# Physical Activity, Health and Wellness Levels Amongst Adults in Northern Ireland

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# ABSTRACT

**Background:** The five objectives (three primary and two secondary) of the current study were to (i) derive an appropriate research instrument that will gain acceptance with stakeholders in the form of a national baseline survey of physical activity in Northern Ireland; (ii) quantify the physical activity levels amongst the adult population in Northern Ireland in the four domains of home, transportation, work, and sport/leisure relative, and to assess this activity against the UK Chief Medical Officer's recommendations; (iii) identify the characteristics associated with physical activity levels and their relationship with physiological measures such as self-reported height and weight (in order to compute BMI); lifestyle factors such as smoking, alcohol consumption and healthy eating habits; and perceived health and happiness measures; (iv) examine the correlates of participation with physical activity; and (v) examine the implications for government policies relating to the achievement of positive health outcomes using physical activity as a driver.

**Methodology:** The research was conducted between July 2009 and August 2010 by Ipsos MORI on behalf of Sport Northern Ireland (with the author as lead officer) and a number of partner organisations in Northern Ireland. A representative sample of 4,653 adults completed the survey. Information was collected on physical activity levels across four life domains (home, work, active transportation and sport), and several health and wellness variables (smoking, alcohol consumption, healthy eating habits, perceived health and happiness and self-reported Body Mass Index). Frequency tests, t-tests and one-way analyses of variance (ANOVA) were used to interrogate the data and investigate significant differences and relationships, with binary regression analyses then used to explore the influence of socio-demographic and health and wellness variables. In addition, analyses were conducted to determine whether or not physical activity contributed significantly to perceived health and happiness.

**Results:** The results of the survey showed that overall 34.5% of Northern Ireland's adult population achieved the levels of physical activity as recommended by the Chief Medical Officer (i.e. at least moderate intensity activities for at least 30 minutes on at least five days per week). The most important correlate of physical activity, including sport participation, was age. In terms of health and wellness, a significant positive relationship was found between healthy eating, physical activity and happiness. However, a significant positive relationship was also found between smoking and being sufficiently active. Only 5.9% of adult population in Northern Ireland were considered to be *model citizens*, and there is strong evidence from the survey to suggest that a number of mariginalised communities have failed to engage with physical activity initiatives to date. These issues present considerable challenges for those tasked with policy development. Sport itself also continues to be stratified, by variables including socio-economic status, with the higher socio-economic classes (social class A, B, C1 and C2) and those with a higher education (University Degree) being more highly to be represented within the sporting community.

**Conclusions:** Overall, the research reinforces the need to employ sophisticated measures of physical activity across all life domains in order to fully explore complex relationships between activity and wellness. While many findings simply complement the existing literature, a number of interesting and previously unexplored relationships were also established that have significant implications for future policy and the targeting of health campaigns towards specific at-risk populations.

**Keywords:** *physical activity, measurement, health, wellness, sport participation, national survey*

# PUBLICATIONS & CONFERENCES

Some of the data presented in this thesis has been presented as follows:

**Publications**

- Donnelly, P. (2011). *The Northern Ireland Adult Sport and Physical Activity Survey 2010.* Belfast: Sport Northern Ireland.

- Murphy, M.H., Donnelly, P., Shibli, S., Foster, C., & Nevill A. (2012) Physical activity, walking and leanness: An analysis of the Northern Ireland Sport and Physical Activity Survey (SAPAS). *Preventive Medicine*, **54** (2), 140-141

- Nevill, A., Donnelly, P., Shibli, S., Foster, C., & Murphy, M.H. (in press). Modifiable behaviours help to explain the inequalities in perceived health associated with deprivation and social class: Evidence from a national sample. *Journal of Physical Activity and Health*. The expected issue of publication for this article is Volume 11, Issue 3, March 2014.

- Murphy, M.H., Donnelly, P., Breslin, G. Shibli, S., & Nevill A. (in press). Does housework keep you healthy? The contribution of domestic physical activity to meeting current recommendations. *BMC Public Health*.

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**Conference presentations**

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- Donnelly, P. (2010). Measuring levels of physical activity to monitor health benefits in Northern Ireland**:** preliminary headline findings from the Northern Ireland Sport and Physical Activity Survey (SAPAS). Oral Presentation at the 18th EASM Conference. Prague, September 2010.

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- Nevill, A., Donnelly, P., Shibli, S., Foster, C., & Murphy, M.H. (2012). Physical Activity, Walking and Leanness: Analysis of the Northern Ireland Sport and Physical Activity Survey. *Medicine and Science in Sport and Exercise*, **44** (2), Issue 5S p1087 presented at the American College of Sports Medicine Annual Conference, San Francisco June 2012.

# FOREWORD

This research began in 2007 after the launch of Sport Matters: The Northern Ireland Strategy for Sport & Physical Recreation 2009-2019. This was an early consultation document which highlighted the need for a co-ordinated approach to research in sport and physical recreation in Northern Ireland so that Government in Northern Ireland and the wider community can have access to robust and reliable information. One particular target within Sport Matters relates to the development and implementation of a revised research framework for participation rates that is cognisant of the recommendations of Chief Medical Officers in the UK. As Policy, Planning and Research Manager within the leading public body for the development of sport, namely Sport Northern Ireland, this provided an ideal and unique opportunity to undertake a major piece of research that would not only be benefical to the development and implementation of policies and programmes in Northern Ireland, but also to the academic community in which robust measures of physical activity levels at a population level remain scarce. The background and context relating to Sport Matters and the need for this research study is discussed fully in Chapter 1: Section 1.1 and 1.2)

In addition to the above, the decision to develop a revised research framework also provided a unique opportunity to capture other important data relevant to the area of physical activity and health in Northern Ireland. There is a growing body of evidence which suggests that the main preventable causes of morbity and mortality – smoking, excess alcohol use, an unhealthy diet, and in physical activity – are not randomly distrubted across the population, but occur in comination with one another (Chiolero *et al.*, 2006; Poortinga, 2006b). Therefore in recognition of this evidence the author, in consultation with key stakeholders in Northern Ireland, decided to incorporate various

measures of health and wellness (i.e. smoking, alcohol consumption and healthy eating habits; perceived health and happiness measures and self reported Body Mass Index) in the development of a new survey instrument (SAPAS).

The study aims to accurately quantify levels of physical activity amongst the adult population (16 years +) in Northern Ireland in order to investigate their relationship with various measures of health and wellness. In order to address this aim, the current study sought to address three primary and two secondary research objectives (see below). The research aim and objectives of this research and their rationale for inclusion are discussed fully in Chapter 3: Section 3.7).

| | RESEARCH OBJECTIVE | STATUS |
|---|---|---|
| 1. | To derive an appropriate research instrument that will gain acceptance with stakeholders in the form of a national baseline survey of physical activity in Northern Ireland. | Primary |
| 2. | To quantify the physical activity levels amongst the adult population in Northern Ireland in the four domains of home, transportation, work, and sport/leisure relative, and to assess this activity against the UK Chief Medical Officer's recommendations; | Primary |
| 3. | To identify the characteristics associated with physical activity levels and their relationship with physiological measures such as self-reported height and weight (in order to compute BMI); lifestyle factors such as smoking, alcohol consumption and healthy eating habits; and perceived health and happiness measures; and | Secondary |
| 4. | To examine the correlates with participation in physical activity. | Secondary |
| 5. | To examine the implications for government policies relating to the achievement of positive health outcomes using physical activity as a driver. | Primary |

The following thesis *'Road Map'* has been designed to provide a logical structure by which to follow and understand the steps taken to complete this research study.

## Road map of the thesis

| Introduction | Review of Literature | Methodology | Results | Discussion | Conclusions |
|---|---|---|---|---|---|
| | Ch2 A Systematic Review of the Literature on Population Based Approaches to Measuring Physical Activity & Health | | Ch5 Exploratory Data Analysis I | | |
| Ch1 ► | Ch3 A Review of the Narrative Literature on Population Based Approaches to Measuring Physical Activity & Health | ► Ch4 ► | Ch6 Exploratory Data Analysis II | ► Ch4 ► | ► Ch8 |

Chapter 1 provides an introduction to the current research study. Chapter 2 describes the application and findings of a systematic literature review process, Chapter 3 reviews the narrative literature and sets out the aims and objectives of the study in detail, Chapter 4 reports on the research methodology, and results are presented in Chapters 5 and 6. Chapter 7 provides discussion of the main issues identified by the research study in the context of the stated aims and objectives of the current study and Chapter 8 provides a summary overview of the thesis as a whole, and including summative conclusions along with a reflective commentary of limitations, consideration of causality v association and suggestions for future research.

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# CHAPTER 1: INTRODUCTION

## Road map of the thesis

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## 1.1 GENERAL OVERVIEW

> There is insufficient action and limited policy orientation for encouraging the adoption and maintenance of physically active lifestyles within supportive political, social and physical environments...
>
> [World Health Organisation, 1996, The Ottawa Charter for Health Promotion]

Participation in sport and physical activity has been the subject of close scrutiny for some considerable time, including work by academics, practitioners, government departments, and a collection of other non-governmental agencies (Department of Health, 2004, Department of Health, 2005; British Heart Foundation, 2009; World Health Organisation, 2010; Department of Health, 2011). This extensive body of literature generally adopts one of two distinct approaches. First, a quantitative approach, which focuses on gathering and then analysing participation data against a host of demographic, physiological and psychological variables; and second, more qualitative or eclectic approaches that attempt to understand what are the determinants of participation in sport and physical activity and how this then impacts on the dynamics of participation over time.

Over time, the measurement of participation in sport and physical activity in the UK has been driven by a range of factors including the monitoring of investment in local authority facilities, evaluating the difference that national initiatives including National Lottery funding have made, and monitoring service level agreements between Government and national agencies, such as Sport Northern Ireland (Sport NI). In recent times a new agenda has arisen driven by the urgent need to monitor the amount of physical activity that people are actually undertaking, and whether this is sufficient to derive a health benefit (e.g. Department of Health, 2004). This new agenda has led to a careful reconsideration of the value and efficacy of existing research instruments and has opened the possibility for developing more sophisticated research instruments than

are currently in use. In keeping with the health agenda, the inspiration for this study is the desire to make a positive contribution to the evidence on physical activity and public health in Northern Ireland, Based on an extensive review of academic and narrative literature a new survey instrument has been designed to assess levels of adult (16 years and older) participation in sport and physical activity in Northern Ireland. Much of the originality of this work is that it investigates the relationship between physical activity levels and various measures of health and wellness at a national level.

### 1.1.1 BACKGROUND TO SPORT NI AND SPORT POLICY RESEARCH IN NORTHERN IRELAND

Sport NI has been in existence for over 30 years. The business of Sport NI is currently framed by three policy objectives centring on increasing participation in sport, and especially among young people; enabling those with potential to excel; and ensuring adherence to good management practice. Sport NI is regarded as the lead public organisation in the development of Northern Ireland's human, physical and financial sporting resources. Its maturity as the leading public body for the development of sport has been accompanied by a growing recognition that research and evaluation are integral to improving understanding about what works and does not work in developing sport. While this critical role for research may seem self-evident today, not least because of a new evidence-based approach to managing public sector investment, it was not always the case.

Looking back, the development of sport policy in Northern Ireland during the last 30 years can be characterised by a number of overlapping phases:

| TIMEFRAME | FOCUS OF INVESTMENT |
|---|---|
| **1974 – 1988** | • Emphasis on investment in physical resources for community sport. |
| **1988 – 1998** | • Emphasis on developing sport's human resources. |
| **1994 – 2000** | • The establishment of a new financial resource for the development of sport - the National Lottery – accompanied by a renewed emphasis on enhancing physical resources in communities and at 'National' level. Since 1997 the Sports Lottery fund has also been used to develop human resources through a number of revenue schemes. |
| **1999-2011** | • Emphasis on investment – through both Lottery and Exchequer funding – to develop and enhance human and physical resources in both participation and performance sport through a number of revenue and capital programmes. |

Up until the mid-1990s these phases of development were characterised by little systematic research and evaluation and hence 'lessons learned' for future investment were not always clear. Since the mid-1990s, Sport NI has undertaken a programme of research and evaluation to inform investment decisions against its three policy objectives.[1]

[1] A list of research projects and reports commissioned by the Sport NI can accessed at www.sportni.net

The context within which Sport NI operates has significant implications for its *modus operandi*. Changing social, political, and economic factors play an important role in determining Sport NI's priorities for investment, its organisational and business practices, the nature of its interventions and its relationships with external partner agencies including Government.

The Policy, Planning and Research function in Sport NI is located within the Corporate Services Directorate. It has close links with other Directorates and teams across the organisation that are responsible for 'Community Sport', 'Performance Sport' and 'Facility Development'; all of which are involved in identifying the research priorities and in the management of research projects.

Most of the research carried out by Sport NI is through a commissioned programme of contract research. Sport NI works with a wide range of research consultancies and partners including leading academics, market research companies, and leisure research consultancies.

*Sport Matters: The Northern Ireland Strategy for Sport and Physical Recreation 2009–2019* (hereafter 'Sport Matters') sets the key strategic priorities for sport and physical recreation over the next 10 years and informs the direction of future investment. As a strategic document, it poses great challenges for every individual and every organisation with a stake in sport, physical recreation, health, education, social well-being, community well-being and the environment.

Following an extensive consultation process, the people of Northern Ireland articulated their aspirations[2], leading to the long-term vision for sport in Northern Ireland over the next decade: *'a culture of lifelong enjoyment and success in sport'*. The supporting documentation to this strategy is structured to reflect the current and anticipated needs of sport and physical recreation as expressed through consultation. These relate to: 'Participation', 'Performance' and 'Places'.

In pursuit of the vision, a series of targets has been identified. These targets take account of the progress made during the period of the last Strategy for the Development of Sport 1997-2005 and the changing contexts within which sport is developed. Some of the targets within Sport Matters, particularly those related to participation, reflect the current absence of suitable baselines against which progress can be measured. It was therefore necessary to identify a number of short-term targets which will address this situation.

As a Policy, Planning and Research Manager within Sport NI and as a member of the Strategy Development Steering Group, I was tasked with developing a robust research and evaluation strategy that would be responsive to the research needs and priorities identified within Sport Matters as well as the wider social policy agenda. To this end, I developed Sport NI's' first research strategy, namely *'Research Matters: An Evidence Base for Sport and Physical Recreation 2008-12'*. The overall aim of Research Matters is to:

> Conduct high quality research which contributes towards evidence-based decision making in sport to realise strategic policy, reinforce the case for the value of sport and enhance the effectiveness of investment in achieving our shared vision of creating a culture of lifelong involvement and success in sport.
>
> [page 6]

[2]Respondent Aspirations: a world class start and lifelong involvement in sport and physical recreation for all people; world class performances by teams and individuals; and a sustainable sporting and physical recreation culture that contributes to broader Government objectives.

The more specific objectives for research within Sport NI are to:

1. Provide data which enables the setting and strategic monitoring of progress against targets detailed within Sport Matters;

2. Enhance strategic understanding by investing in new research and using existing research information to inform the development of policies and practices by Sport NI and its partners;

3. Evaluate the impacts of policy and practices of Sport NI and its partners designed to improve the development and delivery of sport and physical recreation with a view to improving the effectiveness of investment/interventions in the future;

4. Understand the economic importance of sport and any changes over time; and the economic impact of specific sports initiatives;

5. Inform policy and practice in the wider sports community through the communication and dissemination of research findings; and

6. Establish and strengthen links with and between researchers and those involved in sports development to ensure improved understanding in the application of research methods and evidence-based decision making.

The research programme, developed for the period 2008-12, proposed 18 specific research projects that directly relate to the research aim and objectives highlighted

above. One key piece of research proposed within this programme was a large scale population based survey designed to gather baseline data on adult (16 years and older) sport and physical activity levels in Northern Ireland. The primary purpose of this survey was to establish baseline data for the high level targets detailed within Sport Matters that relate to participation, club membership, coaching, volunteering, attitudes to sport, etc. It was anticipated that this large scale survey would be repeated periodically in order to measure progress made against the relevant high level targets with Sport Matters.

It is with considerable personal and professional pride that this large scale population based survey, referred to above, has been subsequently approved, designed, commissioned and conducted and is now known as, *'The Northern Ireland Adult Sport and Physical Activity Survey 2010' (SAPAS).*

### 1.1.2 NEGOTIATING THE DUAL ROLE: POLICY, PLANNING & RESEARCH MANAGER AND INDEPENDENT RESEARCHER

The decision to link the development and implementation of SAPAS to the completion a PhD presented a number of both pragmatic and academic difficulties over the last six years. For example, where a conflict may arise between the direction of travel of the research and government priorities, potentially this could create a dilemma around prioritisation. The author was acutely aware of this possibility throughout the research process but remained committed to ensuring the intergrity of the work and managing the expections from all stakeholders, both within academia and the world of social policy in Northern Ireland.

It would be naive to pursue a research agenda of this kind without heightened sensitivity to potential conflicts of interests and in particular given the need to ensure that the project delivered on its objectives. With hindsight, the project was able to steer a course through this difficult terrain and deliver a set of findings that have been well received within Government (although challenging in many respects) and hopefully have also met and exceeded academic standards and expectations. Two particular examples may help illustrate how in reality these challenges were identified and practically addressed: (1) the development and testing of the new survey instrument (SAPAS); and (2) the presentation and reporting of the headline findings.

As Policy, Planning & Research Manager within Sport NI there was considerable pressure to develop an survey instrument that would focus solely on measuring adult sport participation in Northern Ireland and not activities that may be undertaken in other life domains (e.g. work, home, active transportation). Similar, pressure was experienced when draft headline findings from the survey were presented internally. Specifically, findings which suggested that sport represents a minority contributor to total physical activity levels of adults in Northern Ireland sat uneasily with senior officers who day and day out were tasked with convincing Government of the value and benefits of sport participation.

Despite these concerns from early in the project, the reality of the research itself was not characterised by constant difficulty, but instead by a managed consensus around key concerns and the need to base policy on sound evidence. Although stakeholders did arrive at the table with different agendas and priorities, it was remarkable how easily they moved towards agreement on how to design and implement a new research

instrument and how open they have been to the dissemination of these findings through a variety of channels.

Before providing further detail on SAPAS alongside the measurement of physical activity generally, it is important to set this work in a broader strategic context, which is the aim of the following sections.

## 1.2 THE STRATEGIC CONTEXT OF PARTICIPATION IN SPORT AND PHYSICAL ACTIVITY IN NORTHERN IRELAND & GREAT BRITAIN

Within Northern Ireland, Sport NI (previously known as the Sports Council for Northern Ireland) has a remit that is primarily focused on increasing levels of participation in sport and physical recreation and improving sporting performance. It currently works with local, national and regional partners to realise its vision, to promote *'a culture of lifelong involvement and success in sport which contributes to a healthy, fair and prosperous society'* (Sport NI Corporate Plan 2011-15, page 2).

