunity

The provision of greenspace is an important issue and has been the primary focus of much of the research on the link between greenspace and physical activity. The following section discusses how proximity, quantity, size of greenspace and perceived opportunity appear to influence levels of greenspace use and physical activity.

Proximity, Quantity and Size

Proximity is an aspect of greenspace provision. It was clearly an issue for the study participants in deciding which greenspace to go to and a source of dissatisfaction regarding access to other facilities, such as youth clubs. This supports previous research with adolescents that show a relationship between physical activity levels and proximity of greenspace (Cohen *et al.*, 2006; Gómez *et al.*, 2004). A more recently published American study, though actually based on relatively old data, investigated the association between GIS measured distance to the nearest neighbourhood park and self-reported frequency of participation in physical activity in adolescents aged 12-18 years (Boone-Heinonen *et al.*, 2010). Their findings provide further support for a positive relationship to proximity. Accessibility includes proximity and other studies have investigated the relationship between perceived access to greenspace and also found a positive relationship to physical activity (Babey *et al.*, 2008; Scott *et al.*, 2007). Proximity has also been shown to influence greenspace use in studies on the broader population (Croucher *et al.*, 2007; Scottish Government, 2010c).

Some of the adolescents in the current research expressed a desire for greater provision of greenspace but this was framed more in terms of quality and age appropriate equipment (girls), and more and better playing fields (boys). There was little indication that greenspace was not used because of lack of availability or access, although it did perhaps influence their use of *preferred* greenspace. Size of greenspace was also discussed, but this was more in terms of an appreciated quality of greenspace rather than something that was restricting adolescent use of it. This suggests that the areas studied were relatively well-provisioned in terms of quantity or availability of greenspace, an understanding supported by data from the Greenspace Scotland's recently published *The Second State of Scotland's Greenspace Report*. This provides data on the quantity and type of greenspace across Scotland and by individual Local Authorities (Greenspace Scotland, 2012). Overall, Fife had comparable provision by quantity to the national average of 28 hectares per 1000 head of population (Greenspace Scotland, 2012). Glenrothes had more than three times the Fife average of publicly usable greenspace, of reasonable quality and high levels of access. Kirkcaldy and Dunfermline were also reasonably well-

provisioned, although with more variability in access and quality (Greenspace Scotland, 2012). This detailed information is now being used to provide targeted strategies for greenspace improvement in Fife (Greenspace Scotland, 2012).

Desires for better provision in local areas for young people were centred more on youth services in the form of organised events, clubs and activities. This was alongside greater provision of commercial entertainment venues. Greater provision of greenspace was a secondary consideration. The desire for more organised events and facilitated activities, notable in both S2 and S4 respondents, is in contrast to research which suggests that, as teenagers move from early to mid-adolescence, they become more concerned with informal leisure pursuits and desire less involvement from adults (Coleman and Hendry, 1999; Hendry, 1993; Hendry *et al.*, 1996). It also contradicts the desire for freedom from adult supervision apparent in this present study and other research (Travlou, 2003). A recent survey for SNH asked teenage respondents what single thing would encourage them to spend more free time outdoors. The top three responses were: better weather (19%), better facilities and provision of things to do (18%) and friends to go with (17%). Only 2% stated more organised events/clubs to join (Scott Porter Research & Marketing, 2011). It is difficult to interpret what this contradiction means and the implications of it for policy. It could suggest a lack of understanding by the young people of what it is they really desire, and certainly it was evident that some found it difficult to articulate their desires. Alternatively, it could reflect a change in the cultural expectations of modern adolescents, an expectation of laid-on entertainment, such that they welcome adult organised or facilitated activities more so than might be expected during their increasing experimentation with independence. It is important to understand the needs and desires of the intended greenspace users to inform improvements. This apparent contradiction and uncertainty in what is desired by adolescents would benefit from more research and better understanding of current cultural contexts.

Opportunity is not just about number, size and proximity of greenspace. Restrictions on independent mobility from parents, and the actions of neighbours and police can serve to both promote greenspace use, as well as restrict where adolescents feel they

are able to go. It was evident that parks were used on occasion because of experiencing less harassment than if on the street or elsewhere. In other instances, local amenity greenspace was placed off-limits due to harassment by neighbours. This complicates the relationship between provision and use and may go some way to explain the lack of consistent evidence to date regarding the link between quantity of greenspace (number and percentage coverage) and physical activity. Perceived opportunity may show a stronger relationship to physical activity but it can also be more difficult to assess what it means, as previously discussed in Chapter Three. More research is needed to devise meaningful measures of perceived opportunity that can be translated into policy suggestions.

11.4 Which Adolescents Benefit from Greenspace Use?

Much of what has been discussed so far has treated the adolescents involved in this research as a single group. However, differences were found between certain adolescent subgroups. Drawing on the results from HBSC, the GAG study and interviews, this next section discusses whether certain adolescents may be benefiting more from greenspace use than others.

11.4.1 Affluence

Affluence was associated with greenspace use, with those in the group with the lowest affluence less likely to use it than more affluent adolescents. At a personal or household level, American research with children suggests that the effect of affluence is the opposite to what was observed in HBSC, with those with less financial resources more likely to rely on using free greenspace than those with more options available to them through greater affluence (Loukaitou-Sideris and Stieglitz, 2002). In the broader literature, adolescents in families on lower incomes have previously been shown to have restricted access to public transport and to commercial leisure facilities which restricts the spatial range of such individuals (Lynch, 1977; Von Vliet, 1983). The more affluent tend to rely on being transported by parents in cars (McKeeking and Purkayastha, 1995). This would support the understanding that those who were less affluent would be expected to use a free and proximal resource more, such as greenspace. In qualitative research with teenagers,

Comedia and Demos (1995) found that one of the explanations teenagers gave for using parks was because they had run out of money and parks were free, but they would rather be somewhere else like the cinema. Much of this research is very dated. One possible explanation for the contrast in findings is that differential access to leisure activities that cost money may not be as marked now as a result of more disposable income in adolescents (Furlong and Cartmel, 2007). Alternatively, it may be that inequalities in provision, quality and safety that operate at neighbourhood level more closely reflect the deprivation of an area than individual level affluence.

UK and international research suggests that area deprivation reduces the likelihood of using parks and other greenspace. Results for adults from both the 2009 Scottish Social Attitudes Survey (SSAS) and Greenspace Scotland Omnibus Survey found that those living in the most deprived areas were less likely to use greenspace (Progressive Partnership, 2011; Scottish Government, 2010c). This is thought to be due to lower level of provision, lower quality provision, as well as concerns about safety (CABE, 2010; Lee and Maheswaran, 2010; Mitchell and Popham, 2007; Progressive Partnership, 2011). The interview findings support the understanding that safety and quality are key issues relating to greenspace use. The SSAS revealed that adults living in the most deprived areas were less likely to be satisfied with their local greenspace and more likely to regard good lighting and security as the most important features (Scottish Government, 2010c). Babey *et al.* (2007) in the USA found that, in less affluent areas, fewer adolescents reported having a park nearby and safe to use. Another American study found that more parents in the less affluent area perceived the open space as less safe, comfortable and pleasurable to be in than in more affluent areas (Franzini *et al.*, 2010). Closer to home perceptions of local areas differed in Glasgow, with a greater proportion of those in the lower affluent area reporting problems such as lack of safe places for children to play, vandalism, rubbish, burglaries, assaults and poor reputation of the neighbourhood (Jones *et al.*, 2008).

The issue of whether provision differs between low affluent and more affluent neighbourhoods is less certain. Findings from the interviews suggested this was not a key issue for the adolescents in the present study. In other research, a study from the

USA demonstrated that teenagers living in disadvantaged neighbourhoods were less likely to live within 400m of a park (Babey *et al.*, 2007). In contrast, Franzini *et al.* (2010) found that there was more open space in more deprived American neighbourhoods. Another American study showed that more *locations* for physical activity (which can include greenspace) existed in lower income neighbourhoods but a similar number of amenities were present compared to higher income neighbourhoods. The types of amenities provided differed with more for-profit ones in the higher income area (Suminski *et al.*, 2011).

Closer to home, in England, CABE (2010) concluded that more affluent areas had a much greater amount of greenspace (hectares per 1000 head of population) than less affluent areas and that this was of better quality and residents were more satisfied with it. On the other hand, in more deprived areas they tended to have above average access (number of homes within 300m of greenspace of at least 2 ha.). A study in Glasgow found, from a comparison of resources between a more and less affluent area, that the more affluent area had more resources overall (Jones *et al.*, 2008). Once again the more deprived area had a greater proportion of residents who lived within 300m of a greenspace at least 2ha in size (Jones *et al.*, 2008). Greater accessibility was due to numerous smaller, low quality spaces within high density housing areas (CABE, 2010; Jones *et al.*, 2008). SSAS 2009 showed that in the most deprived areas of Scotland only 53% live within a five minute walk from green or open space compared with 67% of those living in the least deprived areas. However, the GSS 2011 survey showed no difference between the 15% most deprived areas compared to the rest of urban Scotland. Of note is that they found a significant increase in the proportion from deprived areas reporting greenspace within a five minute walk compared to 2009 (52% versus 39%) (Progressive Partnership, 2011). This suggests that perhaps provision has improved in deprived areas in Scotland in recent years.

The evidence suggests that, in the UK, more deprived areas tend to have fewer of the large, good quality greenspace, with a greater sense of dissatisfaction with the spaces provided and concerns about safety. This could explain the lower level of use of greenspace among less affluent groups and appears to override any tendencies to be

more reliant on such places for leisure entertainment through financial constraints. The implication of this is that those with most need of greenspace have the least potential to access it.

11.4.2 Sex Difference and S4 Girls

The present study demonstrated that S4 girls were the least likely to use greenspace. This is consistent with results from a recent SNH survey of 12-17 year-olds which found that there was a significant decrease in visits to the outdoors by girls as they got older, but in boys it remained approximately similar (Scott Porter Research & Marketing, 2011).

The present study also showed that boys in both S2 and S4 were more active and derived more of their activity in greenspace. This is consistent with research using similar methods (Lachowycz and Jones, 2011) and the conclusions from two recent reviews (Lachowycz and Jones, 2011; McCormack *et al.*, 2010). Wheeler *et al.* (2010) found that there was an increased likelihood of physical activity in greenspace being MVPA for boys, but no such relationship was found for girls. Recent qualitative research for SNH showed that boys were more interested in physically active pursuits outdoors than girls (Scott Porter Research & Marketing, 2011). In American research it has been noted that males tend to dominate sport settings (Cohen *et al.*, 2007) and observations of all park users (adults and children) have noted that males are twice as likely to be physically active as females (Cohen *et al.*, 2007). Also, observations revealed more boys than girls using parks and girls tended to be less active in the parks than the boys (Floyd *et al.*, 2011).

The difference in activity levels in greenspace between boys and girls may be explained by different activities undertaken once in parks. Interviews indicated that boys were mainly interested in football, followed by “hanging out” and playing on playground equipment, with occasional mention of talk or chat. In contrast, the girls mentioned “hanging out”, playing on equipment (in S2 girls only), sitting or walking and chatting and or walking/playing with a dog. The physical activity intensity of these different activities varies, with football one of the highest (Ainsworth *et al.*, 2011). This resonates with American research which showed that boys in parks were

more interested in football and other active pursuits played in courts or on the fields, whereas girls were more likely to be found in playgrounds where activity levels were significantly lower compared to courts and fields (Floyd *et al.*, 2011).

The wider literature on leisure pursuits shows that boys are more interested in and participate more in sports and outdoor activities compared to girls (Fawcett, 2007; Fitzgerald *et al.*, 1995). Football has been shown to be particularly popular for boys, especially in Scotland (Trew *et al.*, 1999; West *et al.*, 2002). Girls have been shown to spend more time in passive or sedentary pursuits and those involving social contact with friends and chatting (Fitzgerald *et al.*, 1995). Research suggests they are less interested in competitive pastimes and more in recreational ones (Trew *et al.*, 1999), and when they are physically active, prefer individual orientated activities such as aerobics, yoga, dancing and running (Aaron *et al.*, 2002; Fawcett, 2007). Many of these interests tend to be served by indoor, structured classes.

The biggest concern is for the physical activity levels of the older adolescent girls. In interviews, walking or sitting and chatting appeared to be the primary activities for the S4 girls. One study has shown that sedentary time increases in girls as they move through adolescence and a quarter of sedentary time was found to be associated with sitting and chatting (Hardy *et al.*, 2007). Research suggests girls are more socially orientated than boys and such social pastime and developing interpersonal relationships becomes a key part of their lives (Richards *et al.*, 1989 in Hardy *et al.*, 2007). Thus, even if they are motivated to use greenspace they are likely to be more sedentary in it. Having said this, it was shown that using greenspace, even in the older girls, tended to decrease sedentary time and increase light physical activity and therefore can still contribute to total physical activity accumulation. There remains a challenge, however, in encouraging greater use of greenspace in older adolescent girls and greater activity within it. One option may be to create pleasant walkable surroundings which encourage more walking and facilitate social interaction within greenspace. This could be achieved by creation of more interlinked networks of greenspace with interesting destinations interspersed along the way. There is also an argument for trying to encourage greater interest in more active pursuits which could

be served through facilitated activities or clubs that increase interaction with greenspace in fun and socially meaningful ways.

12 Conclusion - Role of Greenspace in Promotion of Adolescent Physical Activity in Scotland

12.1 Introduction

In this concluding chapter, key messages from the two discussion chapters are drawn together and their implications for policy highlighted. Strengths and limitations of the study that have not already been referred to in earlier chapters are discussed. Finally, recommendations are made for future research directions.

12.2 Key Messages and Implications for Policy

This research has contributed to our understanding of the relationship between adolescent physical activity and greenspace use in Scotland. It has shown that physical activity is higher when adolescents use greenspace. There is considerable scope to increase greenspace use by adolescents in Scotland which can help contribute to meeting physical activity guidelines, although older adolescent girls may require a more targeted approach. Greenspace clearly holds many attractions for adolescents with developmental affordances indicated as relatively strong motivators to use greenspace. Adolescents want to gather with friends and seek freedom and fun. They want entertainment and are looking for variety but also want to feel safe and free from harassment. Although different adolescents react in different ways to the challenges they face, with many negotiating and adapting to their neighbourhoods and greenspace, it is clear that certain qualities (as previously highlighted in Chapter Nine) are almost universally appreciated:

- Greenspace that is well maintained
- Greenspace that is aesthetically attractive with flowers, trees and absence of vandalism, graffiti, broken glass, discarded needles and dog mess
- Greenspace that has age-appropriate play equipment aimed at older teenagers and good quality, well equipped features and facilities for playing sport such as football
- Greenspace that feels safe through increased levels of surveillance but without increasing perceptions of persecution or harassment
- Greenspace that is free from problem drinkers, both adults and other teenagers

- Greenspace that is of a size that is large enough to allow a variety of users to use it simultaneously without creating tensions
- Greenspace that has a variety of areas or natural features that enable different activities to take place

Improving inter-relations between different users; considering how to cater for the desire for novelty; and ensuring that greenspace provision and management do not favour one group over another are important. Some of these issues could be addressed through increased surveillance and better maintenance to increase perceptions of safety and attractiveness of greenspace. Investment in play equipment and facilities for adolescents would go some way to increasing the appeal of greenspace and increasing physical activity. Thought should be given to ways of designing an element of change into play equipment provision to increase the sense of novelty and newness. This would be an alternative to expensive, infrequent, large-scale refurbishments. Perhaps this can be achieved by designing playground equipment that can be rotated around different greenspace or providing temporary structures on a periodic basis. Innovative design is also needed to try to increase the appeal of greenspace even during more adverse weather conditions. Structured activities, perhaps linked to youth clubs or facilitated by youth leaders, may go some way to increase familiarity with use of greenspace in a safe and fun environment. This could help to increase physical activity in greenspace and confidence in using greenspace, promote acceptable ways of using it and contribute towards maintaining a sense of novelty associated with frequently used greenspace.

Adolescents from less affluent households and adolescent girls, particularly the older ones, are at risk of not deriving as much benefit from greenspace as boys and more affluent adolescents. There is a risk that simply providing more greenspace, with the aim of providing more opportunity to be active, will actually increase these inequalities if no account is taken of the different leisure interests and how different groups use greenspace. Quality and safety issues rather than quantity and access may well be the key issues for those in less affluent areas. Many of the interests of girls are just as easily catered for by locations other than greenspace and so there is a particular challenge in attracting them outdoors. Networks of attractive greenspace

for walking, chatting and running, offering a variety of routes and interspersed with interesting destinations may particularly support increased use for this group.

There is a tension between providing greenspace close to residential developments, that risk being too small and not meeting the needs of users, and providing larger, fit-for-purpose greenspace that is more distant. Multiple small spaces may provide different spaces for different groups but may lead to social zoning and not necessarily promote integration between different user groups. In a larger space, although different users may use different sections of the greenspace, there is still a greater likelihood of observing and interacting with other users. Also, it may not be practical to finance the provision and maintenance of desirable facilities and features in multiple, small greenspaces. Variety, space, trees and flowers, the appearance of being cared for with grass cut and litter cleared were all important features of greenspace appreciated by the adolescents in the present study. These features are most obvious in the larger, more traditional Victorian style parks such as Pittencrieff Park in Dunfermline and Beveridge Park in Kirkcaldy. Such parks have long been recognised for their health and well-being benefits and it seems that, as far as adolescents are concerned, they continue to exert their charm and influence. Despite the attractions of the large parks, smaller amenity greenspace closer to home was still of relevance, particularly when adolescents had little time or motivation to access these more distant parks, such as during school week-day evenings. Therefore, consideration should be given to how larger spaces would be linked to a broader network.

There is clearly a great deal of work on-going in Scotland to try to address many of the issues highlighted, as evidenced by the work within Fife Council (O'Kane, 2010) and that leading up to the *Second State of Scotland's Greenspace Report* (Greenspace Scotland, 2012). Also, political endorsement and willingness is evident by the number of policies that incorporate regard for greenspace and health (Scottish Government, 2007, 2008b, 2008d). Greenspace considerations feature prominently in the Single Outcome Agreements of most Local Authorities²⁴. *Good Places, Better Health* (2008) describes how the Scottish Government aims to develop better

²⁴ Source: <http://www.greenspacescotland.org.uk/soa-headlines.aspx> , accessed 7th May 2012

systems to create and ensure environments are consistent with, and promoting of, human health and wellbeing in Scotland. Key areas of health improvement identified for action on the environment include childhood asthma, obesity, unintentional injuries and mental health and wellbeing. The strategy takes consideration of the suitability of and access to greenspace.

Several references are made to the importance and regard that should be given to greenspace in the *Equally Well: Implementation Plan* (Scottish Government, 2008e). This includes recommendations that:

- A precautionary principle should be applied to environment health and education policy development affecting greenspace.
- Government, health and other public sector organisations should take specific steps to encourage greater use of greenspace with the aim of improving health.

Also relevant are the following recommendations:

- Creating physical environments for promotion of healthy lifestyles in young children (through play, physical activity and healthy eating) should be a priority for Local Authorities and other public services
- Scottish Government action on physical environments should include evidence-based improvements to promote healthy weight
- Children's play areas and recreation areas for young people generally should have high priority in both planning and subsequent maintenance by the responsible authorities.

Greenspace and its potential for other benefits, such as environmental and economic, are also set out in a number of other policies (Cummins *et al.*, 2010). Clearly there is a great deal of belief in the importance of greenspace and impetus to act to promote greenspace provision, quality and use.

Despite positive political will, many of the challenges raised in the present study have been repeatedly encountered before, yet 15 years after Comedia and Demos's *Park Life* report the same themes keep emerging. Dunnett *et al.* (2002) comment that steps have been taken towards addressing the issues but that there is a deep-rooted concern over the standard of parks and greenspaces. The findings from the current research wholly support continued policy emphasis on the importance of greenspace for promotion of adolescent physical activity, health and well-being. However, an

additional area for consideration is to incorporate greenspace related actions in youth and community service policies. Fostering responsible engagement with greenspace, reducing inter-group conflict and improving perceptions of safety are all key issues to be addressed. A modernised version of the traditional Park Keeper may serve to address these issues, envisioned as a “parkforce” taken on by multiple community members such as youth workers, park staff, wardens, rangers etc. (Lambert, 2005). In addition, the call for actions needs to be matched by considerable financial investment.

A final point is that the present study indicated that adolescents may make up one of the key user groups of greenspace. This should be reflected in policies influencing provision, design and management. Adolescents should be encouraged to participate more in the decisions that affect their local greenspace. Whilst there may be some difficulty in adolescents articulating their needs and desires, it is still important to encourage their involvement and take their needs into account.

12.3 Implications for Theory

Theories provide a way to manage, organise and see the connections and pathways between different aspects of a phenomenon such as the use of greenspace or the relationship between greenspace and physical activity. It was highlighted in Chapter Five that research into the relationship between greenspace and physical activity needed to include more consideration of theory and it was argued that Gibson’s Theory of Affordances (TOA) provided a suitable framework. Several other theories were also discussed. This section examines these theories/models in light of the findings from this research and discusses the implications with respect to future research and encouraging greater levels of greenspace use or physical activity in greenspace.