The Department of the Environment White Paper of 1975 (Sport and Recreation) paved the way for local authorities to provide sport and recreation facilities for local residents on a discretionary basis, and from 1983, questions relating to adult participation in sport and recreation have been included in the Northern Ireland Continuous Household Survey on an intermittent basis, thus providing a limited evidence base for policy development.

This survey has been highly significant in policy terms because it has been, and will continue to be, used to monitor Public Service Agreement (PSA) targets between the Department of Culture, Arts and Leisure (DCAL) and Sport NI, some of which are explicitly concerned with increasing participation:

- PSA 6 - By 2011 to have 125,000 children participating in sport and physical recreation;
- PSA 8 - By 2011, to halt the decline in adult participation in sport and physical recreation; and
- PSA 9 - By 2011, to halt the rise in obesity.

One of the key drivers for PSA targets relating to 'increasing participation' is a concern about the current health status of the population in general. In government's view, the significance of sport to public health is not unsurprising insofar as most types of sport would involve being 'physically active' in some way and it is hypothesised that this involvement will help to maintain and even improve people's health throughout their lives.

The key initial question to address therefore is what is the level of physical activity that is required in order to deliver a significant health benefit? A recent systematic review of the literature on appropriate 'doses' of physical activity detailed in the '*At Least Five a Week*' guidelines (Department of Health, 2004) revealed consensus in three key areas:

1. Children and young people should achieve 60 minutes per day of moderate intensity physical activity per week. At least twice a week this should include activities to improve bone health, muscle strength and flexibility, for example swimming or team sports.

2. Adults should achieve a total of at least 30 minutes moderate intensity physical activity on five or more days per week. It is increasingly accepted that 30 minutes can be built up in multiples of 10 minutes. This level of activity will provide 'a general health benefit'.

3. In order to prevent certain medical conditions such as overweight and obesity as well as their downstream consequences (coronary heart disease and type II

diabetes), it is likely that 45-60 minutes of moderate intensity exercise is necessary on five or more days per week.

Unlike England, in Northern Ireland there is no PSA target for DCAL and Sport NI which relates directly to these recommendations. This may be for many reasons, including the challenges of managing social, economic and political change in Northern Ireland after the signing of the Good Friday Agreement in 1998, but certainly has not been helped by the constraints attaching to previous surveys in Northern Ireland that have captured data across a wide range of policy areas, including participation levels in sport and physical activity, but not in great depth or detail.

At a Home Country level, the Sports Councils for England, Scotland and Wales, and their relevant government departments, have designed sophisticated research instruments that capture participation data at both a local and regional level (e.g. Active People Survey in England). However, this is not the case in Northern Ireland. Currently DCAL monitors participation in sport using the annual Continuous Household Survey (CHS). The CHS is one of the largest continuous surveys carried out in Northern Ireland. It is designed, conducted and analysed by the Central Survey Unit of the Northern Ireland Statistics and Research Agency (NISRA) and is based on a sample of c. 4,000 adults aged 16 years and above resident in private households. The annual survey is designed to provide a regular source of information on a wide range of social and economic issues (amongst them sports participation) relevant to Northern Ireland.

However, there are limitations of the CHS. First, and critically, it is not a dedicated survey of participation in sport and physical activity, thus the respondent is not entirely focused on their participation in sport and physical activity (these effects are known in

the survey methodology literature as 'contextual effects' and they can be detrimental to the quality of data), and the number of questions which can be asked in the sports section of the survey is limited. Second, as a research instrument it is currently not capable of measuring participation rates that are consistent with the latest recommendations of the Chief Medical Officer (CMO) in the UK (Department of Health, 2004).

In addition to the CHS, several other survey instruments have contained questions on involvement in sport and physical recreation in Northern Ireland. These include:

- Change of Heart Baseline Clinical Survey (1987);
- Diet, Lifestyle and Health Survey (1986/87);
- Change of Heart Survey (1987); and
- The Northern Ireland Health and Physical Activity Survey (1994)

Similar to the CHS none of the surveys listed above were solely dedicated to the measurement of participation in sport and physical recreation; however, unlike the CHS, they were designed to capture information on the type, frequency, intensity and duration of participation. The major weakness in all of these surveys is the fact that they were 'one offs' and were not repeated by the commissioning agencies involved. (The similarities and differences of each survey listed above will be discussed in Chapter 3).

### 1.2.1 A NEW STRATEGY FOR SPORT AND PHYSICAL RECREATION IN NORTHERN IRELAND 2009-19 ('SPORT MATTERS')

The Department of Culture, Arts and Leisure (DCAL), in partnership with Sport NI, developed Sport Matters. As a strategic document it includes a series of targets associated with 'driving up' the participation rates of certain groups of people – most notably women, those from areas of high social need, and those with a disability. It also acknowledges the need for:

- a robust monitoring and evaluation framework to provide the evidence base that will identify baselines and track progress towards the longer term vision of this Strategy;
- a co-ordinated approach to research in sport and physical recreation so that the government of Northern Ireland and the wider community have access to robust and reliable information; and
- consistent approaches to data collection, analysis and evaluation.

In particular, the Sport Matters contains a specific target that relates to this PhD thesis:

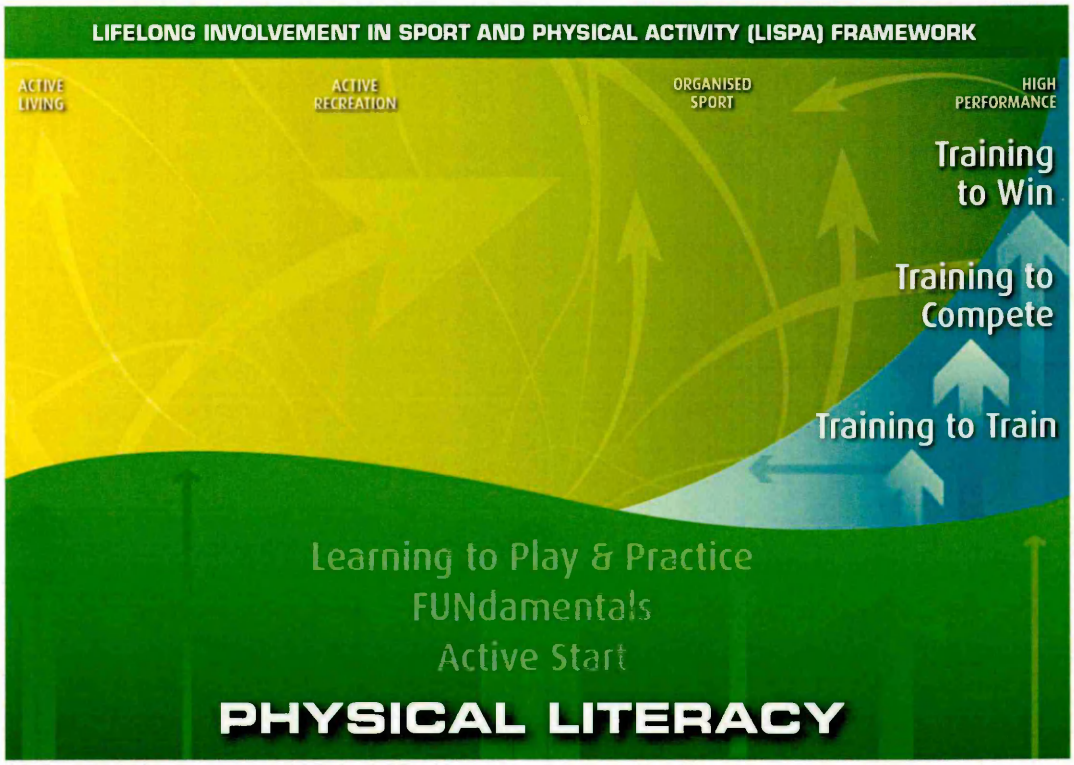
> By 2009, to have agreed and commenced implementation of a revised research framework for participation rates that is cognisant of the recommendations of the Chief Medical Officer (CMO) in the UK.
>
> [page 8]

Sport Matters was formally approved by the Northern Ireland Executive in December 2009, and it articulates the vision of *'a culture of lifelong enjoyment and success in sport'*. To achieve its vision, it recognises the importance of increasing participation in sport and physical recreation and includes seven targets that relate to 'driving up' participation levels, namely:

1. By 2013, to have stopped the decline in adult participation in sport and physical recreation;
2. By 2014 to have increased the number of people in Northern Ireland in membership of at least one sports club;
3. By 2019 to deliver at least a 3 percentage points increase in adult participation rates in sport and physical recreation (from the 2011 baseline);
4. By 2019 to deliver at least a 6 percentage points increase in women's participation rates in sport and physical recreation (from the 2011 baseline);
5. By 2019 to deliver at least a 6 percentage points increase in participation rates in sport and physical recreation among socio-economically disadvantaged groups (from the 2011 baseline);
6. By 2019 to deliver at least a 6 percentage points increase in participation rates in sport and physical recreation among people with a disability (from the 2011 baseline); and
7. By 2019 to deliver at least a 6 percentage points increase in participation in sport and physical recreation among older people (from the 2011 baseline).

Sport Matters, in taking action that will develop sport and physical recreation in Northern Ireland, sets out a range of commitments for government, working through Sport NI, and in partnership with a variety of public, private, sporting and community organisations. The development of sport and physical recreation in Northern Ireland takes into account the recent and significant advances in sports' development thinking, namely the Lifelong Involvement in Sport and Physical Activity Framework (Figure 1.1) which has been endorsed across the UK, Ireland and beyond and provides an inclusive policy environment for the development of sport.

**FIGURE 1.1: THE LISPA FRAMEWORK**




[The Northern Ireland Strategy for Sport and Physical Recreation 2009-2019: Sport Matters, page 55]

### 1.2.2 PROMOTING PHYSICAL ACTVITY IN NORTHERN IRELAND: THE STRATEGIC CONTEXT

In the late 1990s the Government in Northern Ireland invested heavily in new interventions designed to encourage healthier lifestyles. With a particular focus on addressing obesity, this included an investment of approximately £0.5m a year in support of a Northern Ireland Physical Activity Strategy (2002-2006) which set two targets by which to measure progress towards improved health of the population. The aim of the Strategy was 'to increase health related physical activity, particularly those who exercise least'.

In 1998, the Northern Ireland Physical Activity Strategy Implementation Group (NIPAIG) was established to oversee the implementation of the Strategy, including the on-going monitoring and evaluation of aims, objectives and targets.

However, these targets proved difficult to achieve, and a review of the Strategy in 2002 concluded that there was a continuing need for a future Strategy with *'SMART*[3]*'* aims, objectives and targets. A new draft Strategy and Action Plan was prepared and a series of targets set for 2010; this process was, however, then subsumed within the development of *Fit Futures* which is a cross departmental taskforce established by the Ministerial Group on Public Health (2004) in response to concerns about the rising levels of overweight and obesity in children and young people.

The key strategic document which has informed interventions emanating from the Department of Health, Social Services and Public Safety (DHSSPS) is *Investing for Health* (IFH). IFH was the cross-departmental public health strategy, published in 2002, which tackled the wide range of complex and inter-related factors that can impact on the health of the population. The Strategy was built around two overarching goals that had been identified in pursuit of the aims of improving health and reducing health inequalities. The evidence produced in the report is clear and establishes a direct correlation between poverty, social disadvantage and health:

> Children from disadvantaged backgrounds are less likely to achieve the educational qualifications which are the key to improving their social status. People from lower social classes often live and work in more difficult conditions and suffer from poorer mental health.
>
> [Page 6]

[3] SMART - Specific, Measurable, Achievable, Realistic and Time-bound.

Both *Investing for Health* and *Fit Futures* provide a coherent structure and common branding for a wide range of health promotion programmes. They were set up jointly as a whole-of-government initiative to coordinate action on obesity, including physical inactivity. So far, the Ministerial Group on Public Health, which has responsibility for implementing and monitoring *Investing for Health*, has focused on pulling existing initiatives into a consistent framework and encouraging cross-agency coordination.

More recently, in 2008 the DHSSPS put in place an Obesity Prevention Steering Group. This cross-sectoral group, with representation from practitioners, policy makers and researchers, monitors the implementation of the 70 recommendations in *Fit Futures*. It is also developing a Strategic Framework for addressing obesity across the life course. As part of this approach, four Policy Advisory Groups have been established – these cover physical activity, food and nutrition, education and prevention, and data and research.

In January 2009, the Northern Ireland Audit Office (NIAO) report on Obesity and Type II Diabetes acknowledged the need to continue to take forward its strategy for tackling obesity and diabetes effectively. In particular, the report advocated the need for a comprehensive and timely surveillance strategy for obesity and its links with chronic disease in order to better understand the physical activity, eating habits and related biomedical health indicators of the population in Northern Ireland.

In March 2008, the importance of regular physical activity and the benefits of it for maintaining good health and well-being were re-emphasised by The Health Promotion Agency for Northern Ireland (HPA) and Sport NI when the organisations signed an agreement entitled 'The Northern Ireland Charter for Enhancing Health through Sport

and Physical Activity' which tasks both bodies to promote the significance of physical activity and sport at all levels for the good health and well-being of the population. The Charter defines an agreed vision between the two bodies:

> We will have a fit future in which everyone will be motivated to and be supported in their desire and ability to be active[4].

### 1.2.3 THE IMPACT OF THE REVIEW OF PUBLIC ADMINISTRATION IN NORTHERN IRELAND

Following the establishment of the Northern Ireland Executive and associated structures in the wake of the Good Friday Agreement, government has set about a 'root and branch' review of the entire public sector in Northern Ireland, to make the sector more economic, efficient and effective. Rolled out as a series of inter-related measures, this is known as the Review of Public Administration (RPA). In line with RPA, the Health Promotion Agency has now been replaced by a new Regional Agency for Public Health and Social Wellbeing, known as the Public Health Agency for Northern Ireland. It is responsible for: health protection; health and social wellbeing improvement – including addressing existing health inequalities; public health input to commissioning (including screening) and health and social care research and development and as a result incorporates responsibilities previously carried out by Health and Social Boards, Health Action Zones and the Health Promotion Agency.

In particular, the new agency has been tasked with leading the public health and social wellbeing agenda– hence its strap line '*Improving Your Health and Wellbeing*' – not just within the health and social care sector but with local government authorities, other statutory organisations and the community and voluntary sectors. It has yet (as of 1

[4] http://www.sportni.net/pacharter08.htm

October 2011) to produce any strategic and policy statements or priorities for action, and hence as a result its approach to physical activity and sport is undefined; however it is expected to build upon the work of previous strategies and policy agendas such as *Investing for Health* and *Fit Futures.*

The second key impact of note concerning RPA has been the reorganisation of local government, including a reduction in the number of councils from 26 to 11, and an extension of the powers of local government so as to include planning and other services. RPA also called for closer working relationships between councils and other public bodies including Sport NI. For Sport NI, the key driver for this will be the new role of councils to target well-being, providing opportunities for Sport NI's investments to be aligned to councils' work programmes and other stakeholders through community planning. It is envisaged that community planning will be led by councils who will seek to facilitate closer and more effective working relationships with a range of sectors including statutory organisations, community and voluntary organisations, and including governing bodies of sport and sports clubs.

### 1.2.4 OTHER RELEVANT NORTHERN IRELAND POLICIES AND STRATEGIES

Apart from those strategies and policies already identified, there are others that have an immediate bearing on the current project that are worthy of mention. For example, in 2006 the Office of the First Minister and the Deputy First Minister (OFMDFM) launched a strategy entitled *Lifetime Opportunities* (2006) which addressed the issues of poverty and social exclusion. In accepting that government policy should focus on different priority needs at different times in people's lives, *Lifetime Opportunities*

defines specific goals and targets for four key stages in life:- early years (0–4); children and young people (5–16); working age adults and older citizens.

Of close interest to the *Lifetime Opportunities* strategy is '*Ageing in an Inclusive Society': A Strategy for Promoting the Social Inclusion of Older People*[5]. The Vision in the Older People's Strategy is:

> To ensure that age related policies and practices create an enabling environment, which offers everyone the opportunity to make informed choices so that they may pursue healthy, active and positive ageing.
>
> [Page 29]

The *Lifetime Opportunities* strategy was accompanied by action plans covering the period up to 2008 which translated the strategy into a programme of work for Government departments. Key aspects of the Action Plan included an Older People's Advisory Panel, with representatives of older people, key voluntary and community organisations, and the Equality Commission for Northern Ireland.

In the 2005 – 2006 Action Plan for this strategy a significant element had been the development of the *Investing for Health* strategy to support older people to live healthy and active lives, including home safety clubs[6], falls' prevention and physical activity, as well as improvements in the achievement of targets to reduce substantially waiting times and to modernise acute hospital services. A review of the first year of the strategy acknowledged the role of Sport NI in supporting the development of a sport for 'All Older People' module in order to extend the development of training opportunities in

[5] OFMDFM Older Peoples Strategy, 'Ageing in an Inclusive Society' 2005

[6] See Investing for Health update report, 2006 – based on a project from Western Health Action Zone in which a home safety officers scheme targets households most at risk of accidents and located in disadvantaged areas

sport and physical activity for older people. It also noted the variety of initiatives aimed at increasing physical activity levels of older people[7].

## 1.3 RESEARCHING SPORT AND EXERCISE PARTICIPATION

The previous sections establish clearly the priority that is now afforded to physical activity in current government thinking, not least because of the massive burden that is placed on the health service. It is now important to identify precisely how physical activity has been measured, how best to measure it in the future, and to define clearly the terminology attached to this measurement process.

The area of sport and exercise participation has long been recognised as important yet problematic from a research perspective, and typically has been characterised by separate but important contributions from a wide range of disciplines each trying to understand the reasons for participation and factors associated with activity, ranging from the personal to the structural and cultural. Set against this varied research landscape, it is still true that a majority of public health professionals throughout Europe believe that physical activity is critical for maintaining or improving health. This has been reported in the findings of several population surveys; *inter alia*, the *Northern Ireland Health and Activity Survey* (NIHAS, 1994) and the Pan–EU Survey on Consumer Attitudes to Physical Activity, Body Weight and Health (Pan-EU 1999).

Despite a considerable volume of evidence to support the link between physical activity and a positive health status (Lee et al 2000; Wannamethee and Shaper, 2001, Department of Health, 2004; Department of Health, 2011), actually sustaining long term adherence to physical activity programmes remains problematic (Dunn et al 1998). In

[7] http://www.ofmdfmni.gov.uk/ageingreport-2.pdf

the United States of America, the 1996 report on physical activity by the Surgeon General noted that more than 60% of American adults were not regularly physically active. Similarly the ongoing Canadian Physical Activity Monitor (1999) recorded that 64% of adults aged 18 years and older were insufficiently active for optimal health benefits, although this was an improvement on their 1981 figure of 79%. The Pan-EU survey reported a wide variation in participation levels between countries but found that an average of 31% of respondents throughout fifteen member countries did not participate in any physical activity. According to previous estimates from 2005, in Northern Ireland at that time only 30% of the adult population participated in a level of physical activity that is thought to be beneficial to health (NISRA, 2007).