The findings from this thesis provide evidence to support many of the theories discussed in Chapter Five: that greenspace acts as an opportunity to be active; that factors associated with adolescent developmental needs influence place use/preference; and that use of greenspace is indeed multifactorial and complex involving interplay between intention and opportunity.

The role of greenspace as providing an opportunity to be active was supported from findings from the interview, where several participants purposefully sought out greenspace to realise their personal intent to be active, such as playing football or walking the dog. However, this was applicable only to those that did have this prior motivation. The indications are that a stronger and more frequently encountered motivation for using greenspace was to meet friends, get away from parents or the house and seek some form of entertainment (not necessarily active). In seeking these, the adolescents actually engaged in a variety of forms of physical activity but this was incidental to the primary motivations taking them to greenspace. Providing a physical opportunity to be active is clearly important and common sense, however, when availability is not a key limiting factor, as was the case for the three areas included in the GAG study, then multiple other factors are evident and were demonstrated in this research. Thus conceptualising greenspace purely as a physical opportunity has limited theoretical applications.

There was no evidence from this research to suggest that attractive greenspace was instrumental in encouraging adolescents outdoors and/or to be active. The adolescent participants were certainly appreciative of attractive greenspace but also used a wide variety of different types including less attractive types. More research would have to be done to establish if greenspace improvements actually made a difference to levels of use and independently physical activity levels.

The results demonstrated a positive association between greenspace use and physical activity and it was discussed in Chapter Ten about how there is plenty of scope to increase physical activity accumulation in adolescents through increasing greenspace use. The question is then how to understand and achieve this increase in use.

In the discussions of theoretical approaches in Chapter Five, the notion of place preference was introduced with the suggestion that a major influence on place use in young people is influenced by their developmental stage and needs, as well as potentially influential in turn on their development. However, research by Clark and Uzzell (2006) failed to establish a clear link between the number of social and retreat affordances and the frequency of using a variety of different places in adolescents. It

was concluded that place preference only offers a partial model for understanding place use.

The results from the current study add to that of other research on demonstrating the prominence of social interactions and sense of autonomy in determining where young people go in their leisure time. However, as previously pointed out, this theoretical approach does not take account of barriers. It has been clearly shown in this research that deciding where to go is a complex and dynamic balancing of multiple factors and that consideration of social, entertainment and freedom requirements may be motivation enough to go out but not as to where. Other factors such as time, proximity and where the young people or their friends were allowed to go were evident. Important, from a theoretical perspective, was the dynamic interplay of these factors in making a decision where to go at any moment in time. This decisional fluidity adds to the difficulty of predicting greenspace use and certainly there is a need for further research.

The results support the use of Gibson's theory of affordances (TOA) as a framework for understanding greenspace use and the inter-relationship between intent and opportunity. Most of the factors present in the *a priori* model were encountered in the present research confirming their relevance, and no new factors were encountered that fell outside either major concept. The only factors of the *a priori* model which were not encountered or of debatable influence were competence and memories. An important addition is nowhere else to go as influential on intent, although this could be linked to either exclusion (harassment) or provision.

In terms of future research, TOA could be used to design a more explicit study to examine the relative importance of intent versus ability (not examined in this research) and opportunity or of the different aspects within each concept. This may help to prioritise directions for promoting greenspace use. The model could also be used to examine the factors influential to intent, ability and opportunity in different population groups. Further work could also look at integrating concepts from other behaviour models into TOA to further understand intention, for example mapping the different factors onto concepts such as beliefs or affect (Darnton, 2008).

In Chapter Five, further development of the TOA was discussed with examples given where others have sub-divided affordances into different sub-classifications. An argument was presented for a slightly different classification than previously described. This included three sub-types:

- Design affordances – third party design with intended behaviour or range of behaviours associated with an environmental opportunity
- Normative affordances – widely shared understanding of certain types of behaviour associated with environmental opportunity
- Personal (individual) affordances – individual's perception of range of behaviours associated with an environmental opportunity

Evidence from the current study is broadly supportive of these sub-classes. Findings included the perception by several of the age-inappropriateness of play equipment provided in greenspace for adolescents, or a perception of being too old to play on play equipment. Also of experiencing being thrown off swings or frowned upon for using them and believing this to be a result of others perception that adolescents should not be playing on such play equipment – it is for younger children. As a result of these perceptions the behaviour of the adolescents was affected. This supports the notion of a shared understanding of what is acceptable range of behaviours and users for certain facilities a normative understanding, despite the physical possibility of a broader range of use. Also, it supports the idea of design affordance with an implicit understanding that the swings or play equipment is designed for younger children to use. Previous research, with respect to use of public space by adolescents, suggests that such young people can get into conflict with other users of public space because they are using it in alternative, unexpected and unintended ways (Matthews *et al.*, 1998). The practical implications of this are that if our theoretical understanding is that normative affordances can lead to development of tensions then the aim of design in greenspace should be to be as neutral as possible in creating a statement of what a feature is for but at the same time allowing a multitude of functions to be perceived – opportunity without prescription. For example, a series of rocks placed in a park instead of benches. Benches normatively suggest sitting and, therefore, jumping between them may be frowned upon. However, the rocks can be sat on and jumped between without the same associations.

12.4 Strengths and Limitations

12.4.1 Limitations

One of the limitations of the present research was that the GAG study took place only during the school summer term. This limits any inferences that can be made about the contribution of greenspace to physical activity at other times of the year. It also limits making comparisons between term-time versus holidays. The expected impact from this limitation is to under-estimate the contribution of greenspace to leisure time physical activity in adolescents in Scotland during the summer months.

There is a possibility that the contribution of greenspace to physical activity levels may be over-estimated due to the way in which the GAG data were processed. Although the GPS recorded indoors, it was more erratic and there was a greater tendency for data to be missing. In applying the quality criteria, there was a potential for bias towards retention of data from higher greenspace users who went out more. Analysis to check this did suggest this is what happened. The adolescents were classified into three groups based on their level of greenspace use. This level was ascertained through a combination of their GPS results, responses to the greenspace use questions in the recruitment questionnaire and interview discussions. This revealed that low and non-users did indeed tend to be the ones without GPS data included in the final data set used for analysis. An over-estimation of greenspace contribution to physical activity would be the case if those who stayed indoors were also active. This seems unlikely given that research has demonstrated that children and adolescents who spend more time indoors are typically less active (Ferreira *et al.*, 2007; Sallis *et al.*, 2000). In addition, using the questionnaire responses for vigorous physical activity participation as a reference, those who did not contribute any data tended to be less active than the high user group.

Another source of possible over-estimation of the link between greenspace use and physical activity was the recall bias indicated during pilot of the HBSC questionnaire, see Chapter Seven. The reader is reminded that adolescents may have remembered contact with greenspace only in association with specific activities, such as playing football. However, additional evidence of a strong relationship between

greenspace use and physical activity provided by GAG supports the relationship found in HBSC.

The small size of the GAG study sample meant that it was difficult to explore differences in greenspace use and relationship to physical activity amongst the different sub-groups. Also, there are issues with making inferences to the wider population of urban 13 and 15 year-old adolescents in Fife or Scotland. As previously argued in Chapter Five, the adolescents from the three selected towns in Fife were not expected to be markedly different from adolescents elsewhere across Scotland of a similar age or living in similar urban situations. Therefore, it is arguable that the GAG study results are relevant to young adolescents in multiple other urban situations in Scotland. The participants in the GAG study sample completed a questionnaire which included the same physical activity and greenspace questions as in HBSC. A comparison of the distribution of responses to these questions between the GAG sample and S2 and S4 responses from HBSC revealed that a greater proportion of the GAG sample reported frequent visits to greenspace (63% versus 54%) and spent three hours or more per week in greenspace (67% versus 58%). A greater proportion of GAG participants reported two or more episodes of vigorous physical activity per week (72% versus 60%), but a greater proportion of HBSC respondents reported four or more hours duration of vigorous physical activity per week (38% versus 31%). This suggests that the GAG sample may over-represent those who use greenspace more. However, there were ten adolescents who did not use greenspace at all during the week of monitoring and several non-users were identified during the interviews. Thus, low to non-users' views and actions are included. It is less clear what the implications of the apparent differences in vigorous physical activity participation might be. Ideally, this type of research should be replicated on a larger sample to overcome many of these issues.

There has been a marked consistency of attitudes to public space and greenspace across countries and time. The same consistency in attitudes was also present across the sub-groups of adolescents during interviews. Considering this consistency, it seems reasonable to assume that the findings on attitudes are applicable to the wider population of urban adolescents in Scotland. Some degree of caution, however, is

advocated regarding extending findings beyond the central belt of Scotland. This is because of quite different geographical nature of the Highlands compared to the Lowlands. Also, Local Authorities may have very different ways of managing and maintaining their greenspace provision. Therefore, there will always be a certain limitation to extending such findings beyond the confines of the locations studied.

12.4.2 Strengths

A major strength of this study was the inclusion of both perceived and objective methods of physical activity and environmental assessment. Increasingly it has been noted that some of the inconsistency in the environment and physical activity literature appears to be due to the employment of objective or subjective measures across the different studies (De Vet *et al.*, 2011; Ding *et al.*, 2011). The inclusion of both in the current research, and the consistency of findings across both types, strengthens the finding of a relationship between greenspace use and adolescent physical activity.

A related strength was the use of mixed-methods to provide complementary data on several different aspects of the relationship. The concurrent use of interviews with objective data provided insight on the direction of causality. In addition, it was possible to put the apparent popularity of greenspace, indicated by results from the HBSC survey, into context through the use of GAG and interviews.

This study was conducted in Scotland. Much of the previous research has been carried out overseas where cultural, climatic and landscape differences affect the ability to transfer findings to a Scottish context. The abundance of good quality wild landscape in Scotland combined with relatively small towns and cities and variable weather conditions, may have been expected to lessen the strength of relationship. This was not the case.

A final strength was the inclusion of assessment of use of a broad range of greenspace. Much of the research on greenspace relationships to physical activity has tended to focus on parks, but parks are only one of a multitude of greenspaces available. Data from both the recruitment questionnaire and the GAG method revealed that the adolescents spent most of their greenspace contact time in parks and

playing fields, but a substantial proportion of time was also spent in amenity greenspace.

12.5 Future research needs

There are numerous avenues for future research, many of which have been identified throughout this thesis. Two particular areas worthy of more attention are highlighted here. Much of the research to date has been cross-sectional. More research is needed to follow the impact of environmental change, such as refurbishment or establishment of newly accessible greenspace. However, it is recognised that this is challenging in terms of identifying opportunities for such research, expense and conducting naturalistic experiments of this type. The development of Local Authority greenspace strategies such as the one published recently by Fife Council (O'Kane, 2010) will hopefully serve to initiate more greenspace development, creating opportunities to engage in researching change at an early stage.

A multitude of factors have been identified that influence decisions to use greenspace. Despite recognition of the complexity of such decision-making, more research is needed that models how these influences interact to predict greenspace and physical activity behaviour. In addition, policy currently gives little guidance on the types of greenspace that should be provided (Cummins *et al.*, 2010). Planning for provision of greenspace would benefit from more research to examine the use and desires for different types of greenspace across different populations.

12.6 Concluding Comments

It must be remembered that promotion of physical activity in adolescents is only one of the many beneficial services attributed to greenspace and only one of the population groups it serves. Greenspace is a resource that is for everyone. This research adds to the growing evidence of the value and importance of our urban greenspace, strengthening the arguments to protect and enhance it and promote people's engagement with it. Overall, the message is one of a requirement to retain and increase investment in our greenspace, in combination with youth services, in order to increase young peoples' use of greenspace and the benefits they can derive from it. There is a need to ensure our examples of outstanding greenspace are

available to everyone and they are desirable to go to rather than being accessed through a sense of no alternative. Poor provision and quality runs the risk that the generation of young people now and those in future will stay at home to entertain themselves and switch off from greenspace altogether. The life-stage of adolescents may be cited as reason for disinterest and lack of engagement with greenspace, but the range of motivations to use it appear so strongly linked to developmental interests that there should be no reason why greenspace cannot be promoted to meet these needs and serve as a prime leisure time destination.

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APPENDIX A

PAN65 typology of Open Space

Type	Description
Public parks and gardens	Areas of land normally enclosed, designed, constructed, managed and maintained as a public park or garden. These may be owned or managed by community groups.
Private gardens or grounds	Areas of land normally enclosed and associated with a house or institution and reserved for private use.
Amenity greenspace	Landscaped areas providing visual amenity or separating different buildings or land uses for environmental, visual or safety reasons and used for a variety of informal or social activities such as sunbathing, picnics or kickabouts.
Playspace for children and teenagers	Areas providing safe and accessible opportunities for children's play, usually linked to housing areas.
Sports areas	Large and generally flat areas of grassland or specially designed surfaces, used primarily for designated sports (including playing fields, golf courses, tennis courts and bowling greens) and which are generally bookable.
Green corridors	Routes including canals, river corridors and old railway lines, linking different areas within a town or city as part of a designated and managed network and used for walking, cycling or horse riding, or linking towns and cities to their surrounding countryside or country parks. These may link green spaces together.
Natural/semi-natural greenspace	Areas of undeveloped or previously developed land with residual natural habitats or which have been planted or colonised by vegetation and wildlife, including woodland and wetland areas.
Allotments and community growing spaces	Areas of land for growing fruit, vegetables and other plants, either in individual allotments or as a community activity.
Burial grounds	Includes churchyards and cemeteries.
Other functional greenspaces	May be one or more types as required by local circumstances or priorities.
Civic Space	Squares, streets and waterfront promenades, predominantly of hard landscaping that provide a focus for pedestrian activity and can make connections for people and for wildlife.

Source: Scottish Government (2008) Planning Advice Note: PAN 65 Planning and Open Space
<http://www.scotland.gov.uk/Publications/2008/05/30100623/5>

APPENDIX B

HBSC Pilot Research

Table 1 Range of responses encountered during content analysis piloting of new greenspace use for HBSC questionnaire

<u>Distance expressions:</u>	<u>Time expressions walk</u>	<u>Time expression cycle</u>	<u>Time expressions vehicle</u>
Just down/up/across the road	Seconds walk away	A 15 min cycle round the whole thing	Car 15 mins
Just near our school	5 min walk	Cycle 15 mins	Car 30 mins
Not far away	Walk 15 mins	10 min cycle	Car 10 mins
Just round the corner	10 min walk	Cycle 30 mins	Bus 10 mins
I live quite close/right by it	30 min walk	Cycle 3 mins	
Close to my house Right outside my house		Cycle 5 mins	
Closest to us (relative distance)			

Table 2 Places mentioned when pupils were asked about the types of places they were thinking about when they answered the greenspace questions.

<u>Mentioned in question</u>	<u>Spontaneous</u>
Parks	Crags
Beach	Sports Centre
Burn (river)	Fields
Canal	Hockey field, Polo fields, Tesco field, pitches
garden	Streets
Reservoir	Astroturf
Braeburn path	Local church
	farm
	Hills, Craiglockart Hill, Pentlands, Arthurs seat
	Golf course
	The Gully (grassed area where play football)

APPENDIX C

The GAG Study Recruitment Survey

1. GAG recruitment survey
2. Letter to schools accompanying the survey
3. Opt out form
4. Pupil information sheet
5. Parent/carer information sheet
6. Instructions for teachers (for administration of survey)
7. Class return form

Table 1 Number of Respondents to Recruitment Questionnaire by Grade and School

	S2 total in school*	S4 total in school*	No. of S2 pupils normally in classes administered to	S2 completed	No. of S4 pupils normally in classes administered to	S4 completed
School 1	300	300	19	19	77	62
School 2	150	170	56	50	72	56
School 3	95	80	63	56	48	46

*Approximate figures given to maintain anonymity of schools. Source: September 2010 Pupil Census, Scottish Government Education Directorate
<http://www.scotland.gov.uk/Topics/Statistics/Browse/School-Education/RollsByStage>
accessed 29/3/2011

Reasons for non-response to recruitment questionnaire

3 refusals on day, 7 absent due to illness, 3 parent refusal, 7 unauthorised absence, 3 authorised absence – Total 23 recorded reasons for non-completion out of a total of 46.



Questionnaire on Local Environment and Health

First of all thank you for helping with this important survey

Filling in the Questionnaire

Take your time and read each question carefully and answer as honestly as you can.

It is *not* a test. There are no right or wrong answers.

For most questions you will be asked to tick the circle that best fits your answer. Tick just one unless it asks for more. If it is difficult to choose, think about what is true most of the time.

If you are unsure about something raise your hand and a teacher or researcher will try to help you.

If there are questions you feel you don't want to answer then you do not have to. However, remember that your answers will not be looked at by your teachers or parents.

To keep your answers private put your finished questionnaire in the envelope provided and seal it up.

Thanks for your help

Some general questions about yourself

Q1 Are you a boy or a girl?

boy ₁ girl ₂

Q2 What class are you in?

S2 ₁ S4 ₂

Q3 What month were you born?

₁ Jan ₂ Feb ₃ Mar ₄ Apr ₅ May ₆ Jun ₇ Jul ₈ Aug ₉ Sep ₁₀ Oct ₁₁ Nov ₁₂ Dec

Q4 What year were you born?

1993 ₁ 1994 ₂ 1995 ₃ 1996 ₄ 1997 ₅

Q5 Do you know the postcode of your home address? If you do WRITE it down. If not tick 'no'.

₁ yes, my postcode is

₂ no

Physical Activity

Physical activity is any activity that increases your heart rate and makes you get out of breath some of the time.

Physical activity can be done in sports, school activities, playing with friends or walking to school.

Some examples of physical activity are running, walking quickly, cycling, dancing, skateboarding, swimming, football and gymnastics.

For the next question add up all the time you spend
in physical activity each day

Q6 Over the **past 7 days**, on how many days were you physically active for a total of at least **60 minutes** per day? (please tick *one* circle only)

- 1 0 days 2 1 day 3 2 days 4 3 days 5 4 days 6 5 days 7 6 days 8 7 days

This next section asks about the local area in which you live

Q7 How long have you lived in the local area you live in now?

- 1 less than 12 months (1 year)
 2 12 months or more but less than 2 years
 3 2 years or more but less than 3 years
 4 3 years or more but less than 5 years
 5 5 years or more but less than 10 years
 6 10 years or more

Q8 Do you think the area in which you live is a good place to live?

- ₁ yes, it's really good
- ₂ yes, it's good
- ₃ it's OK
- ₄ no, it's not very good
- ₅ no, it's not good at all

Q9 Do you think the area in which you live is attractive?

- ₁ it is not attractive at all
- ₂ it is a bit unattractive
- ₃ it is neither attractive or unattractive
- ₄ it is a bit attractive
- ₅ it is very attractive

Q10 How often are you allowed to play out in the local streets, parks and other open spaces without an adult?

- ₁ whenever I want
- ₂ only at certain times
- ₃ hardly ever or never

Q11 Here are some statements about the area in which you live.

Please read each one carefully and decide how much you agree or disagree with it.

(please tick **one** circle only in each row)

	1 Strongly disagree	2 Disagree a bit	3 Neither agree or disagree	4 Agree a bit	5 Strongly agree
I like where I live	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like my local area	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I wish I lived somewhere else	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I wish I lived in a different house	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I wish there were different people in my local area	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I don't feel safe in my local area	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My local area is too noisy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are lots of things to do where I live	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Q12 Do you have any of the following types of places in your local area that you can use?

AND Can you give an idea how many of each there are?

(please tick **one** circle on each row and then write in the box how many there are)

	1 No, Don't have any	2 Yes, have them	How Many?
parks, play areas, public gardens...	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
canals, rivers, lochs	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
beaches, seashore	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
woodlands, forest	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
playing fields, outdoor grassy sports fields	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
golf courses	<input type="radio"/>	<input type="radio"/>	<input type="text"/>

Q13 Thinking of the summer months, out of school hours **HOW OFTEN** do you usually pass through or spend time in any of the following places **IN YOUR LOCAL AREA**:

parks, play areas, public gardens, woods, playing fields or sports pitches, golf courses, beaches, canals, rivers or by lochs or other types of natural open space.