A major problem for the development of public health policy has been to devise strategies for converting awareness of the need for physical activity into actual participation. However, before these intervention strategies can be put in place, there is a need to establish the most effective methods for collecting information on current physical activity levels - how they should be measured, and how much physical activity is needed to produce health benefits.

## 1.4 MEASURING UK PHYSICAL ACTIVITY

In 2004, the Department of Health published a series of systematic reviews on the subject 'physical activity' and 'health'. In these reviews it was reported that:

> Physical activity comprises a complex set of behaviours that includes habitual active travel, recreational activities such as gardening, and more complex activities such as gym-based exercise and sport. This presents many measurement challenges, and an instrument that can effectively quantify the true level and pattern of an individual's activity behaviour does not exist.
>
> [Page 20]

In an attempt to explain this conclusion, the report (At Least Five a Week) suggested that measurement error is likely to reduce the strength of relationships between physical activity and health, and weaken the measured effect of interventions. The difficulties of measuring physical activity increase when quantification of lifestyle or incidental physical activity is required. The simpler and broader the measure of activity is (e.g. self-completion questionnaire), the less reliable and valid it tends to be. The accurate assessment of total activity - of which incidental activity forms a major part – is critical, as only then is it possible to achieve a measure of total activity energy expenditure – the most important health-related dimension of physical activity.

Methods of collecting data for research into physical activity trends have traditionally been through large scale, population surveys. Paffenbarger (1993) concluded that the survey questionnaire, when properly designed and administered, can measure effectively, among other things, energy expenditure, physiological fitness, quality of life and health maintenance.

Social surveys have been described as being concerned with demographics, the social environment, and the activities or opinions and attitudes of the chosen population and

are practical for assessing physical activity behaviours in large populations (Moser and Kalton 1993; US Surgeon General 1996). Many large scale surveys have been carried out in Northern Ireland and Great Britain using a variety of questionnaires to assess physical activity behaviours at a population level, some of which are highlighted below in Table 1.1, and will be discussed in greater detail in Chapter 3 of this thesis.

**TABLE 1.1: SUMMARY OF KEY SURVEYS DESIGNED TO ASSESS PHYSICAL ACTIVITY BEHAVIOUR IN THE UK**

| SURVEY INSTRUMENT | COUNTRY | YEAR DATA COLLECTED | SAMPLE SIZE | METHOD OF MEASUREMENT AND POPULATION SURVEYED |
|---|---|---|---|---|
| **Continuous Household Survey** | Northern Ireland | 1983- present | c. 4,500 | Self-assessment by interviewer led questionnaire in the home. 16 years + |
| **The Allied Dunbar National Fitness Survey** | England | 1992 | c.4,300 | Self-assessment by interviewer led questionnaire in the home and physical fitness test using mobile laboratory. 16 years + |
| **Northern Ireland Health and Activity Survey** | Northern Ireland | 1994 | c.1600 | Self-assessment by interviewer led questionnaire in the home and physical fitness test using mobile laboratory. 16 years + |
| **Taking Part Survey** | England | 2005 - present | c.27,000 | Self-assessment by interviewer led questionnaire in the home. 16 years + |
| **Active People Survey** | England | 2005 - present | c.353,000 | Telephone survey |

As previous sections have illustrated, participation in 'physical activity' and/or 'sport' represents a complex area of human behaviour and hence measurement instruments must reflect and not sidestep this complexity. In the case of existing 'sport' data, while this is often limited simply to 'who does what and where', there are some recurring trends which can be drawn from a cross sectional analysis of recent large scale data sets

such as the Continuous Household Survey, General Household Survey, Taking Part and Active People. For instance, at a population level these sources consistently reveal that there are considerable disparities between various groups of people and their likelihood of engaging in sport and active recreation. This point is illustrated in Table 1.2 which presents some headline findings from the Northern Ireland Continuous Household Survey in 2004-05 and 2007-08. The findings from this survey are consistent with those obtained from the other surveys (e.g. Active People and Taking Part) and confirm that men tend to have a higher participation rate than women; people with a limiting longstanding illness (proxy for 'disability') have a lower participation rate their able bodied counterparts; and older people (50 years +) tend to have lower participation rates than younger people. These general findings in Northern Ireland and England form part of the rationale as to why there has been 'target' groups for interventions designed to drive up participation such as the Northern Ireland Community Sport Programme and Sport Action Zones in England.

**TABLE 1.2: SUMMARY OF HEADLINE FINDINGS FROM THE NORTHERN IRELAND CONTINUOUS HOUSEHOLD SURVEY**

| | | 2004/05 | 2007/08 |
|---|---|---|---|
| **Overall Adult Participation** | | 53% | 49% |
| **Gender** | Male | 62% | 56% |
| | Female | 49% | 43% |
| **Disability** | Those with a disability | 30% | 23% |
| | Those without | 63% | 58% |
| **Age** | Under 50 | 70% | 65% |
| | Over 50 | 37% | 31% |
| **Socio-economic group** | ABC1 | 70% | 55% |
| | C2DE | 43% | 38% |

As mentioned in Section 1.2, the CHS typically collects data on prevalence and frequency of participation in sport and physical recreation only and is not designed to capture data on the intensity, frequency and duration of participation that will allow for comparison with the CMO's physical activity recommendations.

In summary, there is a strong imperative to increase physical activity levels across the population. Government in Northern Ireland as elsewhere recognises this priority, and while existing research gives some indication of general trends and increasingly low levels of activity across the board, the instruments that have been used to date have limited power to explore the complexities of this aspect of human behaviour. In other words, the case for developing a new research instrument is compelling.

## 1.5 THE NORTHERN IRELAND SPORT AND PHYSICAL ACTIVITY SURVEY (SAPAS): A BRIEF HISTORY

The renowned applied psychologist, Kurt Lewin (1890 – 1947) once famously remarked that there is nothing so practical as a good theory (1951), and in many respects it is this sentiment that underpinned the development of SAPAS.

As highlighted in Section 1.1.1, the author was responsible for developing a robust monitoring and evaluation framework that would provide an evidence base from which to identify baselines and track progress towards the longer term vision of Sport Matters. However, there are two equally important considerations that were acknowledged by a number of stakeholders involved in the development of Sport Matters. These were the need for:

- a co-ordinated approach to research in sport and physical recreation so that the government of Northern Ireland and the wider community have access to robust and reliable information; and
- consistent approaches to data collection, analysis and evaluation.

In 2007, a series of consultation meetings were held with a range of relevant stakeholders, such as Government departments, the Health Promotion Agency (now referred to as the Public Health Agency), the Northern Ireland Statistics and Research Agency, leading academics and many others. The main purpose of this consultation exercise was to highlight Sport NI's proposed research priorities in the context of Sport Matters and to identify opportunities for collaborative research in the future.

Following this consultation exercise, a number of key partners were identified and approached to work collaboratively on the design and implementation of a proposed large scale adult survey on sport and physical activity levels in Northern Ireland, now known as SAPAS. In January 2008, a cross-sectoral Project Steering Group (PSG), involving Sport NI, the Department of Culture, Arts and Leisure (DCAL), the Public Health Agency, and the UKCRC Centre of Excellence in Public Health (NI) was formed to oversee the design and implementation of SAPAS, and to secure the £350,000 that would be required to conduct the survey.

Over a two year period considerable effort was made by the PSG to design and develop a new research instrument that could provide an evidence base not only to identify baselines and track progress towards many of the participation targets and longer term vision of Sport Matters, but also to provide involved partners (e.g. Public Health

Agency) with the information that they would need to formulate their own policies and programmes.

Following an in-depth review of 25 different survey instruments that have been dedicated to the measurement of sport and physical activity in Ireland, the UK and beyond and the various methodologies employed (see Chapter 3 for more information on surveys reviewed), the PSG developed SAPAS as a new research framework for measuring physical activity levels that is reflective of the latest recommendations of the Chief Medical Officer (CMO) in the UK (Department of Health, 2004).

However, the intention behind SAPAS was not simply to chart activity levels but to explore the potential for more sophisticated analysis with a wider host of demographic, physiological and psychological variables. For instance, SAPAS has also been designed to estimate the prevalence of other health and wellness characteristics such as smoking behaviour; healthy eating characteristics and alcohol consumption. While this PhD thesis itself is not able to explore all of these data nuances, given their number and breadth, the research instrument and emerging data will provide great potential for other researchers to carry out secondary analyses over the years to come.

Another famous quote from Kurt Lewin is '*No action without research; no research without action*' (1936) and again, the SAPAS project helps provide a solid research base on which to bring forward and review policy.

### 1.5.1 ROLE OF PHD CANDIDATE IN THE RESEARCH

At this point it is necessary to highlight the role of PhD candidate in the development and implementation of SAPAS. In short, SAPAS would not have been developed nor delivered without the drive, commitment and expertise of the author. For example, no meeting took place without the auhor in attendance and no decision about the research was ever made without the author's seal of approval. Some detail of how extensive this role was at each stage of the research process is outlined below.

| RESEARCH COMPONENT | ROLE OF AUTHOR |
|---|---|
| **SAPAS Project Steering Group** | • Established and chaired the SAPAS Project Steering Group. |
| **Business Case Development and Resources** | • Drafted business case for submission to the Department of Culture, Arts and Leisure for funding. Pitched for and secured £350,000 of public funding for SAPAS. |
| **Procurement of Market Research Agency** | • Engaged with the Central Procurement Division in Northern Ireland and commissioned the services of Ipsos MORI to undertake survey of c.5,000 adults. Successfully managed the Ipsos MORI contract. |
| **Literature Reviews** | • Carried out systematic and narrative literature reviews completed and used to inform the development and |

| | |
|---|---|
| | implementation of SAPAS. |
| **Questionnaire Development & Methodological Approach** | • Led the development/piloting of SAPAS and methodological approach in collaboration the key stakeholders. |
| **Training of Field Staff** | • Contributed to the training/briefing of 60 plus field staff over a 12 month period. |
| **Data Analysis** | • Led and agreed SAPAS key performance indicator framework and statistical procedures for data analyses. |
| **Reporting & Dissemination** | • Presented headline findings from SAPAS at major conferences and seminars. Developed and launched glossy publication for dissemination. |

## 1.6 DEFINING FITNESS, EXERCISE, SPORT AND PHYSICAL ACTIVITY

Before moving to a more detailed consideration of available literature and to the survey instrument, it is important to define terminology. Again, this is one shortcoming with previous research in this domain that may have interfered with the establishment of a consistent and robust research foundation. The terms, 'fitness', 'exercise', 'sport' and 'physical activity' have often been used interchangeably to describe aspects of physical movement, and this has led to some confusion for those charged with encouraging people to become more physically active.

### Fitness

The President's Council on Physical Fitness and Sports (1971) defined *fitness* as:

> The ability to carry out daily tasks with vigour and alertness without undue fatigue and with ample energy to enjoy leisure time pursuits and to meet unforeseen emergencies.

This definition suggested that fitness was a characteristic, a personal goal to be defined by daily needs, or being 'fit for life'; but with time left over to enjoy other things. Bouchard and Shepherd (1993) had a broader concept of fitness that included both physical and physiological fitness, having morphological, muscular, motor, cardiovascular and metabolic components. The US Surgeon General's report (1996) noted that health related fitness has been said to include cardiorespiratory fitness, muscular strength and endurance, body composition, and flexibility. 'Fitness' therefore means different things to different people and varies greatly between individuals, depending on their desired outcomes, whether to be fit for sport, or to prevent illness or disease. Fitness therefore could be described as the consequence of engaging in physical activity, with the level of fitness determined by the quantity and quality of that activity.

**Exercise**

Shepherd (1986) defined *exercise* as:

> A subset of physical activity...it is the undertaking of planned, structured and repetitive movements with a view to maintaining or improving physical condition.

Casperson et al (1985) emphasised that the final or intermediate objective of exercise was to improve or maintain physical fitness. The definition of 'exercise' was much more focused, being activity that leads to a clear outcome - fitness for a specific task or tasks. The fact that the activity is planned, structured and repetitive, suggests that it has a set pattern of movements. The emphasis on maintaining or improving physical condition focuses on physical attributes; in respect of this definition, mental or social

factors were not seen as significant. Whilst it has never been documented, most lay people would intuitively perceive the term 'exercise' to suggest at least moderate hard work; the American College of Sports Medicine (ACSM) in its recommendations for physical activity in 1993 suggested that the low rate of participation in physical activity in America was due in part to the public's perception that they must engage in vigorous continuous exercise to achieve health benefits.

**Sport and Physical Activity**

In order to delimit the scope of what is meant by the term 'sport' in this PhD thesis it is timely to examine how sport is defined. The most commonly cited definition of sport is the Council of Europe's European Sports Charter (1992), which defines sport as follows:

> 'Sport' means all forms of physical activity which, through casual or organised participation, aim at expressing or improving physical fitness and mental well-being, forming social relationships or obtaining results in competition at all levels.
>
> [Article 2]

The Council of Europe definition of sport is regarded as being an 'inclusive' definition; for example in principle it enables activities such as dancing or gardening to be classified as 'sport'. The inclusiveness of the Council of Europe definition can be appreciated by examining the definition of 'physical activity' which itself has been defined by Shepherd (1986):

> Any movement of the body that is produced by the muscles and results in significant expenditure of energy. It includes deliberate participation in programmes of sport and physical conditioning but also normal pursuits, occupational and domestic.
>
> [Page 44]

The Department of Health (2004) attempted to make a distinction between 'sport' and 'physical activity' as follows:

> For the purposes of this report [At least five a week], sport is defined as a subset of physical activity, which involves structured competitive situations governed by rules. However, in mainland Europe and increasingly with the UK, sport is often used in a wider context to include all exercise and leisure physical activity.
>
> [Page 81]

In Northern Ireland, DCAL and Sport Northern Ireland adopt the Council of Europe (1992) definition as outlined above. This in turn facilitates a pragmatic approach to what is meant by sport in the context of this PhD. This broad definition of 'sport', which contains 'physical activity', is be used throughout this PhD, and particularly in the development and implementation of a bespoke population-based survey designed to measure levels of adult participation in sport and physical activity in Northern Ireland, SAPAS.

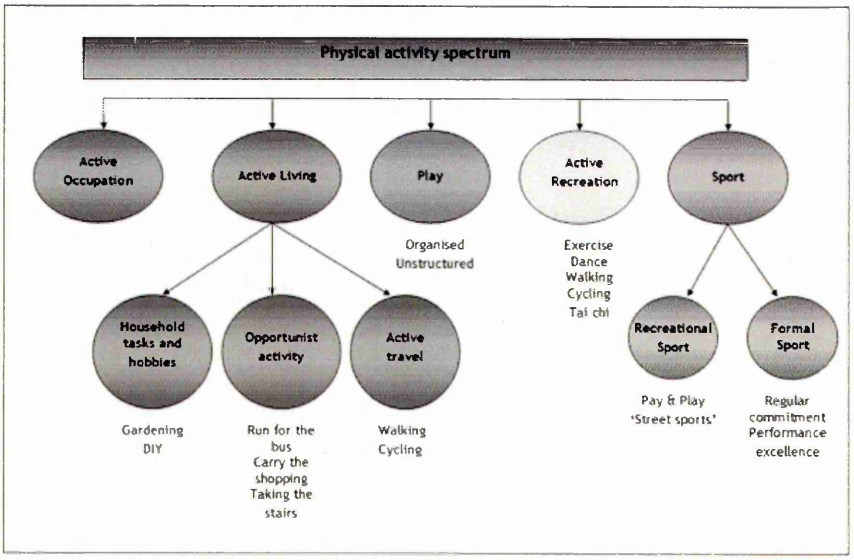
However, it must be noted that in many other surveys 'sport' has been defined in a variety of ways, by a number of different bodies, for a number of different reasons. For instance, the Taking Part Survey, which DCMS uses to monitor PSA 3 targets, used the Council of Europe definition of sport. In the case of the Northern Ireland Continuous Household Survey (1983-present) and General Household Survey (1987-2002) 'sport' is defined by a list of around 40 activities detailed on show cards. By contrast, in the Active People Survey in England, which is conducted by telephone, respondents were given a degree of autonomy as to how they interpreted what they meant by 'sport and active recreation' with responses from 256 activities subsequently recorded. Consequently, it is difficult to draw comparisons of the level of sports participation across surveys because there is uncertainty whether differences in statistics are attributable to definitional issues, sampling tolerance, or indeed other factors such as survey methods.

The plethora of activities which can be classified as 'physical activity' are depicted in the diagram below (Figure 1.2, adopted from Physical Activity and Nutrition Networks Wales) which includes all activities that can be performed under the following domains:

- Sport;
- Active Recreation;
- Play;
- Active Living; and
- Active Occupation.

For the purposes of the current study, physical activity is referred to within this broad and inclusive spectrum and includes all forms of activity, such as everyday walking or cycling to get from A-B, work-related physical activity, active recreation (such as working out in the gym), dancing, gardening or playing active games, as well as organised and competitive sport.

**FIGURE 1.2: THE PHYSICAL ACTIVITY SPECTRUM[8]**




[8] www.physicalactivityandnutritionwales.org.uk

## 1.7 INTRODUCTION: CONCLUDING REMARKS

In today's society, changing inactive lifestyles and increasing levels of physical activity presents a tremendous public health challenge. Physical activity needs to be seen as presenting many positive opportunities - for enjoyment, for improved vitality, for a sense of achievement, for fitness, for optimal weight, and – not least – for health. It is in this context that the current study is relevant, timely and necessary. Government, relevant agencies, communities and individuals in Northern Ireland need to become aware of current levels of activity and then reflect on how conducive different environments may be to supporting or challenging sedentary lifestyles.

The research base for physical activity is limited when compared with many other determinants of health and disease. The field is still relatively new, with the first studies appearing in the 1950s and the greater proportion appearing in the 1990s. In addition, 'physical inactivity' is not classed as a disease; therefore, public and charitable funding for research has been limited. The result has been variability in both the volume and the quality of studies found in different areas of research regarding 'physical activity' and 'health'.

However, given this limitation, there is little doubt that physical inactivity is now a major public health issue. Obesity is the main visible sign of inactivity, yet obesity is just one of possibly 20 chronic diseases and disorders for which low activity levels are a known contributory factor. For instance, the Chief Medical Officer in the UK concluded:

> Given the strength of the relationships between inactivity and the individual diseases, the broad range of diseases affected, and the ubiquitous nature of inactive lifestyles, there are few public health initiatives with greater potential for improving health and well-being than increasing the activity levels of the population.
>
> [Page 20]

The research findings to date have challenged the notion that activity must be continuous to be beneficial to health. Haskell (1994) noted that in many of the observational studies which demonstrated lower coronary heart disease (CHD) mortality rate for more active people, the activities reported by many of the more active subjects included walking, housework and stair climbing, most of which are more intermittent and opportunistic forms of activity.

In light of the evidence suggesting that accumulated activity leads to positive health benefits, some recent surveys have described activity profiles, over the full range of daily activities (Kearney et al 1999; Canadian Fitness and Lifestyle Institute, 1999). It is evident that this PhD should look to test a new survey instrument designed to assess physical activity patterns of adults (16 years and older) in Northern Ireland, including even short bouts of activity, whether they are home-based, occupational, transport related or sporting in order to give a complete profile of total physical activity undertaken.

There is a significant and growing body of evidence which suggests that the four main preventable causes of morbidity and mortality - smoking, excessive alcohol use, an unhealthy diet, and physical inactivity - are not randomly distributed across the population, but occur in combination with one another (Emmons *et al.et al.*, 1994; Ma *et al.*, 2000; Laaksonen *et al.*, 2001; Schuit *et al.*, 2002; Fine *et al.*, 2004; Pronk *et al.*, 2004; Chiolero *et al.*, 2006; Pootinga, 2006b). Most associations between lifestyle risk factors are positive, in particular between smoking and drinking (Casto *et al.*, 1989; Bien and Burge, 1990; Revicki *et al.*, 1991; Chiolero *et al.*, 2006). However recent research suggests that physical activity is negatively associated with smoking and heavy

drinking. Poortinga (2006b) found that people meeting the recommended levels of physical activity are more likely to smoke and drink excessively in relation to recommended guidelines.

Currently, there is no clear explanation as to why the associations of physical activity with smoking and alcohol consumption are positive. One possible explanation is that the relationships reflect on people drinking and smoking after participating in organised sports (Schuit *et al.*, 2002). An alternative explanation is that the clustering of physical activity with smoking and alcohol consumption reflects concentration of these risk factors in specific occupational groups (Poortinga, 2006b). It may be that people with a manual occupation may be more likely to smoke and to drink excessively, in addition to being more physically active due to the nature of their work, as compared to people with a non-manual occupation. At the same time, people from lower socio-economic backgrounds are more likely to meet weekly physical activity recommendations (Poortinga, 2006a), even if they are less likely to engage in more formal sports and leisure time activities (Macintyre and Murtie, 2004; Poortinga, 2006a; Popham and Mitchell, 2006).

Therefore, in recognition of this evidence the current research provides an opportunity to explore further and model the range of possible associations of physical activity (across four life domains – home, work, transportation and sport/leisure) with smoking, alcohol consumption and other health and wellness characteristics such as healthy eating, and body mass index (BMI). For instance, there may be a need to examine whether the associations between physical activity, smoking and alcohol consumption are due to participation in organised sport and exercise, and/or whether people with a manual occupation are more likely to smoke and to drink excessively.

# CHAPTER 2: A SYSTEMATIC REVIEW OF THE LITERATURE ON POPULATION BASED APPROACHES TO MEASURING PHYSICAL ACTIVITY LEVELS & HEALTH

## Road map of the thesis

| Introduction | Review of Literature | Methodology | Results | Discussion | Conclusions |
|---|---|---|---|---|---|
| | Ch2 A Systematic Review of the Literature on Population Based Approaches to Measuring Physical Activity & Health | | Ch5 Exploratory Data Analysis I | | |
| Ch1 ► | Ch3 A Review of the Narrative Literature on Population Based Approaches to Measuring Physical Activity & Health | ► Ch4 ► | Ch6 Exploratory Data Analysis II | ► Ch4 ► | ► Ch8 |

## 2.1 INTRODUCTION

The aim of this chapter is to introduce and present a systematic review of the literature relating to physical activity and health benefits which will aid understanding of the spectrum of physical activity and health research, and help clarify the main approaches that have been used to measure adult physical activity levels in the past. The chapter begins with a rationale for conducting a systematic review and an overview of the method adopted, before moving on to a detailed description of the review itself.

## 2.2 RATIONALE FOR CONDUCTING A SYSTEMATIC REVIEW

As outlined in Chapter 1, the study itself has been driven by three imperatives.

1. Given the significant engagement with a range of stakeholders in the development of Sport Matters and the desired need for a 'co-ordinated approach to research in sport and physical recreation' it was particularly important that any new research instrument must be robust, reliable and capable of addressing the current and future information needs of all relevant stakeholders in Northern Ireland;

2. To date there has been no dedicated survey of adult participation in sport and physical activity in Northern Ireland. Existing omnibus research instruments (e.g. Continuous Household Survey) are limited and are not capable of measuring adult participation rates in a way that is consistent with the latest recommendations of the CMO.

3. Given that there was a planned investment of £350,000 to design, commission and conduct a large-scale population based survey (using a new research instrument) to gather baseline data on adult physical levels in Northern Ireland it is also essential that best use is made of public money to ensure rigor, transparency and replicability.

In combination these three imperatives provide a strong rationale for ensuring that any new research instrument must be based on a rigorous review of academic literature and other relevant information (narrative literature) that is held by organisations that have been involved in commissioning, undertaking and cataloguing research on physical activity and health in Ireland, UK, Europe and beyond. This will provide surety for the general public and other relevant stakeholders that an evidence-based decision making process has been used to underpin the new research instrument.

With this in mind, the next two chapters outline the diversity of literature that characterises this field. Chapter 2 will focus on the academic literature, while Chapter 3 will complement this by appraising the narrative literature that has been so influential in shaping policy and practice to date.

The outcomes and findings of the literature reviews are used to derive a specific research aim and a set of objectives. A process outcome of the literature reviews will be the derivation of a bespoke research instrument for collecting the relevant data at population level in Northern Ireland and also a specific set of research objectives related to the overall aim of the study.

## 2.3 THE PROCESS OF THE SYSTEMATIC REVIEW

Carrying out a comprehensive review of literature is an essential ingredient of any research project as it helps to define the subject under investigation and therefore reveals where there are gaps in our knowledge. Identifying gaps in the literature is important not only in terms of making efficient use of resources, but also for demonstrating that a PhD thesis is in some small way making a genuine and original contribution to the overall knowledge base.

There are two main methods that could have been employed to assess the literature for this research project, a traditional (or narrative review), and a systematic review. The traditional literature review has been criticised for a lack of thoroughness (Tranfield *et al.*, 2003) and for employing a, 'biased sample of the full range of the literature on the subject' (Torgerson, 2003, p.5). The argument is that the traditional literature review does not adopt a scientific or systematic approach and therefore the selection of papers included or excluded may reflect the biases of the reviewer who collects and interprets the studies. The systematic review, on the other hand, offers a more precise alternative methodology for a literature review. It is based on an explicit, rigorous and transparent methodology (Greenhalgh *et al.*, 2004). The aim of the review is to minimise bias through literature searching while providing a systematic, transparent and replicable audit trail of decision making, procedures and conclusions through the reviewing process (Tranfield *et al.*, 2003). To test the procedure, any individual should be able to follow the reported audit trail and derive essentially with the same results.

In Northern Ireland there were numerous and disparate stakeholders involved in this research, who all wished for it to be conducted to the highest level of academic rigour. Such an approach would ensure that any results and subsequent policy interventions

were robust and based on the best possible evidence. Furthermore, given the cost of commissioning national scale surveys, all stakeholders were committed to demonstrating that best practice was followed throughout the study. It was for these reasons that the stakeholders, as a Project Steering Group, were persuaded to adopt the principles of 'systematic review'. From a pragmatic perspective, it is unlikely that the financial resources required for the survey would have been made available without the systematic review.

The processes of a systematic review, shown in Figure 2.1 are well established in the fields of healthcare, social policy and education (Torgerson 2003). The application of the systematic review process within the social sciences is increasingly common and its methods are being extended to incorporate qualitative research (Tranfield *et al.*, 2003). In the field of sport, recreation and health, the systematic review process has been widely used in assessing evidence in relation to health policy and exercise take-up and adherence (e.g., Biddle, *et al.*, 2003) and sport and leisure participation and policy (e.g. Bailey et al, 2005; Weed, 2006; Weed et al, 2009).

**FIGURE 2.1: STAGES OF A SYSTEMATIC REVIEW**

| Stage | | Phase | |
|---|---|---|---|
| **Stage 1** | Planning the Review | Phase 0 | Form a review panel |
| | | Phase 1 | Identification of the need for a review |
| | | Phase 2 | Preparation of a proposal for a review |
| **Stage 2** | Conducting a Review | Phase 3 | Identification of research |
| | | Phase 4 | Selection of studies |
| | | Phase 5 | Study quality assessment |
| | | Phase 6 | Data extraction and monitoring progress |
| | | Phase 7 | Data synthesis |
| **Stage 3** | Reporting and Dissemination | Phase 8 | The report and recommendations |
| | | Phase 9 | Getting evidence into practice |

[Tranfield *et al.* (2003, page 214]

### 2.3.1 PLANNING THE REVIEW

The initial stage in the review planning stage is to form a review panel. The purpose of forming a review panel is to hold regular meetings in order to direct the reviewing process and discuss disputes over the inclusion and exclusion of studies. This panel should include experts in the areas of theory and methodology and practitioners in the field of study and related disciplines. These panel members will guide and define the parameters of the review through the inclusion and exclusion criteria. At this early stage in the review, mapping and scoping studies are conducted to ensure that there are no other systematic reviews covering the same area and to provide a brief overview of the area. This mapping study should focus on issues such as, methodology, theory, practical applications and the key issues currently under discussion in the field of study. This process can also help in assessing the size of the review to be undertaken, however,

it may also show that there is insufficient literature to carry out a review. If this is the case an alternative strategy should be sought for reviewing the literature. If the mapping study shows that there are no other systematic reviews in the area and there is sufficient information to proceed, then the mapping study can then form the basis for the review protocol, which discusses the review questions that the review aims to answer.

The review protocol is set out to establish the theoretical and empirical background to the review and forms a plan that explicitly sets out the procedures that should be followed. This includes the questions the review is to answer, the aims and objectives of the review, the methods for searching for data, how decisions about the data will be made, how the data will be screened and extracted and how the data will be synthesised (Davies and Crombie 1998, Torgerson 2003). Contained within the review protocol should be the search strategy for identifying the specific databases, and other resources that should be searched to identify sources for the review. This strategy should also set out the search terms to be used as well as their search hierarchy. The protocol should give focus and structure to the review, but also act to limit the scope for bias along with providing a level of transparency to aid a third party review if necessary at any time.

Having this explicit plan of the research process is an attempt to maintain a level of objectivity within the review. Once set out, the protocol should be approved by the review panel, and if necessary, it should be refined.

### 2.3.2 CONDUCTING THE REVIEW

A systematic review can be very time consuming, as it should provide an all-encompassing search, where an extreme attention to detail is required as the searching process is one of the major parts of the systematic review process. This attention to detail is what distinguishes a systematic review from that of the traditional narrative review, as the same search criteria is used for all the different databases identified (Torgerson 2003, Petticrew & Roberts 2006). During the searching phase it is important to ensure that the selection of studies is as free from bias as possible. Therefore the search strategy laid down in the review protocol should be followed in a methodical and logical manner with the returns and process undertaken at each stage being fully documented. Full listings of search outputs showing the unfiltered search results should be kept and retained for future reference or potential re-analysis.

Through these processes, the aim of the search strategy is to establish a wide ranging, comprehensive list of sources that conform to all of the inclusion / exclusion criteria (Petticrew 2001, Torgerson 2003). To be able to satisfy this aim, an effective list of search terms has to be constructed in a highly ordered manner. Electronic databases are the search medium that many think should be the basis for the review search (Critical Reviews Advisory Group (CRAG) 1996, Torgerson 2003).

With the recent information and technological advancements over the past 10-15 years there are now a wide range of databases that can be systematically searched for information to aid projects such as a systematic review (Torgerson 2003). The grouping and putting together of related terms is required to best capture the available literature and these words may also have to be used in different permutations to give the optimum returns, whilst achieving the most sensitive searching strategy possible. For instance,

there has to be an appreciation for the different spellings of the same word, e.g. the alternative UK and US spelling of words such as behaviour / behavior.

This need for sensitivity can be achieved by having some prior knowledge of the subject area and how subject headings and keywords are used in the literature (Critical Reviews Advisory Group (CRAG) 1996). Therefore it is extremely helpful if one or more members of the expert panel have expert knowledge of, or are, librarians (Critical Reviews Advisory Group (CRAG) 1996, Torgerson 2003). This will allow for the best possible search strategy to be employed for each specific database.

Despite electronic databases being the favoured method for searching, each database will have its own strengths and weaknesses. One such weakness is the level of content overlap in electronic databases. Content overlap is reported to range from between 10% - 75% dependent on the review topic (Critical Reviews Advisory Group (CRAG) 1996) as there is no single database that is comprehensive enough to cover all publications in a specific topic area. Reviewers also have to be aware that databases will tend to have a language and geographic bias, therefore to minimise this bias a range of different databases should be used in the search.

Once all potentially relevant sources have been identified, the search outputs must be subjected to a number of screening processes in order to be able to decide which studies will be used in the review; this is illustrated in Figure 2.2. Initially the search outputs need to be screened for duplicates. Exporting the search outputs into a reference management software package will ease this process as well as establishing a database of all the search outputs (Torgerson 2003). This is particularly useful when managing a

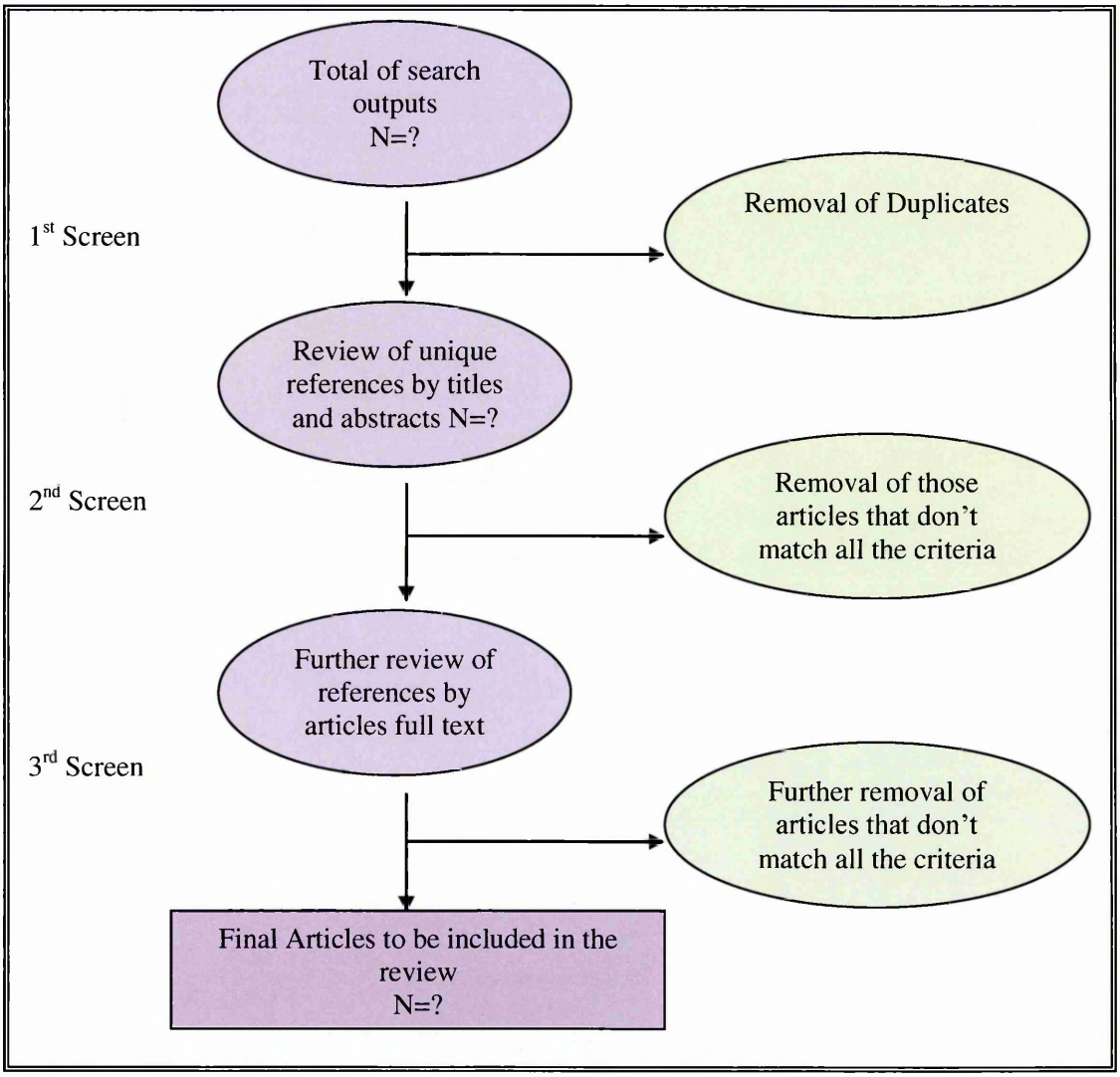
large number of references as they can be sorted and manipulated into different forms (i.e. by author, year or form of publication) quickly and easily.

When all the duplicates have been removed the unique returns then need to be further screened on the basis of their titles and abstract. All those returns that are excluded need to be recorded and the reasons for exclusion specified. The full text of each of the remaining sources needs to be obtained for the next screening process. Retrieving the abstracts and full text of documents may require the help of the expert librarian, but large numbers may be available via the internet and library free text services. Visits to specialist collections, such as the British Library, may be needed if the number of documents needed to be retrieved by inter-library loans is too great as this may be a more cost effective way of obtaining the sources.

Once the full text of the source has been retrieved the sources are then subjected to a further screening process. Here, any further exclusions need to be recorded and notes taken as to the reasons for the exclusion of the source. During these screening processes, advisory bodies such as the Cochrane Collaboration suggest the use of data extraction forms. These forms are designed in such a way to display general information about each of the sources which can then be used to develop tables and a visual representation of the review descriptors, whilst providing the review with the documentation as to how studies were excluded and the decisions that lie behind the exclusions (Clarke and Osman 2001). Tranfield *et al.* (2003) highlighted that systematic reviews employ data extraction forms in order to reduce human error and bias.

Moreover, double extraction procedures may be employed by two independent researchers and results compared and reconciled, if required. A primary aim of the protocol is replicability (any researcher employing the same criteria would arrive at the same sample of literature to review), transparency, accountability (all decisions are explicit and can be defended) and auditability.

**FIGURE 2.2: FLOW DIAGRAM OF STUDY SELECTION PROCESS**



### 2.2.3 THE REPORTING AND DISSEMINATION OF THE REVIEW

This part of the review should aim to synthesise the primary research from large amounts of information into smaller, easier to comprehend forms of information (Torgerson 2003). Commonly, this takes the form of a two stage report, a 'descriptive analysis' of papers such as name of authors, title, abstract etc. The second is a 'thematic analysis' with references to broader themes apparent across the literature reviewed. The reporting should focus on linking themes which range across various core contributions.

Systematic review provides a means for practitioners to use the evidence provided by previous research to inform their decisions. However, Tranfield et al, (2003) point out that although the systematic review process can support an evidence based practice approach, there is a need to acknowledge that evidence alone is often insufficient and incomplete. Therefore, the terms 'evidence informed' or 'evidence inspired', rather than 'evidence based' may be more appropriate. Furthermore, decision makers should be encouraged to use their own personal experience and problem solving skills rather than just relying on the results of a systematic review (Bero and Rennie, 1995; Rosenburg and Donald, 1995 cited in Tranfield *et al.*, 2003).