- ¹ less than once a month
- ² about once a month
- ³ 2 to 3 times a month
- ⁴ 1 to 2 times a week
- ⁵ 3 to 4 times a week
- ⁶ 5 to 6 times a week
- ⁷ every day

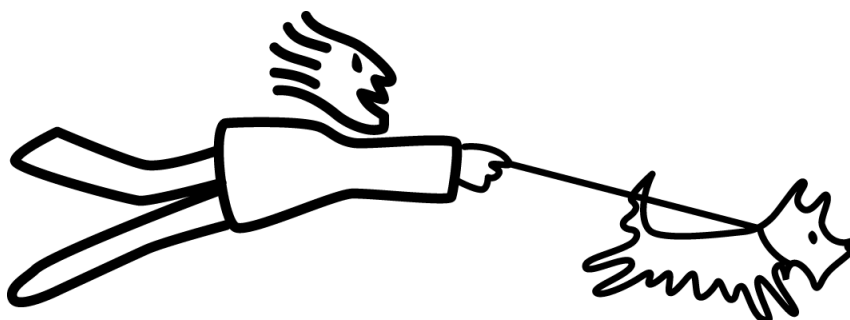
Q14 Thinking of the summer months, out of school hours **HOW MUCH TIME overall in a week** do you usually spend in the following places **IN YOUR LOCAL AREA:**

parks, play areas, public gardens, woods, playing fields or sports pitches, golf courses, beaches, canals, rivers or by lochs or other types of natural open space

- 1 none
- 2 half an hour or less per week
- 3 between half to one hour per week
- 4 between 1 to 2 hours per week
- 5 between 2 to 4 hours per week
- 6 between 4 to 6 hours per week
- 7 7 or more hours per week

Q15 Do you have a garden?

- 1 yes - own garden
- 2 yes - garden shared with neighbours
- 3 yes - both a garden shared with neighbours and own garden
- 4 no



Q16 Thinking of the summer months during out of school hours:

(a) Which of the following types of places IN YOUR LOCAL AREA do you visit most frequently? (please tick *one* circle only)

- 1 canals, rivers, lochs
- 2 golf courses
- 3 own or shared garden
- 4 beaches, seashore
- 5 parks, play areas, public gardens
- 6 playing fields, outdoor grassy sports fields
- 7 woodlands, forest

(b) Which do you visit next most frequently? (please tick *one* circle only)

- 1 canals, rivers, lochs
- 2 golf courses
- 3 own or shared garden
- 4 beaches, seashore
- 5 parks, play areas, public gardens
- 6 playing fields, outdoor grassy sports fields
- 7 woodlands, forest

(c) Which do you visit third most frequently? (please tick *one* circle only)

- 1 canals, rivers, lochs
- 2 golf courses
- 3 own or shared garden
- 4 beaches, seashore
- 5 parks, play areas, public gardens
- 6 playing fields, outdoor grassy sports fields
- 7 woodlands, forest

Q17 Of the types of places mentioned in question 16 a, b and c [EXCEPT your own or shared garden] think of the one you use most often

(a) How far away is this from your home? (please tick *one* circle only)

- 1 less than a 5 to 10 minute walk
- 2 within a 10 to 20 minute walk OR 5 to 10 minute cycle ride
- 3 within a 20 to 30 minute walk OR 15 to 20 minute cycle ride
- 4 more than a 30 minute walk or 20 minute cycle ride away

(b) What is the main way you get to it? (please tick *one* circle only)

- 1 by walking
- 2 by public transport
- 3 by bike
- 4 by taxi, car, motorcycle, van or truck
- 5 other (please say how) _____



These next few questions are about your health and well-being

Q18 In general how would you say your health is?

- 1 excellent
- 2 very good
- 3 good
- 4 fair
- 5 poor



Q19 Please read the next question carefully

<p>Here is a picture of a ladder.</p> <p>The top of the ladder '10' is the best possible life for you and the bottom '0' is the worst possible life for you.</p> <p>In general, where on the ladder do you feel you stand at the moment?</p> <p>Tick the circle next to the number that best describes where you stand.</p>	1 <input type="radio"/>	10	Best possible life
	2 <input type="radio"/>	9	
	3 <input type="radio"/>	8	
	4 <input type="radio"/>	7	
	5 <input type="radio"/>	6	
	6 <input type="radio"/>	5	
	7 <input type="radio"/>	4	
	8 <input type="radio"/>	3	
	9 <input type="radio"/>	2	
	10 <input type="radio"/>	1	
	11 <input type="radio"/>	0	

These next questions are about how you feel

Q20 Thinking about *last week*: (please tick *one* circle in each row)

	1	2	3	4	5
Have you felt fit and well?	Not at all <input type="radio"/>	slightly <input type="radio"/>	moderately <input type="radio"/>	very <input type="radio"/>	extremely <input type="radio"/>
Have you felt full of energy?	Never <input type="radio"/>	Not often <input type="radio"/>	Quite often <input type="radio"/>	Very often <input type="radio"/>	Always <input type="radio"/>
Have you felt sad?	Never <input type="radio"/>	Not often <input type="radio"/>	Quite often <input type="radio"/>	Very often <input type="radio"/>	Always <input type="radio"/>
Have you felt lonely?	Never <input type="radio"/>	Not often <input type="radio"/>	Quite often <input type="radio"/>	Very often <input type="radio"/>	Always <input type="radio"/>
Have you had enough time for yourself?	Never <input type="radio"/>	Not often <input type="radio"/>	Quite often <input type="radio"/>	Very often <input type="radio"/>	Always <input type="radio"/>
Have you been able to do things that you want in your free time?	Never <input type="radio"/>	Not often <input type="radio"/>	Quite often <input type="radio"/>	Very often <input type="radio"/>	Always <input type="radio"/>
Have your parent/s treated you fairly?	Never <input type="radio"/>	Not often <input type="radio"/>	Quite often <input type="radio"/>	Very often <input type="radio"/>	Always <input type="radio"/>
Have you had fun with your friends?	Never <input type="radio"/>	Not often <input type="radio"/>	Quite often <input type="radio"/>	Very often <input type="radio"/>	Always <input type="radio"/>
Have you got on well at school?	Not at all <input type="radio"/>	slightly <input type="radio"/>	moderately <input type="radio"/>	very <input type="radio"/>	Extremely <input type="radio"/>
Have you been able to pay attention?	Never <input type="radio"/>	Not often <input type="radio"/>	Quite often <input type="radio"/>	Very often <input type="radio"/>	Always <input type="radio"/>

Q21 How long does it usually take you to travel to school from your home?

(please tick **one** circle only)

- 1 less than 5 minutes
- 2 5-15 minutes
- 3 15-30 minutes
- 4 30 minutes to 1 hour
- 5 more than 1 hour

Q22 On a typical day is the **main** part of your journey **to** school made by...

(please tick **one** circle only)

- 1 walking?
- 2 bicycle?
- 3 bus, train, tram, underground or boat?
- 4 car, motorcycle or moped?
- 5 other? -----

Q23 On a typical day is the **main** part of your journey **from** school made by...

(please tick **one** circle only)

- 1 walking?
- 2 bicycle?
- 3 bus, train, tram, underground or boat?
- 4 car, motorcycle or moped?
- 5 other? -----

Q24 OUTSIDE SCHOOL HOURS: How **often** do you usually exercise in your free time so much that you get out of breath or sweat? (please tick **one** circle only)

- 1 every day
- 2 4 to 6 times a week
- 3 2 to 3 times a week
- 4 once a week
- 5 once a month
- 6 less than once a month
- 7 never

Q25 OUTSIDE SCHOOL HOURS: How many **hours a week** do you usually exercise in your free time so much that you get out of breath or sweat? (please tick **one** circle only)

- 1 none
- 2 about half an hour
- 3 about 1 hour
- 4 about 2 to 3 hours
- 5 about 4 to 6 hours
- 6 7 hours or more

Q26 OUTSIDE SCHOOL HOURS: How many **hours a week** do you usually spend **walking IN YOUR LOCAL AREA?**

This can include walking to and from school and other places as well as going for a walk locally. (please tick **one** circle only)

- 1 none
- 2 about half to one hour a week
- 3 about 1 hour a week
- 4 about 2 to 3 hours per week
- 5 about 4 to 6 hours a week
- 6 7 hours or more a week

Q27 Do you have any of the following pieces of sports and games equipment at home?

(please tick *all* that you have)

- Bicycle
- Balls (e.g. tennis balls or football)
- Raquets (for example tennis, squash, badminton))
- Rollerblades, roller skates or ice skates
- Skateboard
- Skis or snowboard
- Weights or other gym equipment (e.g. cross trainer, rowing machine)
- Other. Please say what:.....

Q28 How easy is it for you to get to the following facilities?

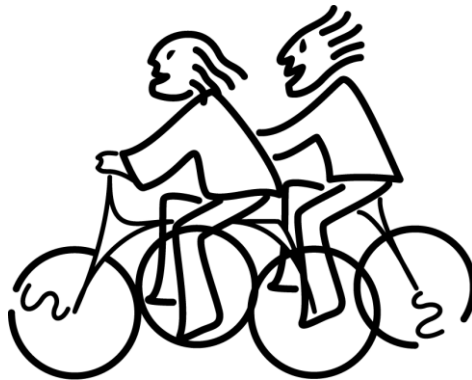
(please tick *one* circle only in each row)

	1 Very easy	2 Quite easy	3 Not very easy	4 Not at all easy	5 Don't know
sports or leisure centre	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
playing field (e.g football pitch)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
swimming pool	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
basketball court or hoops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
tennis court	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q29 Please rate your satisfaction (or happiness) with the following areas of your life
(please tick **one** circle only in each row)

I would rate my satisfaction (or happiness):

	1 Very dissatisfied	2 dissatisfied	3 a bit dissatisfied	4 neither satisfied or dissatisfied	5 a bit satisfied	6 satisfied	7 very satisfied
with my family life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
with my friendships	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
with my school experience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
with myself	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
with where I live	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
with my overall life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Q30 Read each item and decide how often or how much you feel this way *in general*

(please tick *one* circle only in each row)

	1 Very slightly or never	2 A little	3 moderately	4 Quite a bit	5 A lot
alert	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
hostile	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
inspired	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
afraid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
nervous	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
determined	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
upset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
attentive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
active	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ashamed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q31 Is there any reason for you to NOT be able to be physically active at all?

no

yes

If yes, what is your reason?

.....

.....

Q32 Is there any reason for you to NOT be able to use parks or other types of open space at all?

no

yes

If yes, what is your reason?

.....

.....

Q33 During the last month have you taken any medicine/tablets prescribed by a doctor or nurse for the following?

[You do not have to answer all or any of this question if you do not want to, but it would help us if you did]

	1 No	2 Yes, once	3 Yes, several times	4 Yes, I take regular medicine for this
Headache	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stomach-ache	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Difficulty in getting to sleep	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nervousness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Depression	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Something else (please say what if you can or want to)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Before answering the final section I am offering you the chance to take part in the next stage of this study

I am looking for volunteers who will be loaned a **Blackberry mobile phone** with GPS function to carry everywhere with them for one week, and to wear a small physical activity monitor. The phone will have **unlimited free texts included** as a way of thanking those taking part.

The GPS function tracks where the phone goes BUT don't worry, no-one will know where you have been except me. Parents and teachers WILL NOT be allowed to see this information. All your data will be kept strictly private.