## 2.4 THE SYSTEMATIC REVIEW PROCESS APPLIED

As highlighted in Section 2.3, a comprehensive review of literature is an essential ingredient of any research project, but the precise methods used must accommodate the research area in question. For example, some fields lend themselves to an approach which considers a hierarchical structure within the data while others focus on a meta analysis of data across studies. Within various disciplines the history of systematic reviews is well established and protocols have been developed to accommodate the characterisitics of datasets in those fields (e..g medicine). In this area of research, the use of systematic review is more recent and hence protocols have yet to be established. Given these circumstances a number of choices were deliberately made to fashion the review from an early stage and inevitably these decisions will have impacted on the outcome of the review process. It was decided not to include a hierarchy of evidence[9], nor to conduct meta analyses[10] of data across studies as neither would contribute to the primary research objectives. Instead the review was based on 19 key variables that have occurred or been identified within the extant literature.

As part of the review protocol, it was also decided that only studies that met all of the specified inclusion criteria and possessed none of the exclusion criteria were included in the review. The strict criteria which were used in the systematic review were linked

[9] A hierarchy of evidence offers a systematic way of ranking the strength of an intervention's findings – specific research methods are ranked according to their scientific validity. These types of hierarchies are often used by reviewers when creating systematic reviews or meta-analyses of evidence in a particular area of research. Because health promotion interventions use a wide range of activities, strategies, and theories – it is clear that no single method (whether it be quantitative or qualitative) can be used to 'best evaluate' all programmes. http://66.240.150.14/pubs/hierachy_of_evidence.pdf

[10] A meta-analysis is a type of research study in which the researcher compiles numerous previously published studies on a particular research question and re-analyzes the results to find the general trend for results across the studies. A meta-analysis is a useful tool because it can help overcome the problem of small sample sizes in the original studies, and can help identify trends in an area of the research literature that may not be evident by merely reading the published studies. http://bpd.about.com/od/glossary/g/Meta-Analysis.htm

to the review panel's desire to base the review on the best quality evidence available at that time. The review panel was well aware of the challenges of establishing inclusion critieria that would help to ascertain what is 'relevant' or 'good quality' in both quantitative and qualitative research (Tranfield *et al.* 2003); and decided, in addition to the relevance criteria, to use peer-reviewed articles as a proxy for assessing the quality of studies included in the review. This decision was primarly based on Tranfield *et al's* (2003) suggestion that within the field of social science it may be possible to conduct a quality assessment of research articles by relying on the implicit quality rating of a particular journal, rather than formally applying any quality assessment criteria to articles that are included in reviews.

By adopting this approach the primary research objectives were reinforced, however, on the downside there were some weaknesses relating to the process that was applied to this research study. These weaknesses are highlighted below:

1. Whist there were a wide range of databases available to search for information relating to physical activity and health, it is important to note that the standard approach to the searching of databases could not be applied by the review panel using the cross-database search function. A more effective approach was the decision to search each database in a bespoke manner rather that relying on one touch database searching techniques.

2. It is widely recognised (Tranfield *et al.* 2003) that a systematic review is only as robust as the inclusion criteria, key terms and search strings that are applied. The review panel did spend considerable amount of time discussing and agreeing the inclusion criteria, key terms and search strings to be used to inform this review;

however, key elements of the selection process may have been improved if an external expert had been invited to review and comment on the proposed approach in advance of initating the systematic review process. In hindsight, the systematic review would have benefited from broadening the selection criteria (see Table 2.2) to include other relevant information such as non-peer reviewed reports, , books and chapters in books. This approach may have provided the review panel with a more comprehensive list of information to be included in the review and negated the need to undertake a separate extensive narrative review, This is a highly important finding for future studies and helps to reinforce the point that systematic review techniques are only as good as the criteria which are used to underpin them.

3. To ensure that all relevant areas were scrutinised, the review panel could have been extended to involve external personnel with expertise in areas of theory, methodology and key issues relevant the subject area of physical activity and health. This may have allowed for greater discussion on mapping and scoping studies, the review protocol and review questions that the systematic review aimed to answer.

4. Given the diversity of instruments employed to track physical activity in the past, rigourous application of quality criteria was not feasible otherwise the available data would have been significantly limited. However, subsequent discussions of sources by the review panel ensured that the quality of data was a critical consideration during the review and had a significant influence on the value attached to particular research outputs.

The review strategy has a number of stages designed to provide a systematic and precise method of the review. The next section provides specific detail on how the systematic

review process was implemented as part of this research study. The main steps taken in this systematic review are summarised in Table 2.1.

**TABLE 2.1: KEY STAGES OF THE SYSTEMATIC REVIEW**

| **Stage 1: Planning the Review** | |
|---|---|
| **Steps** | **Contents** |
| **Step 1: Forming the review panel** | Professor Simon Shibli (SIRC, Sheffield Hallam University); Jo Dobson (Sheffield Hallam University, Subject Specialist); Paul Donnelly (PhD Candidate) |
| **Step 2: Mapping the field of study** | |
| *Step 2.1. Conduct scoping studies* | A brief overview of the related topic surrounding the field, such as "*population based approaches to the measurement of adult physical activity levels and health*". |
| *Step 2.2. Define the aim of this systematic review* | To identify the range of population based approaches to measuring adult participation in sport and physical activity and the relationship between physical activity and various measures of health and wellness. |
| **Step 3: Developing a Review protocol** | |
| *Step 3.1. Discussion of the problem* | How have physical activity levels been measured at a population level to monitor health benefits? What methods were employed? Have there been consistent approaches to the measurement of physical activity levels? |
| *Step 3.2. Search Strategy* | In order to achieve focus in the review, the panel decided to combine several key words in the search strategy. |
| *Step 3.3. Define criteria for including studies* | 1. **Academic relevance:** do the papers selected through the search criteria consider measuring national levels of physical activity to monitor health benefits<br>2. **Length:** 3 pages or more: short articles are less likely to provide evidence or argument supported approach and will tend to be more journalistic<br>3. **Language:** English<br>4. **Reviewed:** Only Peer Reviewed journal articles<br>5. **Timeframe:** Literature published in the last three decades (1983-2008) |
| *Step 3.4. Project Timetable* | 8/2008 – 11/2008 |

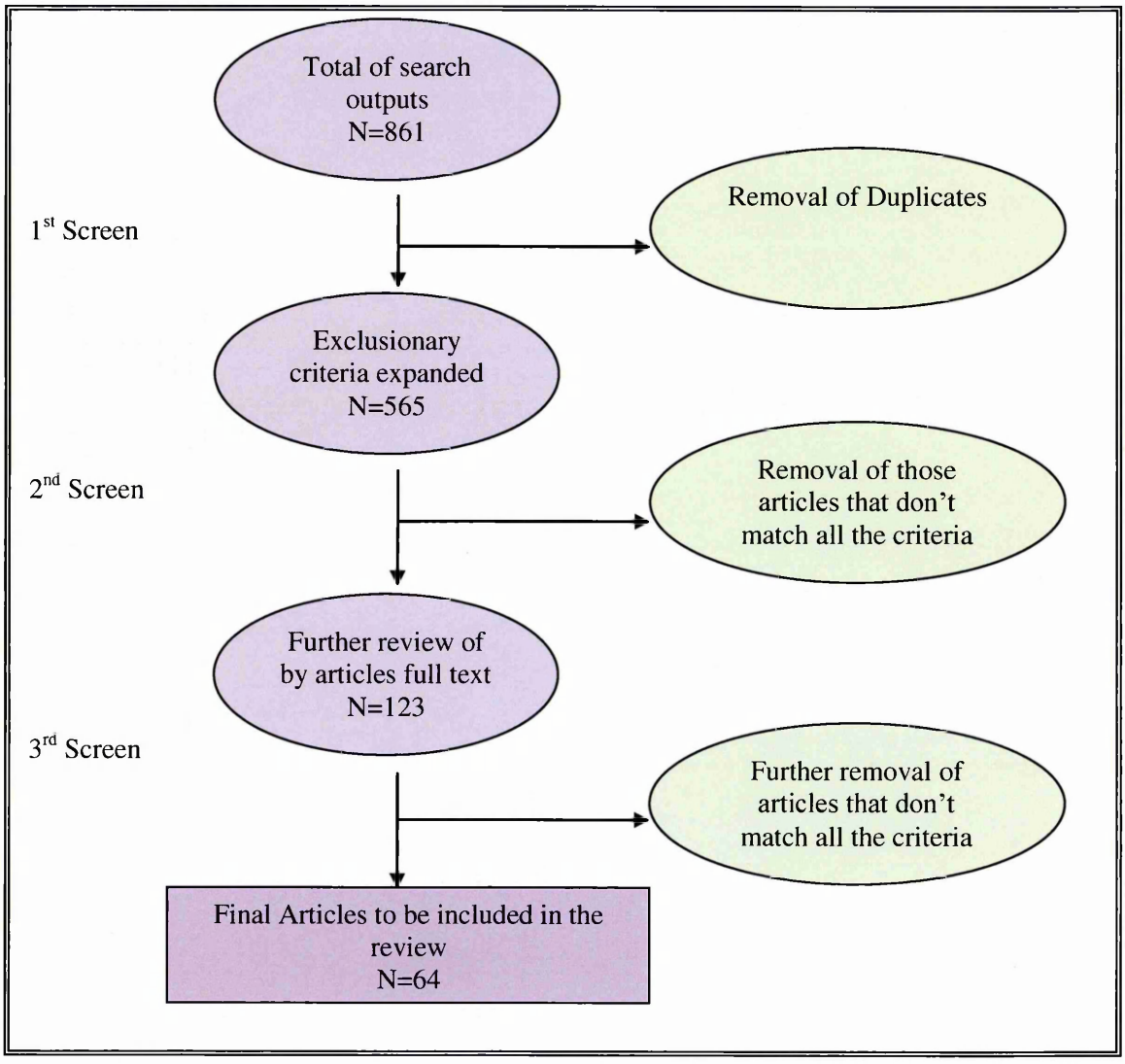
| TABLE 2.1 (continued) KEY STAGES OF THE SYSTEMATIC REVIEW | |
|---|---|
| **Stage 2: Conducting a Review** | |
| **Steps** | **Contents** |
| **Step 4: Identification of research** | |
| *Step 4.1. Define key terms* | National survey, national study, sport participation, physical activity, health, adult, monitor, measurement, recreation and leisure |
| *Step 4.2. Group keywords into search strings* | national survey OR national study AND health AND adult<br>sport*participat* OR physical activity AND health and adult<br>*measur* OR monitor (excluded following preliminary search)*<br>*recreation OR leisure (excluded following preliminary search)* |
| *Step 4.3 Define appropriate databases* | Search terms were grouped into search strings to be used in searching each of the databases (Scopus; SPORTDiscus; Web Of Science; Highwire Press, Swetwise, ScienceDirect). These databases were chosen under the guidance of the subject specialist as the most relevant databases for investigating the subject area. |

| TABLE 2.1 (continued) KEY STAGES OF THE SYSTEMATIC REVIEW | |
|---|---|
| **Stage 2: Conducting a Review** | |
| **Steps** | **Contents** |
| **Step 5: Evaluation of studies** | |
| *Step 5.1. Include studies based on criteria* | 1. Timeframe: 1983-2008<br>2. Academic Relevance<br>3. Language: English<br>4. Length (3 pages or more) |
| *Step 5.2. Assess included studies based on title and abstract* | Create table that includes inclusion or exclusion decision for each document. |
| **Step 6: Conducting data extraction** | Providing a historical record for the decisions made during the review process. |
| **Step 7: Conducting data synthesizing** | Summarising and integrating relevant studies to achieve greater level of understanding of the study. |
| **Stage 3: Reporting and dissemination** | |
| **Step 8: Reporting findings** | |
| **Step 9: Getting evidence into practice** | |

Each of the following sections in this chapter relate to the application of the key stages of the systematic review process outlined earlier in Section 2.3.

Figure 2.3 illustrates the actual stages of the review and how the number of sources under review reduced as each stage of the process was undertaken.

**FIGURE 2.3: ACTUAL FLOW DIAGRAM OF THIS STUDY'S SELECTION PROCESS**



## STAGE 1: PLANNING THE REVIEW

### Step 1: Forming the review panel

The review panel was made up of the following members:

- Professor Simon Shibli (Head of Sport Industry Research Centre)
- Jo Dobson (Subject Specialist)
- Paul Donnelly (PhD candidate)

Panel members were chosen based on their background to encompass the expertise related to the field of study, to information services and also their involvement within the PhD process.

The review panel held an intensive two-day meeting on 25 and 26 June, 2008. During the meeting, the panel identified the aim of the systematic review, the appropriate databases and key terms. Subsequent discussions in the group were conducted by face-to-face meetings and via email discussion. This communication process will be discussed later.

### Step 2: Mapping the Field of Study

The mapping study for this systematic review allowed for the clarification of the aim and objectives of this particular systematic review. This mapping study included an examination of the literature on population based approaches to the measurement of physical activity levels and health. This mapping study also allowed key concepts and keywords to be extracted from this literature and utilised when forming the search term strings in the next stage of the review process.

**Step 3: Developing a Review Protocol**

The systematic review aimed to answer the following questions:

- What is the body of knowledge relating to national surveys and sports participation, physical activity and health?
- How have physical activity levels been measured at a population level to monitor health benefits?
- What methods were employed?
- Has there been a consistent approach to the measurement of physical activity levels?

In order to form a solid base for the review, the panel decided to formulate a search strategy which combined several keywords. Furthermore, core criteria for inclusion and exclusion were established (Table 2.2).

In conjunction with academic relevance and language (English), the publication date was limited to those appearing after 1983. The main reason for using this 'time related' criterion is the fact that 1983 was first year in which adult participation in sport and physical recreation was measured at a population level in Northern Ireland using the CHS.

Publication length was required to be more than three pages as articles shorter than this tend to be 'journalistic' in nature and often there is no space for providing evidence and arguments to support claims made. This criterion has been used in other systematic reviews in the area of sport and exercise (Weed *et al.*, 2009).

Finally, only peer reviewed articles were chosen for inclusion on the basis that it is often difficult for authors and researchers, whether individually or in a team, to spot every mistake or flaw in a complicated piece of work. This is not necessarily a reflection on those concerned, but because with a new and perhaps eclectic subject, an opportunity for improvement may be more obvious to someone with special expertise or who simply looks at it with a fresh eye. Therefore, allowing work to be peer reviewed by others increases the probability that weaknesses will be identified and improved. It is on this basis that the review panel decided to use 'peer reviewed articles' as a criterion for selection and inclusion of journal articles. The criterion has been used in a recent systematic review undertaken by Biddle *et al.* (2011) which aimed to identify factors associated with children's and adolescents physical activity by reviewing systematic quantitative reviews of non-intervention research relating to participation in physical activity by young people.

**TABLE 2.2: INCLUSION CRITERIA**

| No. | Criteria |
|---|---|
| 1. | **Academic relevance:** Do the papers selected through the search criteria consider measuring national levels of physical activity to monitor health benefits |
| 2. | **Length:** 3 pages or more: short articles are less likely to provide evidence or argument supported approach and will tend to be more journalistic |
| 3. | **Language:** English |
| 4. | **Reviewed:** Only Peer Reviewed journal articles |
| 5. | **Timeframe:** Literature published in the last 25 years (1983-2008) |

Inclusion criteria were used in two stages, first to locate all relevant articles, and second, to highlight articles that would be subjected to in-depth analysis.

## STAGE 2: CONDUCTING A REVIEW

### Step 4: Conducting the Review and Evaluating Studies

To begin, a number of keywords relating to population based approaches to the measurement of physical activity levels in order to monitor health benefits were identified by the panel based on their prior experience (Table 2.3).

**TABLE 2.3: KEYWORDS**

| | |
|---|---|
| National survey | Measurement |
| National study | Monitor |
| Sports participation | Health |
| Physical activity | Adult |
| Recreation | |
| Leisure | |

However, in order to reduce the volume and increase relevance, the panel decided to combine key words into search strings rather than use a single keyword. The following search strings were identified (Table 2.4).

**TABLE 2.4: COMBINATION OF KEYWORDS**

| No. | Criteria |
|---|---|
| **1.** | national survey OR national study AND health AND adult |
| **2.** | sport*participat* OR physical activity AND health and adult |
| **3.** | *measur* OR monitor (excluded following preliminary search)* |
| **4** | *recreation OR leisure (excluded following preliminary search)* |

The panel identified six databases to search for keywords based on the relevance to sport, physical activity and health fields (Table 2.5). The search was conducted using the search terms set out in Table 2.4 above. Following a preliminary search of SportDiscus database using the above keyword strings, the review panel noticed that the

use of "measure* OR monitor" and "recreation OR leisure" as keyword strings for the review were elemental and very much limited in their returns.

**TABLE 2.5: DATABASES**

| | |
|---|---|
| SportDiscus | Scopus |
| Web of Science | Highwire Press |
| ScienceDirect | Swetwise |

Once final keyword combinations and databases were agreed by the review panel, a search was conducted during August 2008 – November 2008. The keyword combinations were entered into each database, and the number of results published in each database is presented in Table 2.6. It is important to note that a 'standard approach' to the searching of the databases could not be applied by the review panel using the cross-database search function. This was because, in practice, databases of this type have different architecture and apply different logic to the way in which searches are conducted. For example, the review panel found that when conducting the search using a cross-database approach, very different results were yielded when using the same search terms in a bespoke database search.

Therefore, the review panel considered that more effective searching would be achieved by interrogating each database in a bespoke fashion rather than relying on simplistic 'one touch' database searching techniques. As online databases tend to updated on a seemingly daily basis, the reality is that different results will be obtained on different days. This point is true even if the number of days between searches is relatively small (e.g. one week). Therefore, the extent to which these searches are entirely replicable is in practice limited.

**Step 5: Evaluation of Studies**

The title and abstract of all papers from the results of searches were screened for inclusion by two reviewers (Professor Simon Shibli and Paul Donnelly). The decision to include and exclude papers was based on the criteria agreed by the review panel in June 2008. The criteria of inclusion were (1) Time frame: 1983-2008 (2) Academic relevance (3) English language (4) Pages: 3 pages or more (5) Peer reviewed articles only. A full copy of each identified article was then retrieved.

Each of the extracted documents was imported into the reference management software package RefWorks and filed according to their extraction database. Over 800 potential relevant articles (before removal of duplicates) were returned following the database search.

RefWorks was used to filter all the duplicate documents rather than doing the process by hand as it was more time efficient. Once all duplicate sources were filtered out from the search returns, 565 unique sources remained. The remaining sources and their database can be seen in Table 2.6. Having all of these 565 unique sources in the RefWorks software package allowed for data to be managed effectively and efficiently (a full list of unique sources included in the systematic review is included at Appendix 1). The organisation of the references was also much easier in that all of the references could be sorted by different descriptors and features such as author and publication year. If the citation from the database had a full text link, this was also exported into RefWorks as it made it quicker to find the articles in full text, rather than going back to the individual database and searching for the source individually.

**Step 6: Conducting Data Extraction**

The search was carried out on six databases, from which 861 potential papers were returned. The number of results was then reduced to 565 by deleting duplicate returns. Following a review of each result by two reviewers (Professor Simon Shibli and Paul Donnelly), 123 articles were identified for further examination and the full articles were reviewed. Subsequent to this process it was decided that 64 articles, which were deemed to be particularly relevant to this study, would be taken forward into the final full text review process of the study synthesis. A data extraction template was created to present details of the 64 articles identified for final full text review. Each of the 64 full texts of the final articles to be included in the systematic review was obtained, either through the Library databases or Inter Library Loans. Some articles were unobtainable as they were not held by any other UK institution or the British Library. A full list of the 64 articles is included in the final review is included at Appendix 1.

**TABLE 2.6: DATA EXTRACTION STATISTICS**

| **Databases** | **Total Returns (excluding duplicates)** |
|---|---|
| SPORTDiscus | 79 |
| Science Direct | 38 |
| Web of Science | 255 |
| Scopus | 102 |
| Highwire Press | 87 |
| Swetwise | 4 |
| **Total** | **565** |

**Step 7: Conducting Data Synthesising**

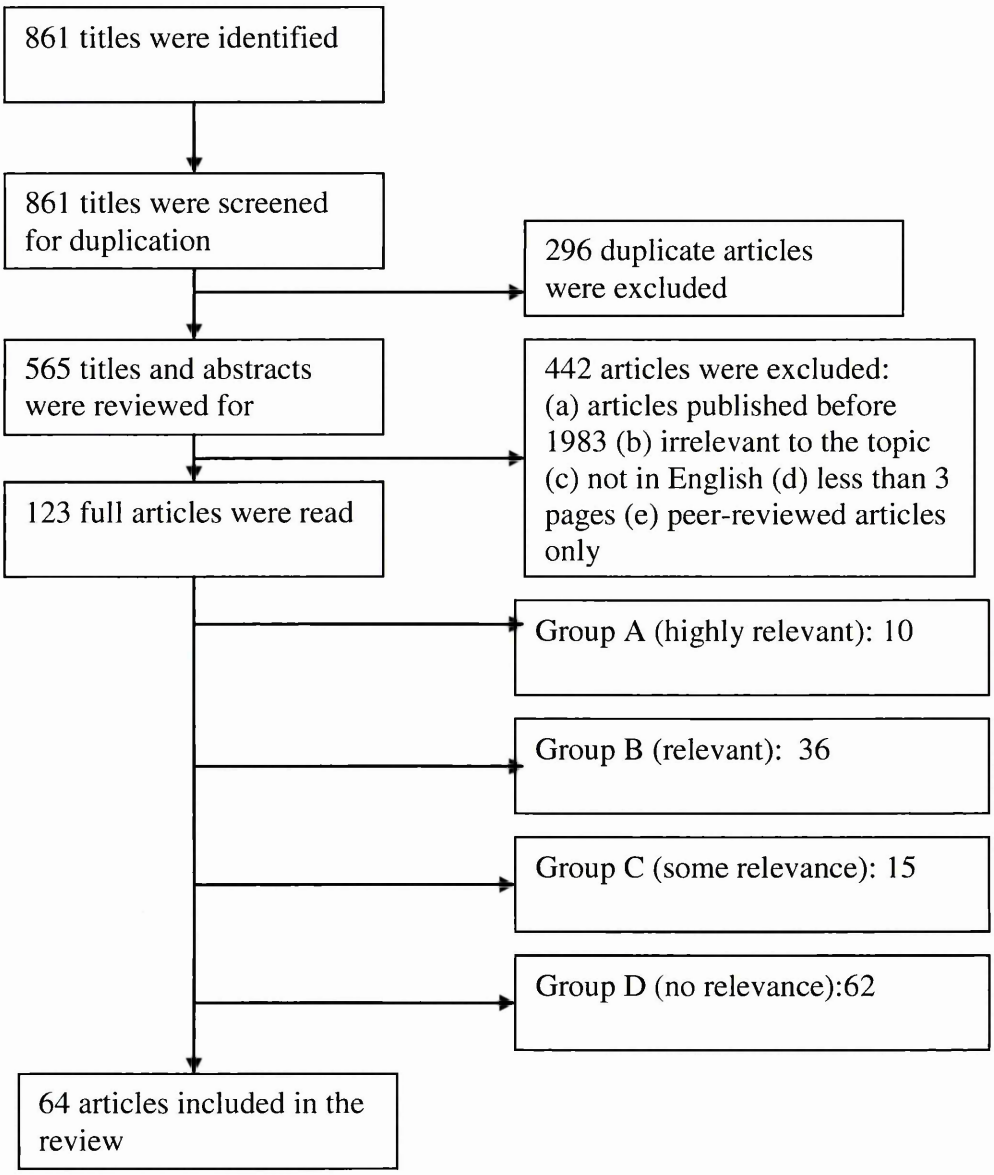
Following further examination of articles, 123 documents were separated into four categories (Table 2.7).

**TABLE 2.7: DATA EXTRACTION CATEGORIES**

| Categories | Total Returns |
|---|---|
| A - Highly relevant | 10 |
| B – Relevant | 36 |
| C – Some relevance | 15 |
| D – Non relevance | 62 |
| **Total** | 123 |

The A and B groups represented articles of particular relevance to the topic. The C group represented articles of some relevance and group D represented articles of seemingly no relevance whatsoever. Following the extraction of data, the next step is data synthesising. The main purpose of data synthesising is to achieve a greater level of understanding of the field of study by reviewing, summarising and combining pertinent studies. Figure 2.4 highlights the process used to search for, and select final articles for in-depth review. The knowledge and understanding created as a result of the systematic review is detailed in the next section.

**FIGURE 2.4: FLOW CHART FOR SEARCH AND SELECTION OF STUDIES**



## STAGE 3: REPORTING AND DISSEMINATION

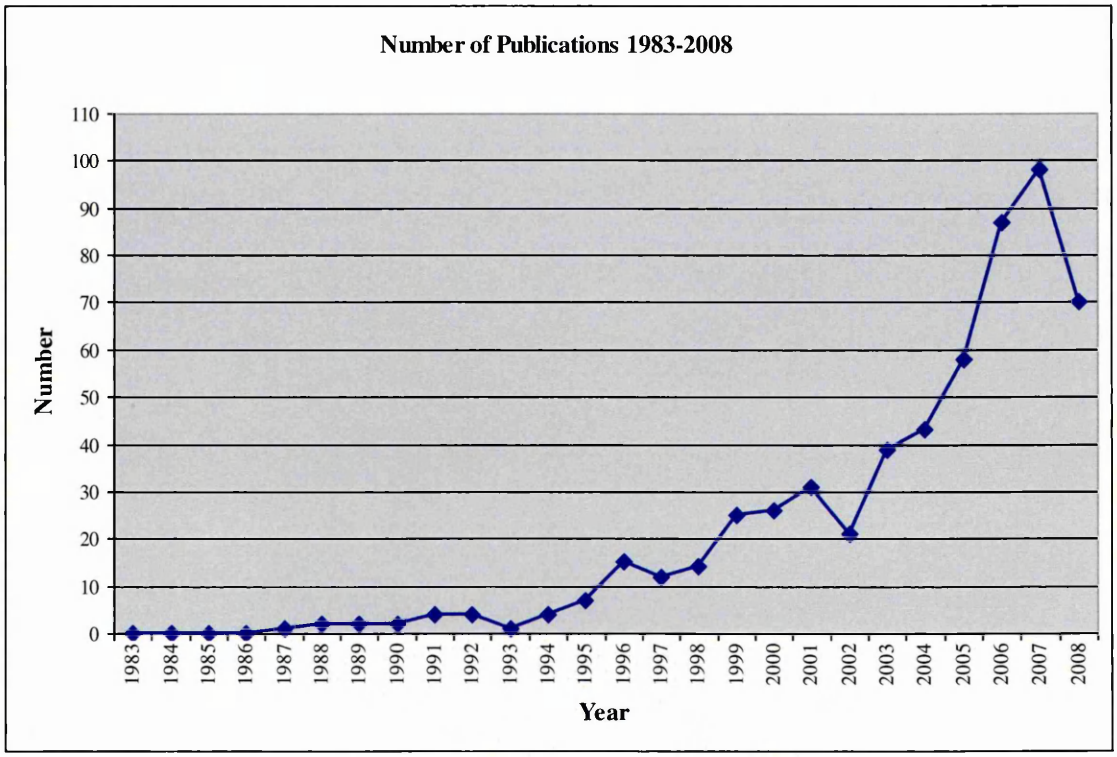
### Step 8: Reporting Findings – The key conclusions of the systematic review

This section discusses and reports the findings of the analysis that has taken place within the systematic review. Key concepts that have emerged from the resulting literature are discussed. Reporting the findings of a systematic review is usually carried out in two stages, the descriptive results and in the case of this review, the thematic analysis.

### The Descriptive Findings

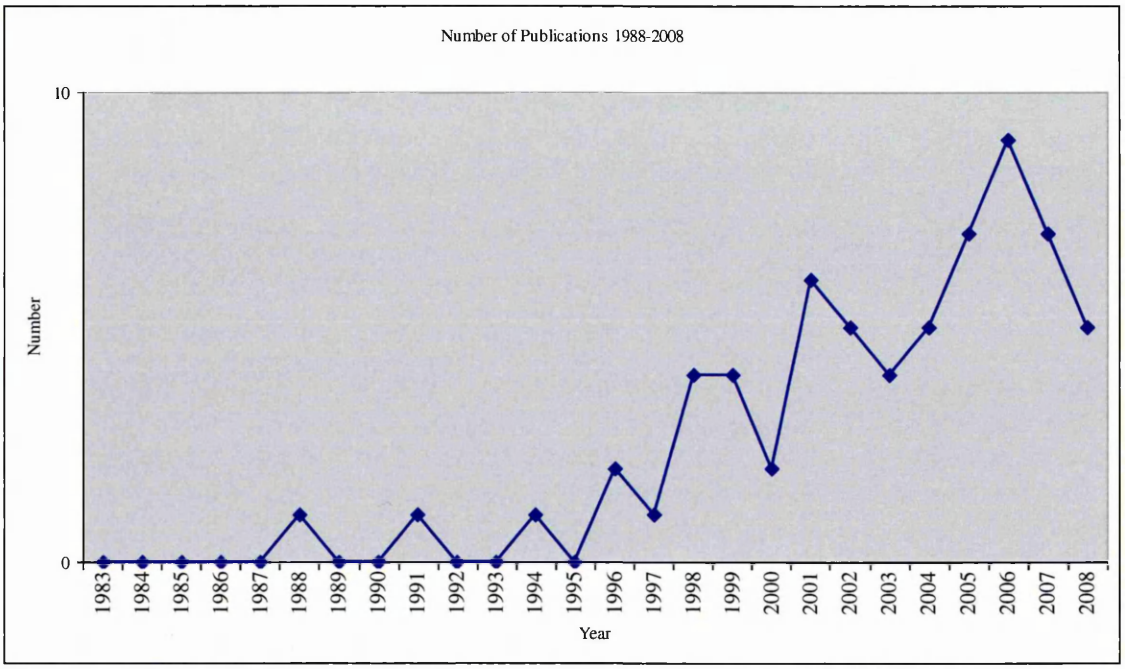
The search outputs returned over 861 potentially relevant sources and once all the duplicates were removed from the outputs, 565 unique sources for potential inclusion were remaining. The sources ranged from being published in 1983 to 2008, as is shown in Figure 2.5 below.

**FIGURE 2.5: THE NUMBER OF PUBLICATIONS FROM 1983-2008 (565 Unique Sources)**



The chart shows the profile of unique returns and tracks and highlights the growth in the field of research into physical activity, sport and health. The 565 unique returns span the period 1983 to 2008. There is an observable increase in the number of publications relating to this field from 1996 and there is again, an observable increase after 2002. The number of publications that matched the review criteria peaks 98 sources in 2007. Here it must be noted, that the figure of 70 returns for 2008 may not be a complete number of returns, as there may be a time lag on some of the electronic databases and some sources produced in 2008 may not have been added to the databases at the time of the review. This is an exponential increase in the number of research publications over the period 1983-2008 reflecting the growing importance of the field as an area for research. Following the application of the screening processes, the number of sources for potential inclusion in the review were reduced to 64 peer reviewed journal articles which were published between 1988 and 2008. Figure 2.6 charts the profile of the final 64 articles and highlights the growth in the field from 2002 (5 articles) through to 2006 (9 articles).

**FIGURE 2.6: THE NUMBER OF PUBLICATIONS FROM 1988-2008 (64 Final Articles)**




The final 64 articles were returned by 5 of the 6 databases that were searched for this systematic review. These returns by database are shown in Table 2.8.

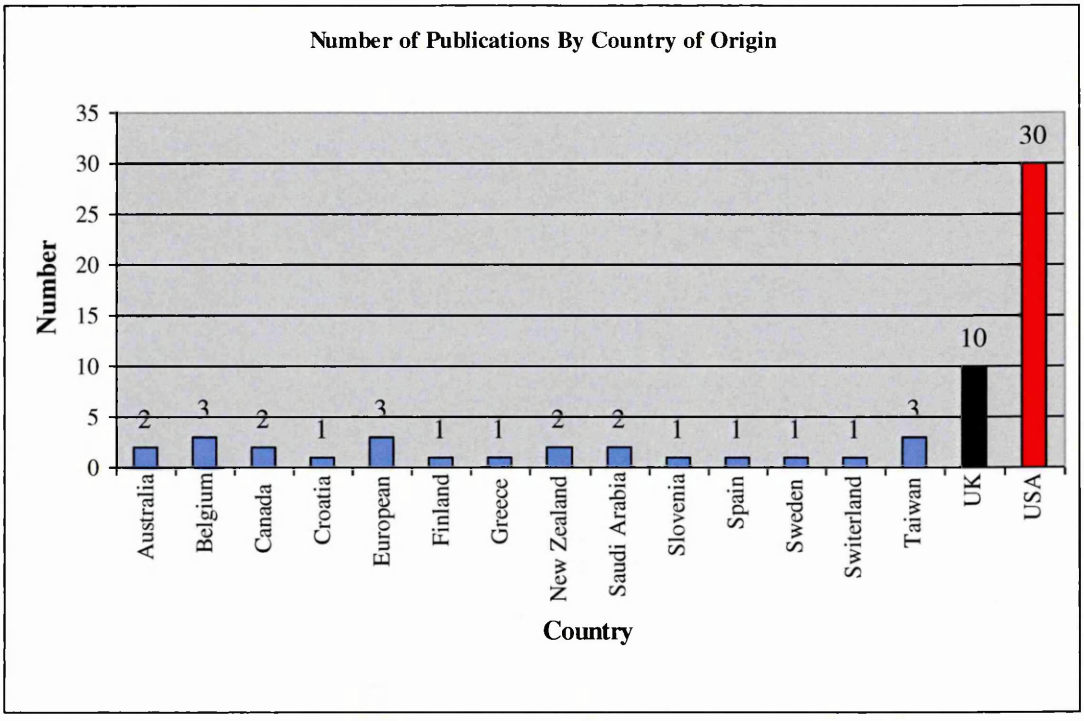
**TABLE 2.8: FINAL ARTICLES BY DATABASE**

| **Databases** | **Total Articles per Database** |
|---|---|
| SPORTDiscus | 10 |
| Science Direct | 6 |
| Web of Science | 23 |
| Scopus | 16 |
| Highwire Press | 9 |
| Swetwise | 0 |
| **Total** | **64** |

The diversity in this field of study is highlighted by number of different first authors across the 64 articles that were included in the final review. The final 64 articles were authored by 58 different first authors.

Figure 2.7 shows the profile of the articles included in the final review by their journal's country of origin. The final 64 articles were produced by 15 different countries. The USA (30) dominates the research area, with the UK (10) and thirteen remaining countries significantly less. Three of the articles included in the final review are European based papers involving a number of EU member states.

**FIGURE 2.7: THE NUMBER OF PUBLICATIONS BY COUNTRY OF ORIGIN (64 Final Articles)**



**The Thematic Findings**

Having outlined the process of systematic review and provided a brief description of the final 64 journal articles identified for review, the key themes revealed by reviewing the 64 articles considered to be the most relevant to this research were then extracted.

Each of the 64 most relevant (CATEGORY A, B and C) articles were reviewed in a structured format designed to identify their compliance or otherwise, with a list of key variables (19) classified by methodological, physical activity and health and wellness variables. These key variables were identified following an in-depth review of each article.

In order to establish the extent to which the 19 key variables were present in each national survey, it was sometimes necessary to go beyond the paper being reviewed and to cross refer to the original survey headline report. For example, in the case of the Allied Dunbar National Fitness Survey, the paper by Fentem and Mockett 1998 on body composition might not have revealed that alcohol consumption levels were included in the survey. However, by referring back to the original report from which this paper was drawn, it was possible to clarify the full extent to which the 19 key variables identified by the review panel were included on each survey. This approach was adopted for all surveys featured in the tables included at Appendix 2 and summarised in Table 2.10. These key variables and related questions were used to support the in-depth review of each of the most relevant publications as described in Table 2.11.

In the next and penultimate stage of the systematic review process, a system has to be devised that allows for a 'grounded' analysis of all relevant data, thereby not imposing

themes or issues at too early a stage as this may prejudice the orientation and thoroughness of the review. To achieve this objective it was initially decided to categorise studies by their geographical location, and specifically by utilising a crude tripartite distinction between the US, UK and others. This categorisation will not only help group together research according to potential cultural influences that may impact on the choice of methodologies but also on priorities and interpretations of data, at the same time still allowing for themes and issues to emerge that may cut across this typology.

A framework was developed in order to categorise each individual study by key variables relating to physical activity levels and health (Table 2.9). A summary table (Table 2.10) condenses this information further to provide the reader with an at a glance picture of the range and frequency of key variables considered across all publications. In combination, these tables provide a useful visual and quantitative synopsis of available evidence contained within existing data sources.

It is important to note that these tables are based on published evidence alone. It is not always clear whether or not additional variables had been measured, and despite reasonable attempts to clarify this matter, it has not been possible to determine with any degree of certainty the full scope of all research instruments (see Chapter 3 – narrative literature review for a more detailed review of the most relevant survey instruments identified by the systematic review). For example, all of the studies included in the final review were primarily based on self-reported physical activity and secondary analysis of a subset of variables within a large scale data set. On this basis, it was therefore not possible to be 100% certain that the articles revealed all variables measured.