I think you will find it interesting and fun to take part.

If you want to find out more, fill in your name and address.

Full Name:

School:

Class:

Address

Village / Town:

Postcode:

*If lots of people want to take part I may have to choose, so not everyone will be contacted.

Final section - a bit more about you and your family

Q34 How many computers (PCs, Macs or laptops) does your family own?

- 1 none
- 2 one
- 3 two
- 4 more than two



Q35 Do you have access to the internet at home?

- 1 no
- 2 yes

Q36 Does your family own a car, van or truck?

- 1 no
- 2 yes, one
- 3 yes, two or more

Q37 During the past 12 months, how many times did you travel away on holiday with your family?

- 1 not at all
- 2 once
- 3 twice
- 4 more than twice

Q38 Do you have your own bedroom for yourself?

- 1 no
- 2 yes

If you have any comments about this questionnaire or anything else to add then write it here:

THE END
Thank You Very Much
Justine

Put your questionnaire in the envelope provided and seal it up.

Put your hand up and a teacher or researcher will let you know what to do next



Name of Contact
Role in School
Address of School

16th February 2010

Dear *Name of Contact*,

Local Environment and Health of Young People Survey 2010

Just to reiterate, the main aims of the study are to look at behaviours and attitudes of young people in and around their local environments and to examine any relationships to certain key aspects of health such as physical activity behaviour. The results will be used to inform policy regarding development of neighbourhood environments to benefit young people's health and well-being.

YOUR SCHOOL'S INVOLVEMENT

In your school I understand that two S2 and two S4 classes will be taking part in the survey. This will involve approximately 100 pupils. This survey pack contains:

- 110 questionnaire booklets
- 110 envelopes (one for each pupil to put their questionnaire in when he/she has completed it)
- 110 puzzle sheets
- 4 class return forms for the class teachers to complete on the day of the survey and to be returned with the completed questionnaires.
- 4 sets of instructions/guidelines for the teachers administering the survey
- A large envelope for return of questionnaires, class return forms and any unused materials.

Class return form

The summary of information recorded on the class return forms will be used to report on the overall survey response rate and reasons for non-response. No information about individual schools will be passed on or published.

Teacher Instruction Sheet

The teacher information sheet explains that each pupil should place their questionnaire in an envelope and seal it before handing it back to the teacher. Information is also given about introducing the questionnaire and assisting with queries or those requiring additional support.

Please could class teachers involved in the survey be given a copy of these instructions in advance.

Parent/Pupil Information Letters and Passive Consent Forms

Consent to take part is assumed if no opt out form is received before the survey takes place.

Please ensure that class teachers involved in the survey know to keep all opt out forms and return them to the researcher when returning the questionnaires.

Return of Questionnaires

Use the large envelope provided. Place in this envelope:

- all the sealed questionnaire envelopes from all pupils who have taken part in the survey in your school
- class return forms
- completed opt out forms returned to the school

Phone, text or email me to let me know they are ready and I will arrange for them to be picked up.

If you have any questions about the survey please do not hesitate to get in touch with me.

Regards,

Mrs. Justine Geyer
PhD Researcher
Tel: 0131 651 6552
Mob: 07786 953298
Email: J.Geyer@sms.ed.ac.uk



QUESTIONNAIRE COMPLETION OPT OUT FORM

Exploring relationships between the local environment and health in teenagers survey

Full name (pupil) _____

School _____

Class _____

I do not wish to take part in this study.

Signature _____ Date _____

Full name (parent/carer) _____

Relationship to pupil _____

I do not wish my child to take part in this study.

Signature _____ Date _____



PUPIL INFORMATION SHEET

Exploring relationships between local environment and young people's health

I would like to invite you to take part in a study that is looking at how your local environment influences your health.

This will involve

Filling in a questionnaire in class which will take about half an hour.

It will ask about your local environment, some general questions about your health and a small number of questions about you and your family.

In the questionnaire you will be asked whether you would like more information about taking part in the second part of the study.

Project

I am a research student at the University of Edinburgh and I am carrying out a study looking at the local environment and its effect on health in teenagers. This project will give information that can help the government plan better neighbourhoods

For more Information you can contact me:

Justine Geyer

CAHRU (Child and Adolescent Health Research Unit)
University of Edinburgh, St. Leonard's Land,
Holyrood Road, Edinburgh, EH8 8AQ

Tel: 0131 651 6552 **Email:**

J.Geyer@sms.ed.ac.uk

Mob: 07786 953298

for young people.

This is a chance for you to have a say about how you feel about your local area and to have an input into how your local environment is shaped in the future.

Taking Part

You can choose if you want to take part or not. If you do NOT want to then please return a completed "opt out" form. Even if you agree to take part you can still decide to stop at any point.

A parent/carer will also need to know about this project and help you decide whether to take part or not.

Data and Results

I will write reports, presentations and articles about my project but will not use your names.

All your information will be kept in a safe place and made anonymous.

Parents and Teachers will not be allowed to look at your answers.



Thanks for reading this

Justine



PARENT INFORMATION SHEET

Exploring relationships between local environment and teenagers' health

My name is Justine and I am a research student from Edinburgh University. One of your child's classes at school is taking part in completing a questionnaire which is an important part of a larger study that I am carrying out.

Project Description

My PhD project aims to explore how the local environment meets the needs of teenagers and how this may influence their health. This will help inform the government about better planning and design of neighbourhoods in the future.

What will be involved for my child?

Your child will be asked to complete a questionnaire during one of their classes at school. This will take about 30 minutes. The main questions will be about their local environment and general questions about their health and a small number of questions about themselves and their family. At the end of the questionnaire they will be asked if they want to find out more about taking part in the next stage of the study. If they do then they will be asked to provide contact details and more information will be sent home in the post.

Consent

If you do not want your child to fill in the questionnaire then please complete the "opt out" form enclosed and send it in to the school as soon as possible. If no form is received consent will be assumed.

What will happen to the information collected?

The completed questionnaires will be treated with utmost confidentiality. Teachers and parents will not have the right to see the pupil's answers. Pupils will be asked to place their completed questionnaires in an envelope provided and seal them up before handing them in.

Questionnaire answers will be put into a computer and the data will be stored securely and made anonymous. This data will only be used for research purposes.

Results may be presented in reports, academic or media articles and at conferences and will ensure anonymity and confidentiality so that pupils and schools cannot be identified.

For more information you can contact me:

Mrs Justine Geyer

CAHRU (Child and Adolescent Health Research Unit)

University of Edinburgh, Moray House School of Education, St. Leonard's Land, Holyrood Road, Edinburgh, EH8 8AQ

Tel: 0131 651 6552 Mobile: 07786 953298 Email: J.Geyer@sms.ed.ac.uk

Thank you for taking the time to read this information.

Justine



INSTRUCTIONS FOR TEACHERS

These instructions and guidelines are for use by the teacher who is administering the questionnaire in the classroom in the absence of the researcher.

GENERAL REQUIREMENTS

1. On the day of the survey: **Please complete the Class Return Form** (number of pupils present etc.) and return this together with the completed questionnaires to the person co-ordinating the survey in your school.
2. It is important that pupils are not rushed or disturbed while completing the questionnaire, as this will affect the validity of their answers.
3. Pupils need to be assured of **CONFIDENTIALITY**. Therefore the questionnaire should ideally be completed under **exam conditions**, i.e. pupils should not be allowed to talk or be able to see each other's answers.
4. Pupils should also be confident that you, yourself, are not looking at their answers.
5. Pupils themselves should seal the questionnaires in the envelopes provided once they have finished, so please hand these out together with the questionnaires.

INSTRUCTING THE PUPILS

The questionnaire includes instructions to pupils on how to complete it. However, it would be good if you could **reinforce the key points highlighted in bold on the enclosed suggested script for the beginning of the class**.

COMPLETING THE QUESTIONNAIRE

In our experience, the questionnaire takes on average 30 minutes to complete. The quickest will take around 15 to 20 minutes and the slowest 40 minutes or more.

Pupils usually enjoy the experience and are keen to answer all the questions.

If it is possible, please give them as long as they need. If time is limited, please ensure that pupils hand in as much as they have completed and tell them that their answers are still useful and important. They should not take away the questionnaire if they don't finish it.

NB. Pupils who finish early need something else to do so that they don't disturb those who are still completing the questionnaire. Puzzles have been provided to hand out to each pupil after they complete the questionnaire (please not before), or you may wish to have them start a school related piece of work. (Sudoku solution provided with this information sheet).

PROVISION FOR PUPILS WITH SPECIAL NEEDS

If there are pupils with special needs in the class, please use whatever methods are normally used to assist them. Please note, however, that if it is necessary for someone to read the questions out to a pupil then care must be taken, as far as is possible, to allow the pupil's responses to remain private.

GIVING HELP

Although the questionnaire is self-explanatory, some pupils may still require help with answering. If this happens, **please be aware of the potential risk of biasing a pupil's answer:**

1. Only give help if the problem is a straightforward, practical one, such as whether to place a tick or number in a circle, or a simple matter of comprehension.
2. If the request for help would mean interpreting a question or suggesting an answer (particularly on questions involving feelings or opinions), then the pupil should be encouraged to 'answer the question as you understand it yourself' or to 'choose the answer that is closest to what is true most of the time'.
3. If the pupil is still unable to answer the question, they should enter the 'don't know' response (if there is one) or write 'I don't understand' next to the question.

Solution for Sudoku puzzle at the end of the questionnaire.

Sudoku (solution)

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

THANK YOU VERY MUCH INDEED FOR YOUR HELP WITH THIS SURVEY

Suggested script to be used by the class teacher for instructing pupils at the time of the survey

Our school is taking part in an important research about how local environments affect young people's health. The same questions are being asked in several schools across Fife.

You are going to be asked to fill in a questionnaire, most of which involves ticking the circle that best fits your answer.

Nobody at school, including me, or anyone at home will see your answers. To keep them private seal it in the envelope provided once you have completed it. The questionnaires will then be sent back to the research team.

Try to answer the questions as honestly as you can but without spending too much time on each question. Raise your hand if you need any help.

Remember, **there are no right or wrong answers.** It is your own opinion that is important.

Please don't talk to each other until everyone has finished. When you have finished put your hand up and I will let you know what you can do next.



Local Environment and Health of Young People Survey 2010

CLASS RETURN FORM

Please return this form together with the completed questionnaires

School name _____ High School

School Address _____

Date survey carried out __ / __ / __

Class (circle appropriate year group) S2 S4

Name of teacher administering the survey:

Number of pupils normally in class

Number of pupils completing the questionnaire

Number of pupils requiring assistance due to special educational needs

Reasons for pupils not taking part in survey *(please give number of pupils)*

Parental refusal

Pupil refusal

Absent due to illness

Authorised absence

Unauthorised absence

Exclusion

Other reasons (please specify)

Any problems experienced by pupils or teacher: (please continue over the page if necessary)

.....
.....

Thank you for your help in carrying out this survey

APPENDIX D

The GAG Study

1. Parent/carer information sheet
2. Adolescent information sheet
3. Consent form
4. Protocol for monitoring
5. Activity belt diary
6. Instructions for activity belt
7. Instructions for Blackberry
8. Minisurvey questions
9. Basic interview guide
10. Activity sheet one (AS1)
11. Activity sheet two (AS2)



Exploring relationships between local environment and teenagers' health

A PhD research project supported by the ESRC and Scottish Government.

Your son or daughter recently completed a questionnaire at school on local environment and health. They wanted to find out more about taking part in stages two and three of the study. Please read the information carefully and discuss it with your son or daughter. If you are both happy for them to take part then please complete both sides of the consent form and return it as soon as possible.

Project Description

This PhD research will explore how the local environment meets the needs of teenagers and the potential for the environment to influence certain aspects of teenage health.

Involvement of Teenagers

Stage 1 - Monitoring (one week)

Activity monitor - Volunteers will be asked to wear an activity monitor on their hip for one week. These monitors are about the size of a matchbox and are easily hidden under clothing. They record the level of physical activity done each day. They are put on every morning and taken off last thing at night, but also need to be removed for any water based activity e.g. swimming or a shower.

GPS phones - Volunteers will be lent a mobile phone that has an inbuilt global positioning system (GPS). They will be asked to carry this with them at all times for one week. GPS records the phones location at regular intervals and this tells me how the local environment is being used. In all other ways the phone is a normal mobile phone. Phones will have unlimited texts as a way of saying thank you for taking part.

Each evening volunteers will be asked to fill in a short questionnaire (5 minutes) using their mobile phone. This will ask about mood and activities for that day.

Stage 2 –Informal chat (about 20 minutes)

I would like to chat to your son or daughter to find out how they got on with the phones and activity monitors and to have a general discussion about what they think of their local environment. They can bring along a friend if they want.

Confidentiality

Data will be treated with utmost confidentiality. Information from the questionnaires, monitors and interviews will only be used for research purposes and will not be available individually to parents or teachers. Data will be stored securely and made anonymous. Presentation of results in reports, academic or media articles and at conferences will ensure anonymity and confidentiality.

NB In the unlikely event of a volunteer being involved in criminal activity such that the GPS data is requested as evidence I would be obliged to act within the law.

Risks to Volunteers

It is not expected that the loan of a GPS phone to the volunteers will pose any greater risk than usual mobile phone use patterns in this age group.

Taking part

If you and your son or daughter are happy for them to take part then please return the enclosed consent form as quickly as you can.

Ongoing consent is also taken into account and volunteers are able to withdraw at any point in the project if they wish, even if they have provided written consent at the beginning.

Once I have received these forms I will get in touch to arrange things**. I'd really appreciate it if forms were returned as early as possible.

****NB: If lots of people volunteer it may not be possible to include everyone in the research even if they have returned a completed consent form.**

Thanks for taking the time to read this

Justine

If you would like any more information please contact me:

Mrs Justine Geyer
CAHRU (Child and Adolescent Health Research Unit)
University of Edinburgh, Moray House School of Education, St. Leonard's Land,
Holyrood Road, Edinburgh, EH8 8AQ

Tel: 0131 651 6552

Email: j.geyer@sms.ed.ac.uk

Mobile: 07786953298

Exploring Relationships between the Local Environment and Health in Teenagers

Thanks again for filling in the questionnaire at school - now I would like to invite you to take part in the second and third stages of this project.

This will involve:

Stage 2 - monitors

Wearing a small activity monitor around your waist for a week and being lent a Blackberry Curve 8900 (A.K.A. a Javelin) to carry with you everywhere you go for one week.

- The activity monitor records all your physical activity for the day. You put it on when you get up and take it off before bed. It must also be removed if you are going swimming or having a bath or shower as it is not waterproof. It is about the size of a small matchbox and can be easily hidden underneath clothing.
- A GPS receiver in the phone records the location of the phone regularly. This tells me how your local environment is being used. In all other ways the phone is a normal mobile phone.

The phones will have unlimited texts as a way of saying thank you for taking part and some free minutes.

- Each evening I'll text you to ask you to fill in a short questionnaire (5 minutes) using the Blackberry. This will ask about mood and activities for that day.

Stage 3 - Informal chat

At the end of the monitoring week I'd like to chat to you about how you got on, and what you think and feel about your local environment. You can bring along a friend and it should not last any longer than 20 minutes.

The Project

I'm a research student at Edinburgh University and this is an important part of my work.

My work will give information that can help the government plan better facilities for young people in their local environments.



Data and Results

I will write reports, presentations and articles about my project but will not use your names.

All information provided by your questionnaires, monitors and interviews will be kept in a safe place. Your information will only be used for research and will not be seen by parents or teachers.

Once I have received the forms I will get in touch to arrange to meet up. It would be really great if forms were returned as early as possible.

NB If lots of people want to take part I may not be able to include everyone. The earlier you return your form the better chance you have of taking part.

Taking Part

If you want to take part then please complete and return the consent form as soon as possible and get your parents to sign it too. Even if you agree to take part now you can still decide to stop at any point.

If you want to chat to me then here are my contact details:

Justine
CAHRU (Child and Adolescent Health Research Unit)
University of Edinburgh, St. Leonard's Land,
Holyrood Road, Edinburgh, EH8 8AQ

Tel: 0131 651 6552 (office)
Email: j.geyer@sms.ed.ac.uk
Mobile: 07786953298



Exploring the relationships between local environment and health in teenagers

STUDY CONSENT FORM [PUPIL]

Full name _____ Age _____

Address _____

Post Code _____ Tel no. _____

Mobile _____

Email _____

I have read and understood the information sheet for this study. yes no

I understand that taking part in this study is voluntary and I am free to leave at any time without giving any reason. yes no

I understand that the information I give will only be used for research purposes. Parents and teachers do not have a right to see my information. yes no

I understand that in reports and other publications no-one should be able to identify me. yes no

I understand that the activity monitor and phone are on loan only and I must hand them back when asked to. yes no

I would like to take part in this study. yes no

Date _____ Signature _____

Protocol for Monitoring

- Arrange monitor introduction meeting _____

Print off map of home location and ensure have contact details with map

Phone day before to confirm meeting

Take on day of meeting

- Enhanced disclosure form
- Student card
- Passport
- Business cards
- Volunteer contact details
- Map of volunteer location
- Time sheet
- Initialised Actigraph (8am next day)
- Selection of belts
- Blackberry + Pouch
- Quick start manual & tips
- Charger
- Activity belt diary
- Activity monitor instructions
- Blackberry instructions
- Research comments sheet
- usb cable
- Answer any questions parents or vols might have
- Run through use of activity monitor and activity diary, use of phone and NB to remind of possibility of random calls and texts from previous vol's contacts
- Arrange date for monitor return & interview _____
- Meeting normally lasts approx 15 mins

Confirm pick up date and time by text/email/phone

Confirm again the day before meeting due

On equipment return

Make sure the following is returned:

- Accelerometer
- Belt
- Blackberry
- Quick start manual
- Charger & usb cable
- Pouch
- Activity belt diary
- Research comments sheet

Text all phone contacts about change of phone status:

"This is a research phone and is no longer available to XXXXXX. Please delete this number from your contacts"

Delete all contacts

Maps

Interview guide
digital recorder

Take back research pack

Check all there

Explain will interview first then clean phone

Meeting normally lasts approx 30 mins

TASKS on COMPLETION of Interview to be done in front of participant if possible

1. Delete from volunteer phone: pictures, videos, voicenotes, music, files
2. messages, emails, call log, missed calls, calendar entries, alarms, locations, browser history, contacts except me and own number, check for downloads and additions to games, check for change of high scorer from Edin Uni to volunteers name
3. Delete any paired devices
4. delete any added email addresses
5. set home screen to one of sample pictures

TASKS before next drop off

1. Download Actigraph data and reinitialise (include actigraph number, vol and gp no., set to record from 8am on day following drop off)
2. Download GPSlogger data and check all days present
3. Download full minisurvey data
4. Download interview audio files and make sure correctly labelled
5. Write up field notes
6. Double check all phones again via Blackberry Desktop Manager to ensure all personal details removed from phone
7. Check all pack info and contents are present and ready to go

ACTIVITY BELT DIARY

Name:.....

1. Put the activity belt on in the morning and write down when you started wearing it under "Time On".
2. Take the belt off at bed-time and write down when you stopped wearing it under "Time Off".
3. Write down any other times taken off and put back on for example if went swimming or had a shower.



DAY	2.6.1 TIME ON	TIME OFF	times off/on & why
one			
two			
three			
four			
five			
six			
seven			

INSTRUCTIONS FOR ACTIVITY MONITOR



The activity monitor is set to record activity; you do not need to switch it on or off.

Follow the instructions below for wearing the activity belt:

- 1) When you get up in the morning place the elastic belt around your waist, so that the activity monitor is on your right hip. Hide it under your clothes. Make sure it is on **THE RIGHT WAY UP** - either the star at the top or the arrows pointing up the way.
- 2) Tie the elastic (the belt buckle is not secure) so that the monitor is held snugly against your body and does not flop about.
- 3) Record the time you started wearing it in your "Activity Belt Diary".
- 4) Wear the activity belt all day, **BUT the activity belt must be removed if you have a bath/shower or go swimming. It is not waterproof.** Write down in your activity belt diary any times it was removed and put back on and why.
- 5) Remove the activity belt at bed-time and write down the time you took it off in the "Activity Belt Diary".
- 6) Repeat this for each day of monitoring (7 days in total).

INSTRUCTIONS FOR THE BLACKBERRY



The Blackberry will record location - *GPS functions are password protected*

Please follow the instructions below to make sure the Blackberry works at its best for this research:

1. **Put the Blackberry on to charge every night.**
2. **Keep the Blackberry with you everywhere you go.** You can keep it safe in the pouch provided. It still works even in bags, but not so good in trouser pockets.
3. **Battery Power** - Keep the Bluetooth function off and only turn it on when you want to use it.
4. **Daily Minisurvey** - Every evening you'll be sent a text message with a link attached to a short survey. You fill this in using the Blackberry and it only takes 5 to 10 minutes.

Open message

Scroll down to the link and click on it

Click on "Get Link"

When you get the "end of survey" message, click on the red phone button to exit and then delete the message from your inbox.