**TABLE 2.9: KEY VARIABLES AND RELATED QUESTIONS USED TO ASSESS PUBLICATIONS INCLUDED IN FINAL REVIEW (64)**

| | Variable | Questions used to assess the quality of the evidence |
|---|---|---|
| | **METHODOLOGICAL VARIABLES** | |
| **1** | National Survey | Is the study a national study or based on findings of a national study (i.e. primary or secondary analysis)? |
| **2** | Sample Size | Is the total sample size greater or less than N=1000 |
| **3** | Survey Mode | How was the survey data collected? (e.g. telephone, personal interview in the home, postal survey) |
| **4** | Physical Activity Reference Period | What reference period relating to involvement in sport and physical activity was used to elicit a response from the population surveyed? (e.g. last 7 days, four weeks, 12 months) |
| **5** | Activity Type | Did the study assess involvement in sport and physical activity by:<br>• Type of Activity of Undertaken (e.g. football, gardening, walking, cycling)<br>• Frequency (e.g. the number of times/days the activity was undertaken in the last 7 days, 4 weeks, 12 months?)<br>• Duration (e.g. the amount of time spent doing an activity in the last 7 days)<br>• Intensity (e.g. the intensity by which an activity is undertaken. This can be light, moderate or vigorous depending on the nature of the activity) |
| **6** | Frequency | |
| **7** | Duration | |
| **8** | Intensity | |
| **9** | Qualifying Time | Did the study state the minimum amount of time that a person needed to be involved in at least moderate intensity physical activity before an activity could be recorded? |
| | **PHYSICAL ACTIVITY RELATED VARIABLES** | |
| **10** | Total Physical Activity | Did the study measure and categorise involvement in physical activities across all four life domains independently? (e.g. home, work, active travel and sport and recreation) |
| **11** | Leisure Time Physical Activity | |
| **12** | Work Related Physical Activity | Did the study measure involvement in physical activity from one or more of the four life domains? (e.g. sport and recreation and work related physical activity) |
| **13** | Active Travel (Getting about by walking and/or cycling for recreation or to get somewhere) | |
| **14** | Home Related Physical Activity | |
| | **HEALTH & WELLNESS VARIABLES** | |
| **15** | Perceived Health and Happiness | Did the study assess the general health, wellness and happiness of the population surveyed? |
| **16** | Alcohol Consumption | Did the study assess the prevalence of selected health behaviours (smoking behaviour, alcohol consumption, fruit and vegetable consumption) of the population surveyed? |
| **17** | Smoking Behaviour | |
| **18** | Fruit and Vegetable Consumption | Did the study analyse the relationship between involvement of physical activity and the prevalence of selected health behaviours? |
| **19** | Self Reported Body Mass Index (BMI) | Did the study assess BMI of the target population? |

| TABLE 2.10: SUMMARY OF KEY VARIABLES CONSIDERED ACROSS CATEGORIES A, B & C | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| METHODOLOGICAL, PHYSICAL ACTIVITY AND HEALTH & WELLNESS VARIABLES | | | | | | | | | | | | | | | | | | | | |
| | METHODOLOGICAL VARIABLES | | | | | | | | | PHYSICAL ACTIVITY VARIABLES | | | | | HEALTH & WELLNESS VARIABLES | | | | |
| **AUTHORS** | NATIONAL SUVREY | SAMPLE SIZE ( n=1000 > ) | SURVEY MODE | REFERENCE PERIOD | ACTIVITY TYPE | FREQUENCY | INTENSITY | DURATION | QUALIFYING TIME | TOTAL PA TPA | LEISURE TIME PA | WORK RELATED PA | ACTIVE TRAVEL | HOME RELATED PA | HEALTH & HAPPINESS | SMOKING BEHAVIOUR | FRUIT & VEG CONSUMPTION | ALCOHOL CON-SUMPTION | SELF-REPORTED BMI |
| **CATEGORY A (10) 'Highly Relevant'** | 5 | 6 | 9 | 9 | 5 | 9 | 9 | 9 | 7 | 4 | 9 | 6 | 6 | 4 | 2 | 1 | 2 | 2 | 1 |
| **CATEGORY B (38) 'Relevant'** | 22 | 25 | 24 | 17 | 11 | 22 | 20 | 21 | 14 | 5 | 26 | 11 | 7 | 8 | 5 | 8 | 9 | 2 | 3 |
| **CATEGORY C (16) 'Some Relevance'** | 11 | 12 | 14 | 11 | 5 | 9 | 9 | 8 | 5 | 2 | 12 | 4 | [illegible] | 2 | 3 | 6 | 1 | 5 | 2 |
| **Totals (64)** | **38** | **33** | **47** | **37** | **21** | **40** | **38** | **38** | **26** | **11** | **47** | **21** | **14** | **14** | **10** | **15** | **12** | **9** | **6** |
| **% Incidence for Each Variable** | **59%** | **67%** | **73%** | **57%** | **33%** | **63%** | **59%** | **59%** | **41%** | **17%** | **73%** | **33%** | **22%** | **22%** | **16%** | **23%** | **19%** | **14%** | **9%** |
| **% Incidence for Each Theme** | **67%** | | | | | | | | | **22%** | | | | | **11%** | | | | |

As a final stage in the interrogation of the data, Table 2.11 provides a detailed breakdown of the methods employed in each survey including questions relating to key variables classified by methodological, physical activity and health and wellness variables.

**TABLE 2.11: ADULT POPULATION BASED SURVEYS : A DETAILED ANAYLSIS OF METHODOLOGICAL, PHYSICAL ACTIVITY AND HEALTH & WELLNESS VARIABLES FOR EACH PUBLICATION IDENTIFIED FOR FINAL REVIEW**

| | METHODOLOGICAL VARIABLES | | | | | | | PHYSICAL ACTIVITY VARIABLES | | | | | HEALTH & WELLNESS VARIABLES | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AUTHORS & COUNTRY** | **SURVEY INSTRUMENT, YEAR DATA COLLECTED & SAMPLE SIZE** | **REFERENCE PERIOD (DAYS)** | **ACTIVITY TYPE** | **FREQUENCY** | **INTENSITY** | **DURATION** | **QUALIFYING TIME** | **TOTAL PA** | **LEISURE TIME PA** | **WORK RELATED PA** | **ACTIVE TRAVEL** | **HOME RELATED PA** | **HEALTH & HAPPINESS** | **SMOKING BEHAVIOUR** | **FRUIT & VEG CONSUMPTION** | **ALCOHOL CONSUMPTION** | **SELF-REPORTED BMI** |
| **Brown & Bauman (2000)*** <br><br> **AUSTRALIA** <br><br> ***This study is based on two surveys; reported results reflect on each survey separately.*** | Active Australia 1997 N=2,500 Telephone Survey | Last 7 days; Frequency; Intensity; Duration; 10 minutes. | | | | | | Respondents asked four questions related to moderate and vigorous intensity leisure time physical activities and walking for recreation/exercise or to get somewhere. | | | | | Self-reported body weight wa captured. | | | | |
| | Australian Longitudinal Study on Women's Health 1998 N= 10,464 Postal Survey | Normal week; Frequency, Intensity; Duration, 20 minutes. | | | | | | Respondents asked three questions on related to moderate and vigorous leisure time physical activities, walking (including to and from work) and other moderate intensity activities not already mentioned. | | | | | Self-reported body weight wa captured. | | | | |
| **Brown & Miller (2005)** <br><br> **AUSTRALIA** | Australian National Physical Activity Survey 2000 N=3,841 Telephone Survey (CATI) | Last 7 days; Frequency, Intensity; Duration; 10 minutes. | | | | | | Respondents asked to recall frequency and duration of participation in each of the following types of physical activities: walking for at least 10 minutes for recreation/exercise or to get or from places; vigorous activity (excluding household chores, gardening) (e.g. jogging, cycling) and other moderate intensity physical activity (e.g. gentle swimming, golf). | | | | | None of the above variables wer considered. | | | | |

**TABLE 2.11: ADULT POPULATION BASED SURVEYS : A DETAILED ANAYLSIS OF METHODOLOGICAL, PHYSICAL ACTIVITY AND HEALTH & WELLNESS VARIABLES FOR EACH PUBLICATION IDENTIFIED FOR FINAL REVIEW**

| | METHODOLOGICAL VARIABLES | | | | | | | PHYSICAL ACTIVITY VARIABLES | | | | | HEALTH & WELLNESS VARIABLES | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AUTHORS & COUNTRY** | **SURVEY INSTRUMENT, YEAR DATA COLLECTED & SAMPLE SIZE** | REFERENCE PERIOD (DAYS) | ACTIVITY TYPE | FREQUENCY | INTENSITY | DURATION | QUALIFIYING TIME | TOTAL PA | LEISURE TIME PA | WORK RELATED PA | ACTIVE TRAVEL | HOME RELATED PA | HEALTH & HAPPINESS | SMOKING BEHAVIOUR | FRUIT & VEG CONSUMPTION | ALCOHOL CONSUMPTION | SELF-REPORTED BMI |
| **Duvigneaud *et al.* (2007)**<br><br>**BELGIUM** | Flemish Physical Activity Computerised Questionnaire (2002-2004)<br>N=4903<br>Personal Interview in the Home | Usual week; Type; Frequency; Duration; Qualifying Time – not stated. | | | | | | 3 variables of physical activity were used (1) time spent in health related sports (Tsport), total leisure time physical activity (TLTPA) and time watching TV/using computer (Ttv). Time spent in Tsport was assessed by asking respondents to select 3 most practised sports activities. TLTPA (hours/week) sums the time spent on all active leisure time activities (including active travel, household and gardening activities and time spent in sports activities. | | | | | Smoking behaviour and alcoh consumption were assessed | | | | |
| **Craig *et al.* (2004)**<br><br>**CANADA** | Canadian Fitness Survey (using adaptations of the Minnesota Leisure Time Physical Activity Questionnaire) 1981-2000<br>N=2,500 – 18,000<br>Self administered in | Last 7 days; Type, Frequency; Intensity; Duration. | | | | | | Leisure time physical activity was calculated in MET hours per week by summing the metabolic cost of each activity, its duration in hours and the average occasion per week across 12 months.<br><br>Detail regarding the exact wording of questions was not provided. | | | | | None of the above variables wer considered. | | | | |

**TABLE 2.11: ADULT POPULATION BASED SURVEYS : A DETAILED ANAYLSIS OF METHODOLOGICAL, PHYSICAL ACTIVITY AND HEALTH & WELLNESS VARIABLES FOR EACH PUBLICATION IDENTIFIED FOR FINAL REVIEW**

| | METHODOLOGICAL VARIABLES | | | | | | | PHYSICAL ACTIVITY VARIABLES | | | | | HEALTH & WELLNESS VARIABLES | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AUTHORS & COUNTRY** | **SURVEY INSTRUMENT, YEAR DATA COLLECTED & SAMPLE SIZE** | REFERENCE PERIOD (DAYS) | ACTIVITY TYPE | FREQUENCY | INTENSITY | DURATION | QUALIFYING TIME | TOTAL PA | LEISURE TIME PA | WORK RELATED PA | ACTIVE TRAVEL | HOME RELATED PA | HEALTH & HAPPINESS | SMOKING BEHAVIOUR | FRUIT & VEG CONSUMPTION | ALCOHOL CONSUMPTION | SELF-REPORTED BMI |
| | the Home (1981 & 1988)<br>Telephone Survey (1995-2000) | | | | | | | | | | | | | | | | |
| **Craig *et al.* (2004)**<br><br>**CANADA** | Canadian Physical Activity Monitor (using IPAQ Short Form)<br>N=9,935<br>Telephone Survey | Last 7 days; Frequency; Intensity; Duration; 10 minutes.<br><br>Walking defined as walking at least one hour daily (regardless of purpose) in the week prior to the survey. | | | | | | Respondents were asked about walking, moderate and vigorous physical activity in the past 7 days across domains of work, leisure, home and transport.<br><br>Detail regarding the exact wording of questions was not provided. | | | | | None of the above variables wer considered. | | | | |
| **Turek *et al.* (2001)**<br><br>**CROATIA** | Croatian General Health Survey (1995-1997)<br>N=5,840<br>Personal Interview in the Home | Last 7 days, Intensity; Duration.<br><br>Type; Frequency; Qualifying Time (not stated). | | | | | | Respondent's patterns of physical activity were examined using information work, home and leisure time activities. Intensity of physical exertion during physical activity was graded into 4 categories (light, medium, heavy, very heavy) that were offered to respondents together with examples of physical activities for each category. | | | | | Smoking behaviour, alcoho consumption and dietary habits wer examined. | | | | |
| **Zaletel-Kragelj *et al.* (2006)** | CINDI Health Monitor Survey 2001 (using IPAQ Short | Last 7 days; Frequency; Intensity; Duration; 10 minutes. | | | | | | Respondents were asked about walking, moderate and vigorous physical activity in the past 7 days across domains of | | | | | Nutrition habits were examined. | | | | |

**TABLE 2.11: ADULT POPULATION BASED SURVEYS : A DETAILED ANAYLSIS OF METHODOLOGICAL, PHYSICAL ACTIVITY AND HEALTH & WELLNESS VARIABLES FOR EACH PUBLICATION IDENTIFIED FOR FINAL REVIEW**

| | METHODOLOGICAL VARIABLES | | | | | | | PHYSICAL ACTIVITY VARIABLES | | | | | HEALTH & WELLNESS VARIABLES | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AUTHORS & COUNTRY** | **SURVEY INSTRUMENT, YEAR DATA COLLECTED & SAMPLE SIZE** | **REFERENCE PERIOD (DAYS)** | **ACTIVITY TYPE** | **FREQUENCY** | **INTENSITY** | **DURATION** | **QUALIFIYING TIME** | **TOTAL PA** | **LEISURE TIME PA** | **WORK RELATED PA** | **ACTIVE TRAVEL** | **HOME RELATED PA** | **HEALTH & HAPPINESS** | **SMOKING BEHAVIOUR** | **FRUIT & VEG CONSUMPTION** | **ALCOHOL CONSUMPTION** | **SELF-REPORTED BMI** |
| **SLOVENIA** | Form, 2005)<br>N=9,043<br>Self-administered postal questionnaire | | | | | | | work, leisure, home and transport. | | | | | | | | | |
| **Gutiérrez - Fisac *et al.* (2002)**<br><br>**SPAIN** | Spanish National Health Survey 1993<br>N=12,044<br>Personal Interview in the Home | Frequency; Duration; Intensity<br><br>Type; Reference Period, Qualifying Time (not stated) | | | | | | Respondents were asked questions relating to Work-related Physical Activity (WRPA) and Leisure Time Physical Activity (LTPA). | | | | | Smoking behaviour, alcoh consumption and self-reported healt were assessed.<br><br>Self-reported body mass index was als captured. | | | | |
| **Lissner *et al.* (1996)**<br><br>**SWEDEN** | Physical Activity Questionnaire<br>N=1,405<br>Administered verbally by a physician | Last 12 months<br><br>Type; Frequency; Duration; Intensity; Qualifying Time (not stated) | | | | | | Respondents were asked to provide about physical activity at work and during leisure time using two 4 point scales (1 signifies least active and 4 indicates most active). | | | | | Alcohol consumption, smokin behaviour and dietary intake wer examined. | | | | |
| **Ku et al (2006).***<br><br>**TAIWAN**<br><br>***This study is based on two** | National Health Interview Survey, 2001<br>N=15,559<br>Personal Interview in the Home | Type; Frequency; Duration; Intensity<br><br>Reference Period; Qualifying Time (not stated) | | | | | | No detail on the survey was provided. | | | | | No detail on the survey was provided. | | | | |

**TABLE 2.11: ADULT POPULATION BASED SURVEYS : A DETAILED ANAYLSIS OF METHODOLOGICAL, PHYSICAL ACTIVITY AND HEALTH & WELLNESS VARIABLES FOR EACH PUBLICATION IDENTIFIED FOR FINAL REVIEW**

| | METHODOLOGICAL VARIABLES | | | | | | | PHYSICAL ACTIVITY VARIABLES | | | | | HEALTH & WELLNESS VARIABLES | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AUTHORS & COUNTRY** | **SURVEY INSTRUMENT, YEAR DATA COLLECTED & SAMPLE SIZE** | REFERENCE PERIOD (DAYS) | ACTIVITY TYPE | FREQUENCY | INTENSITY | DURATION | QUALIFIYING TIME | TOTAL PA | LEISURE TIME PA | WORK RELATED PA | ACTIVE TRAVEL | HOME RELATED PA | HEALTH & HAPPINESS | SMOKING BEHAVIOUR | FRUIT & VEG CONSUMPTION | ALCOHOL CONSUMPTION | SELF-REPORTED BMI |
| ***surveys; reported results reflect on each survey separately.*** | National Council on Physical Fitness Survey 2000, 2001, and 2004 (NH2000; NH2001; NH2004) N=1021, 8573, 4073 respectively Telephone Survey | Last 3 months; Frequency; Duration; 30 minutes<br><br>Intensity (not stated) | | | | | | In the NH2001 and NH2004 respondents first reported their activity using a dichotomous variable: 'Have you taken part in any sport or exercise activities in the past two weeks? Positive respondents were then asked to report activity frequency, duration and intensity. Respondents in the NH2000 and NH2001 reported the frequency and duration (but not intensity of their activity involvement in the last 3 months. | | | | | None of the above variables wer considered. | | | | |
| **Lan *et al.* (2006)**<br><br>**TAIWAN** | Taiwan National Health Survey 2001 N= 6,592 Personal Interview in the Home | Past 2 weeks; Type, Frequency, Duration and Intensity.<br><br>Qualifying Time (not stated). | | | | | | Respondents were asked the question "Did you engage in any kind of leisure activity during the last two weeks?" to classify subjects as exerciser ("yes") or sedentary individuals (answering "no"). For exercisers, the information on names, total times, and duration for each activity (up to 3) during the 2-week period was collected. | | | | | Smoking behaviour, alcoh consumption, self-reported body mas index and self-rated health wer examined. | | | | |

**TABLE 2.11: ADULT POPULATION BASED SURVEYS : A DETAILED ANAYLSIS OF METHODOLOGICAL, PHYSICAL ACTIVITY AND HEALTH & WELLNESS VARIABLES FOR EACH PUBLICATION IDENTIFIED FOR FINAL REVIEW**

| | METHODOLOGICAL VARIABLES | | | | | | | PHYSICAL ACTIVITY VARIABLES | | | | | HEALTH & WELLNESS VARIABLES | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AUTHORS & COUNTRY** | **SURVEY INSTRUMENT, YEAR DATA COLLECTED & SAMPLE SIZE** | REFERENCE PERIOD (DAYS) | ACTIVITY TYPE | FREQUENCY | INTENSITY | DURATION | QUALIFYING TIME | TOTAL PA | LEISURE TIME PA | WORK RELATED PA | ACTIVE TRAVEL | HOME RELATED PA | HEALTH & HAPPINESS | SMOKING BEHAVIOUR | FRUIT & VEG CONSUMPTION | ALCOHOL CONSUMPTION | SELF-REPORTED BMI |
| **Hillsdon. *et al.* (2001)**<br><br>**UK** | Bespoke National Survey to Assess the Impact of England's Active for Life Campaign<br>N=3,189<br>Personal Interview in the Home | Previous 4 weeks; Type; Frequency; Duration; Intensity, 30 minutes (moderate PA) or 20 minutes (vigorous PA). | | | | | | Respondents were asked about the frequency, duration and intensity and type of physical activity they had performed in the last four weeks. | | | | | None of the above variables wer considered. | | | | |
| **Poortinga W. (2007)**<br><br>**UK** | Health Survey for England 2003<br>N=11,617<br>Personal Interview in the Home | Frequency; Duration; Intensity.<br><br>Reference period; Qualifying Time (not stated). | | | | | | Respondents were asked about their involvement in a range of sport and exercise activities such as swimming, football, rugby, cycling etc. and other sport and exercise.<br><br>Occupational activity was also assessed. | | | | | Smoking behaviour, alcoh consumption was examined. | | | | |
| **McGrath *et al.* (2007)**<br><br>**UK** | International Physical Activity Questionnaire (IPAQ) Short Form<br>N=1074<br>Self-Administered | Last 7 days; Frequency; Intensity; Duration; 10 minutes. | | | | | | Respondents were asked about walking, moderate and vigorous physical activity in the past 7 days across domains of work, leisure, home and transport. | | | | | Smoking behaviour, alcoh consumption was examined. | | | | |