NB Please fill in each day's survey before the next one is due. Get in touch if you have a problem

5. The Blackberry has unlimited free texts

Some limited free talk minutes - (approx 50 mins) *ONLY use for urgent calls not chatting*

You have an email address (see on phone for details) - but better to use texts

You have some free internet access but again please don't go mad - (APPROX 80mb)

If you need help with the Blackberry or have any queries in general, you can text, phone or email me: 07786 953298 (mobile) email

j.geyer@sms.ed.ac.uk

There is a manual for this model (Blackberry Curve 8900 Smartphone v4.6.1) online at:

http://na.blackberry.com/eng/deliverables/5054/userguide_0x84001503_gprs.pdf

****Any problems please get in touch with me as soon as possible. If you lose the Blackberry or it gets stolen get in touch as soon as possible as I can help trace it.**

HAVE FUN

Questions included in short questionnaire (minisurvey) sent daily to GPS mobile phones

- 1) How much have you felt enthusiastic today?
 - 1 very slightly or not at all
 - 2 a little
 - 3 moderately
 - 4 quite a bit
 - 5 extremely
- 2) How much have you felt scared today?
 - 1 very slightly or not at all
 - 2 a little
 - 3 moderately
 - 4 quite a bit
 - 5 extremely
- 3) How much have you felt interested today?
 - 1 very slightly or not at all
 - 2 a little
 - 3 moderately
 - 4 quite a bit
 - 5 extremely
- 4) How much have you felt irritable today?
 - 1 very slightly or not at all
 - 2 a little
 - 3 moderately
 - 4 quite a bit
 - 5 extremely
- 5) Did you take part in any clubs or other type of organised activity today when you were not at school?
 - 1 yes (route to)
 - 2 no (route to)
- 6) What club or activity was it?
open ended
- 7) How long were you there for?
(please say in minutes)
open ended
- 8) How much have you felt upset today?
 - 1 very slightly or not at all
 - 2 a little
 - 3 moderately
 - 4 quite a bit
 - 5 extremely
- 9) How much have you felt inspired today?
 - 1 very slightly or not at all
 - 2 a little
 - 3 moderately
 - 4 quite a bit
 - 5 extremely
- 10) How much have you felt determined today?
 - 1 very slightly or not at all
 - 2 a little
 - 3 moderately
 - 4 quite a bit
 - 5 extremely
- 11) Did you go to any of the following types of places today when you were not at school?
(You can include the time you travel to and from school)
parks, play areas, public gardens, canals, river or lochs, beaches or seashores, woodlands or forests playing fields, school playing fields, outdoor grassy sports fields, Golf courses
 - 1 Yes, once only (route to)
 - 2 Yes more than once (route to)
 - 3 No (route to)

12) Who did you go with?

(If you went more than once think of the visit where you spent the most amount of time)

- 1 alone
- 2 with 1 or 2 friends or to meet 1 or 2 friends
- 3 with a group of friends or to meet a group of friends
- 4 with family
- 5 other

13) What was the reason or main reasons (if more than one visit) why you went?

open ended answer

14) How much have you felt nervous today?

- 1 very slightly or not at all
- 2 a little
- 3 moderately
- 4 quite a bit
- 5 extremely

15) How much have you felt guilty today?

- 1 very slightly or not at all
- 2 a little
- 3 moderately
- 4 quite a bit
- 5 extremely

16) How much have you felt alert today?

- 1 very slightly or not at all
- 2 a little
- 3 moderately
- 4 quite a bit
- 5 extremely

17) Did you do any physical activity today when not at school?

- 1 Yes (route to 17)
- 2 No (route to)

17 What did you do?
open ended

18) Where did you do your PA?

- 1 inside (route to)
- 2 outside (route to)
- 3 both (route to)

19) Did any of your PA take place in any of the following places?

(tick all that apply)

- parks, play areas, public gardens
- canals, river or lochs
- beaches or seashores
- woodlands or forests
- playing fields, outdoor grassy sports fields,
- Golf courses

20) How long did you spend on homework and/or chores about the house today?

- 1 no time at all
- 2 up to half an hour
- 3 between half an hour to 1 hour
- 4 between 1 to 2 hours
- 5 more than 2 hours

21) What was the weather like today? (you can choose more than one answer)

- 1 rainy and wet all day
- 2 some rain showers
- 3 dry but cloudy
- 4 sunny
- 5 windy
- 6 felt cool or cold
- 7 warm

Basic Interview Guide

Use of the Local Environment

1. Show maps from some of the data from their GPS phone to stimulate spontaneous discussion of use of local area
2. Check:
 - Always have the phone with them
 - Charged
 - Typical week?
3. Where do you spend most of your free time?
4. Why?
5. Are there places in the local area that you use in your free time after school or at the weekends during term time?
6. Can you tell me a bit about these places and what you like to do there?
7. Introduce Activity Sheet one (AS1)
 - Explain interest in greenspaces and what greenspaces are.
 - Ask to write down on sheet greenspaces used in the local area and a few words to describe them and what they do in them.
 - If no greenspaces used in the local area then ask participant to comment on the back of the sheet why not.

USING THE SHEET

Ask to explain a bit more fully about 1 or 2 places mentioned or to give a fuller explanation of why some places may not be used.

Attitudes towards greenspace and the local environment

Introduce Activity Sheet two (AS2)

Ask participants to circle words on the sheet that they associate with greenspace

USING THE SHEET

Ask why they have circled certain words, where were they thinking of when they circled the word and what they meant by it.

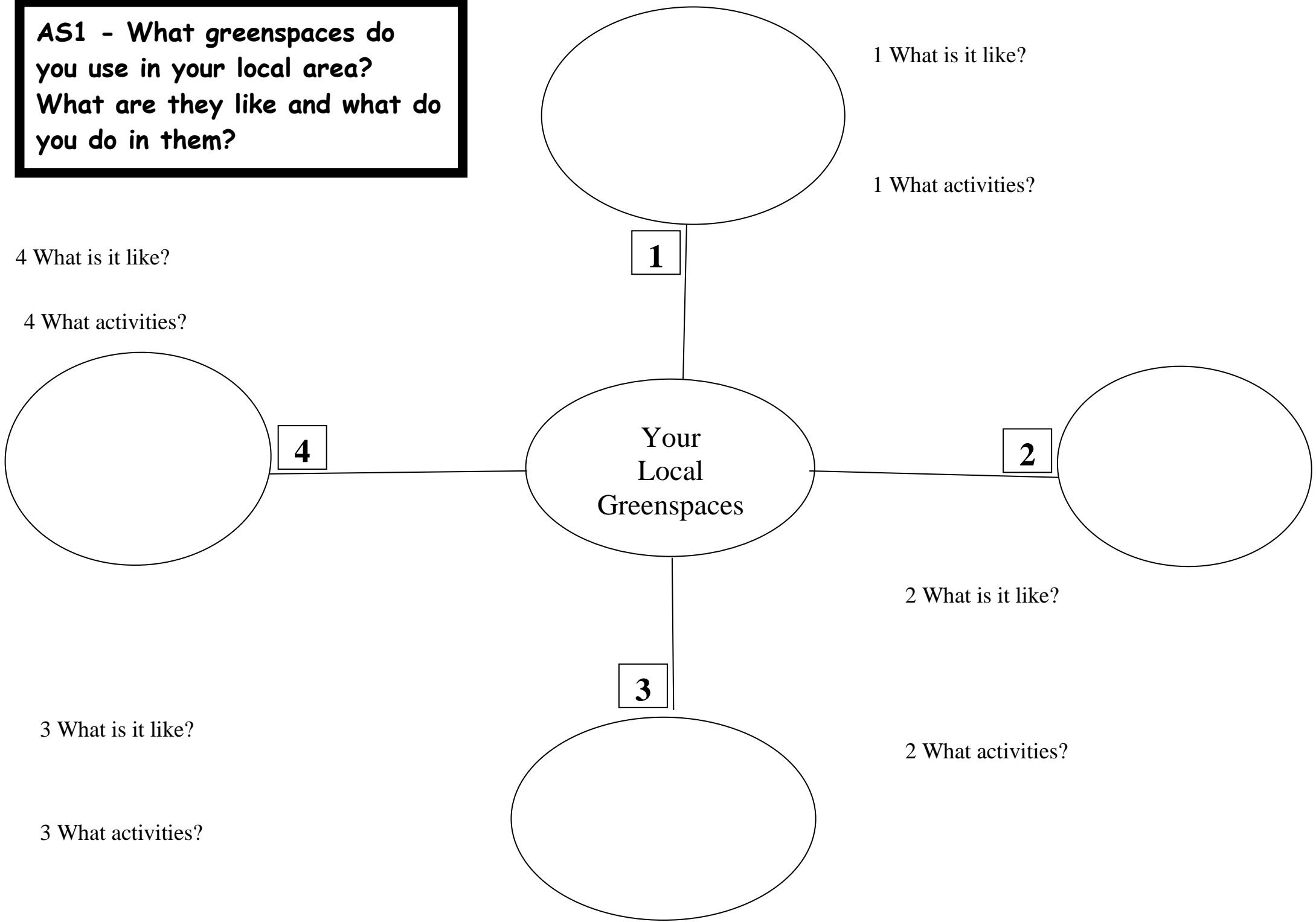
Experiences in greenspace/local environment (if not already covered)

1. Have you ever had a bad experience in your local area?
2. Are there any places in your local area you hardly ever or won't use?
3. What is it about these places that stops you from using them?
4. Were you taken to greenspaces when you were younger?
5. What do you remember about those trips?

Desires for provision for young people

1. Do you think there are enough things to do for people your age in your local area?
2. Is there anything else you would like to be provided?
3. Is there anything else you'd like to say either about your local area or the research itself?

**AS1 - What greenspaces do you use in your local area?
What are they like and what do you do in them?**



1

1 What is it like?

1 What activities?

2

2 What is it like?

2 What activities?

3

3 What is it like?

3 What activities?

4

4 What is it like?

4 What activities?

Your
Local
Greenspaces

AS2 The following words express feelings or thoughts about greenspace or how greenspace might make you feel

(Circle all that you agree with – add your own words if you want to)

Boring	Peaceful	Tidy	Not welcoming
Cold	Good place to be with friends	Annoying	Calming
Dark	Happy	Dangerous	Wet
Fun	Attractive	Unsafe	Sociable
Safe	Private	Is good because of the wildlife	Nowhere else to go
Scary/afraid	Has nice plants and flowers	Pretty	Inviting
Threatening	Pleasant	Sad/upset	Pleasant
Warm	Lots of things to do	Dirty	Lonely
Freedom	Hassle		