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| | METHODOLOGICAL VARIABLES | | | | | | | PHYSICAL ACTIVITY VARIABLES | | | | | HEALTH & WELLNESS VARIABLES | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AUTHORS & COUNTRY** | **SURVEY INSTRUMENT, YEAR DATA COLLECTED & SAMPLE SIZE** | REFERENCE PERIOD (DAYS) | ACTIVITY TYPE | FREQUENCY | INTENSITY | DURATION | QUALIFIYING TIME | TOTAL PA | LEISURE TIME PA | WORK RELATED PA | ACTIVE TRAVEL | HOME RELATED PA | HEALTH & HAPPINESS | SMOKING BEHAVIOUR | FRUIT & VEG CONSUMPTION | ALCOHOL CONSUMPTION | SELF-REPORTED BMI |
| | Postal Questionnaire | | | | | | | | | | | | | | | | |
| **Lawlor *et al.* (2002)**<br><br>**UK** | British Women's Heart and Health Survey 1999/2000<br>N=2,341<br>Self-administered Questionnaire | Typical week in the past 12 months; Type; Frequency, Duration; Intensity.<br><br>Qualifying time (not stated). | | | | | | Respondents were asking to indicate their usual duration of activity in hours per week for several types of activity: walking, cycling, physical exercise, light/heavy housework, light/heavy gardening and DIY. In addition, they were asked to indicate whether their usual walking pace was slow, steady, brisk or fast. | | | | | Smoking behaviour and general healt status were examined. | | | | |
| **Fentem & Mockett (1998)**<br><br>**UK** | Allied Dunbar National Fitness Survey 1992<br>N=4,316<br>Personal Interview in the Home & Physical Appraisal | Various; Type; Frequency; Intensity; 20 minutes.<br><br>Duration (not stated). | | | | | | Respondents were asked questions on the type, frequency and intensity of current habitual physical activity and past patterns of participation. Most details were collected for the four weeks prior to interview. Questions concerned physical activity at work, leisure, home, and as a means of transport. | | | | | Smoking behaviour, alcoh consumption, dietary habits wer examined. | | | | |
| **Berrigan *et al.* (2006)** | National Health Interview Survey 2000<br>N=5,000 | Various; Frequency; Intensity.<br><br>Type; Duration and Qualifying Time (not | | | | | | Respondents were asked questions relating to leisure time physical activity (LTPA) and non-leisure time physical | | | | | None of the above variables wer considered. | | | | |

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| | METHODOLOGICAL VARIABLES | | | | | | | PHYSICAL ACTIVITY VARIABLES | | | | | HEALTH & WELLNESS VARIABLES | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AUTHORS & COUNTRY** | **SURVEY INSTRUMENT, YEAR DATA COLLECTED & SAMPLE SIZE** | REFERENCE PERIOD (DAYS) | ACTIVITY TYPE | FREQUENCY | INTENSITY | DURATION | QUALIFIYING TIME | TOTAL PA | LEISURE TIME PA | WORK RELATED PA | ACTIVE TRAVEL | HOME RELATED PA | HEALTH & HAPPINESS | SMOKING BEHAVIOUR | FRUIT & VEG CONSUMPTION | ALCOHOL CONSUMPTION | SELF-REPORTED BMI |
| **US** | Personal Interview in the Home | stated). | | | | | | activity (walking or cycling to get somewhere; sitting/standing/walking; lifting and carrying things). | | | | | | | | | |
| **Reeves & Rafferty (2005)**<br><br>**US** | Behavioural Risk Factor Surveillance System (BRFSS) 2000<br>N=153,000<br>Telephone Survey | Type; Frequency; Intensity; Duration.<br><br>Reference period; Qualifying Time (not stated). | | | | | | Respondents were asked questions on the frequency and duration of leisure time physical activities (up to two). | | | | | Smoking behaviour, self-reporte health and body mass index wer considered. | | | | |
| **Patterson *et al.* (2004)**<br><br>**US** | National Health Interview Survey 1998 (Sample Adult & Adult Prevention Module)<br>N=32,440<br>Personal Interview in the Home | No detail provided. | | | | | | No detail on the questions was provided.<br><br>NHIS physical activity measure is a measure of leisure time physical activity, excluding occupational physical activity. | | | | | Self-reported health, body mass inde and smoking behaviour wer considered. | | | | |
| **Kruger *et al.* (2007)***<br><br>**US**<br><br>***This study is based on two** | Behavioural Risk Factor Surveillance System (BRFSS) 2003<br>N=264,684<br>Telephone Survey | Usual Week; Frequency; Intensity; Duration.<br><br>Qualifying Time (not stated). | | | | | | Respondents were asked six questions about the frequency and duration of moderate and vigorous leisure-time, household and transport-related physical activity. BRFSS 2003 did not include questions specific types of physical activities performed. | | | | | None of the above variables wer considered. | | | | |

**TABLE 2.11: ADULT POPULATION BASED SURVEYS : A DETAILED ANAYLSIS OF METHODOLOGICAL, PHYSICAL ACTIVITY AND HEALTH & WELLNESS VARIABLES FOR EACH PUBLICATION IDENTIFIED FOR FINAL REVIEW**

| | METHODOLOGICAL VARIABLES | | | | | | | PHYSICAL ACTIVITY VARIABLES | | | | | HEALTH & WELLNESS VARIABLES | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AUTHORS & COUNTRY** | **SURVEY INSTRUMENT, YEAR DATA COLLECTED & SAMPLE SIZE** | REFERENCE PERIOD (DAYS) | ACTIVITY TYPE | FREQUENCY | INTENSITY | DURATION | QUALIFIYING TIME | TOTAL PA | LEISURE TIME PA | WORK RELATED PA | ACTIVE TRAVEL | HOME RELATED PA | HEALTH & HAPPINESS | SMOKING BEHAVIOUR | FRUIT & VEG CONSUMPTION | ALCOHOL CONSUMPTION | SELF-REPORTED BMI |
| ***surveys; reported results reflect on each survey separately.*** | National Health & Nutrition Examination Survey (NHANES) 1999-2004<br>N=31,126<br>Personal Interview in the Home | Last 30 days; Type; Frequency; Intensity; Duration; 10 minutes. | | | | | | Respondents were asked questions relating to physical activity across four domains (home, transportation, sport and leisure-time).<br><br>Transportation-relate physical activity was defined as walking or bicycling to work, school, or to do errands. In particular, respondents were asked about participation, frequency, and duration of walking and cycling. | | | | | | | | | |
| **Brown *et al.* (2004)**<br><br>**US** | Behavioural Risk Factor Surveillance System (BRFSS) 2001<br>N=74,960<br>Telephone Survey | Usual Week; Frequency; Intensity; Duration; 10 minutes. | | | | | | BRFSS 2001 assesses combined leisure time, household and transportation related physical activities.<br><br>Respondents were asked two questions to determine whether in a usual week they participated in moderate intensity physical activities such as brisk walking, cycling, vacuuming, or gardening, and /or vigorous intensity | | | | | None of the above lifestyle variable were considered. | | | | |

**TABLE 2.11: ADULT POPULATION BASED SURVEYS : A DETAILED ANAYLSIS OF METHODOLOGICAL, PHYSICAL ACTIVITY AND HEALTH & WELLNESS VARIABLES FOR EACH PUBLICATION IDENTIFIED FOR FINAL REVIEW**

| | METHODOLOGICAL VARIABLES | | | | | | | PHYSICAL ACTIVITY VARIABLES | | | | | HEALTH & WELLNESS VARIABLES | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AUTHORS & COUNTRY** | **SURVEY INSTRUMENT, YEAR DATA COLLECTED & SAMPLE SIZE** | REFERENCE PERIOD (DAYS) | ACTIVITY TYPE | FREQUENCY | INTENSITY | DURATION | QUALIFIYING TIME | TOTAL PA | LEISURE TIME PA | WORK RELATED PA | ACTIVE TRAVEL | HOME RELATED PA | HEALTH & HAPPINESS | SMOKING BEHAVIOUR | FRUIT & VEG CONSUMPTION | ALCOHOL CONSUMPTION | SELF-REPORTED BMI |
| | | | | | | | | physical activities such as running, aerobics or heavy yard work. Respondents who indicated that they did moderate or vigorous intensity physical activity were also asked to report how many days per weeks they spent at least 10 minutes at a time doing the activities, and how much total time per day they spent doing these activities. | | | | | | | | | |
| **Andersen *et al.* (2001)**<br><br>**US** | National Health & Nutrition Examination Survey III (NHANES III) 1988-1994<br>N=6,569<br>Personal Interview in the Home | Last 30 days; Frequency.<br><br>Type; Intensity; Duration; Qualifying Time (not stated). | | | | | | Respondents were asked questions relating to leisure time physical activity (LTPA) during the past month and were asked to specify the frequency of participation for the following activities: jogging or running, cycling, swimming, dancing, gardening or yard work, and weight lifting. | | | | | None of the above variables wer considered. | | | | |
| **Swan *et al.* (2008)**<br><br>**US** | National Health Interview Survey (NHIS) 2003 | Various; Frequency; Intensity; Duration; 10 minutes. | | | | | | The Adult Behaviours section of NHIS collects data on 3 types of leisure time physical activity (LTPA): moderate, | | | | | None of the above variables wer considered. | | | | |

**TABLE 2.11: ADULT POPULATION BASED SURVEYS : A DETAILED ANAYLSIS OF METHODOLOGICAL, PHYSICAL ACTIVITY AND HEALTH & WELLNESS VARIABLES FOR EACH PUBLICATION IDENTIFIED FOR FINAL REVIEW**

| | METHODOLOGICAL VARIABLES | | | | | | | PHYSICAL ACTIVITY VARIABLES | | | | | HEALTH & WELLNESS VARIABLES | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AUTHORS & COUNTRY** | **SURVEY INSTRUMENT, YEAR DATA COLLECTED & SAMPLE SIZE** | REFERENCE PERIOD (DAYS) | ACTIVITY TYPE | FREQUENCY | INTENSITY | DURATION | QUALIFIYING TIME | TOTAL PA | LEISURE TIME PA | WORK RELATED PA | ACTIVE TRAVEL | HOME RELATED PA | HEALTH & HAPPINESS | SMOKING BEHAVIOUR | FRUIT & VEG CONSUMPTION | ALCOHOL CONSUMPTION | SELF-REPORTED BMI |
| | N=95,501<br>Personal Interview in the Home | Type (not stated). | | | | | | vigorous, and strengthening activities. Data are gathered on the frequency and duration of such activities. | | | | | | | | | |
| **Zhu *et al.* (2004)**<br><br>**US** | National Health & Nutrition Examination Survey III (NHANES III) 1988-1994<br>N=18,825<br>Personal Interview in the Home | Last 30 days; Frequency; Intensity.<br><br>Type; Duration; Qualifying Time (not stated). | | | | | | Respondents were asked questions relating to leisure time physical activity (LTPA) during the past month and were asked to specify the frequency of participation for the following activities: jogging or running, cycling, swimming, dancing, gardening or yard work, and weight lifting. | | | | | Smoking behaviour, alcoh consumption and carbohydrate (CHC intake were examined | | | | |

## 2.5 DISCUSSION ON FINDINGS OF THE SYSTEMATIC REVIEW

The systematic review has revealed the considerable effort that has been expended in endeavouring to quantify physical activity, in particular in the US and UK, and specifically in the last decade. The review would appear, at first glance, to provide a solid empirical foundation from which to formulate and test policy. However, a more forensic examination of this research suggests that a degree of caution should be exercised in the application of these data. In order to critique this literature, the remainder of this chapter will reflect on the review under the banner of two broad themes: (1) Surveying Physical Activity; and (2) Quantifying Health & Wellness. The chapter will conclude with a critical reflection on the strengths and weaknesses of both the systematic review process and the extant literature, thereby providing a critical logistical link to the development of SAPAS itself.

## 2.6 SURVEYING PHYSICAL ACTIVITY

Almost universally the available research celebrates the obvious physical and psychological benefits of physical activity while lamenting the growing epidemic of obesity linked to increasing sedentary lifestyles (Hopkins *et al.*, 1991; Martínez-Gonzalez *et al.*, 1999; Turk *et al.*, 2001; Kerner & Kurrant, 2003; Craig *et al.*, 2004; Haskell *et al.*, 2007; Tzuo *et al.*, 2006; McGrady et al, 2007). However, the degree of sophistication attaching to the measurement of this relationship varies considerably across studies.

With this in mind, Janz (2006) acknowledged the future need to 'accurately' measure physical activity in epidemiological research in order to (1) successfully establish the

relationship between physical activity and health outcomes; (2) set efficacious and reasonable physical activity guidelines; (3) determine the causal factors for activity choices; and (4) develop interventions that will improve activity levels across the population. However, he also acknowledged that the measurement of a behaviour as complex and multifaceted as activity is, at best, challenging.

It is also worth noting that the degree of comparability across surveys is limited. This is not necessarily because one survey is better than another. The reality is that the commissioners of each survey had different objectives and were not primarily concerned with producing data that was comparable to other data sets within their own nation or indeed data sets in other countries. It is therefore worth stating that there is probably no 'gold standard' of best practice for the proposed SAPAS to replicate. The best that can be hoped for is an optimum solution based on the precise objectives of the research, the resources available, and the lessons learnt from similar previous studies.

### 2.6.1 SELF REPORTING BEHAVIOUR

Evidence from this systematic review indicates that the majority of existing studies have relied heavily on questionnaire methods to characterise 'easy to recall' structured movement during exercise, sport and work (Brown & Bauman, 2000; Brown & Miller, 2005; Lan *et al.*, 2006; Craig *et al.*, 2004; Duvigneaud *et al.*, 2007). Unfortunately, it is well known that self-reporting of physical activity through questionnaires is subject to a variety of factors, most notably over reporting of time and intensity (Montoye *et al.*, 1996, cited in Rzewnicki *et al.*, 2002; Craig *et al.*, 2004; Reeves & Rafferty, 2005; Craig *et al.*, 2007).

In order to address this issue a number of researchers have developed guidelines for interviewers explicitly warning them about this potential bias and also providing relevant instructions (De Back *et al.*, 1981; Taylor *et al.*, 1978; Rzewnicki *et al.* 2002). One reason for over reporting of physical activity may be the wish to present oneself in a positive light by giving socially desirable responses (Edwards, 1957, cited in Rzewnicki *et al.*, 2002; Nunnally, 1978). In support of this statement, Hillsdon *et al.* (2001) in a study aimed at assessing the impact of England's ACTIVE for LIFE[11] campaign used a physical activity questionnaire to obtain information from participants (n=3189) about the frequency, intensity, duration and type of physical activity (work, home, transportation, sport/recreation) undertaken in the past four weeks. The study found no evidence to suggest that the campaign improved physical activity; either overall or in any subgroup. However, the researchers concluded that one of the limitations of the study was that 'panel survey' may have affected reported levels of physical activity, calling it 'a kind of Hawthorne Effect' where less active groups may have been inclined to over-report their physical activity at follow-up.

Furthermore, Janz (2006) argues that self-reporting activity through questionnaires is cognitively difficult for adults, the elderly, and other subgroups, and they are also prone to various degrees of measurement error depending on the facet of activity queried and the time period considered. However, despite these short comings and given the lack of feasible alternatives, the reliance on questionnaires remains the most common assessment technique in epidemiology (Janz, 2006; MacAuley, 1994).

[11] The ACTIVE for LIFE campaign was aimed at increasing knowledge and acceptability of the CMO's new physical activity recommendations and contributing to increase participation.

Interestingly, in addition to physical activity, over reporting has been found to be significantly correlated with health reports and health related behaviours (Kristiansen *et al.*, 1984; Mathers *et al.*, 2001, cited in Rzewnicki *et al.*, 2002).

### 2.6.2 METHODS AND INSTRUMENTS

As highlighted in section 2.5.1, most studies included in this review measure physical activity by questionnaire but there seems to be little consistency in questionnaire wording and survey design. The techniques used are often imprecise and employ various methods to assess the physical activity and health related behaviours of respondents. Many instruments have been designed to only measure Leisure Time Physical Activity (LTPA) (e.g. Behavioural Risk Factor Surveillance, Centres for Disease Prevention, 2001; National Health Interview Survey (NHIS; National Centre for Health Statistics 1997, cited in Boslaugh *et al.* 2005) and have not attempted to assess physical activity that may be performed in other life domains such as home, work or travel. Questionnaires have been self-administered or administered by an interviewer face to face or on the phone and are of variable length and complexity. Most tend to depend on recall, ranging from several days to 12 months.

Table 2.11 provides a detailed breakdown of the methods employed for each survey reported in the final review, including questions relating to key variables classified by methodological, physical activity, and health & wellness variables[12]. A total of 25

[12] Details relating to 25 survey instruments listed in Table 2:11 has been drawn from information contained within each publication included in the review. On this basis, full details (e.g. methodology) relating a particular survey instrument may not have been included in the paper and therefore not be recorded in the summary table.

different survey instruments[13] have been used across nine different countries (United States, United Kingdom, Australia, Canada, Spain, Slovenia, Taiwan, Belgium, and Sweden). At first sight many of the surveys listed appear similar. For example, the frequency, intensity and duration of activity undertaken has been recorded on 25, 22 and 18 separate occasions. Furthermore, the methods of data collection appear similar with many of the surveys using one of the three ways to collection the data, Personal Interview in Home (12), Telephone (8) and Self-Administered Postal Questionnaire (4).

These apparent similarities, however, are far outnumbered by the methodological differences. These differences place severe constraints on making any meaningful comparison of results across and between surveys. This is not to suggest that *de facto* there ever existed a basis for comparison. Rather it is to flag up dangers of a tendency to make comparisons whenever 'like is not being compared with like'. Superficial similarities, immediately evident through repeated use of the same concepts (e.g. frequency, intensity, duration, participation), creates the impression of the possibility of comparison, or the ability to measure change over time. Closer examination of the different interpretations given to these concepts, or the values placed on concepts in the context of survey objectives, reinforces the fact that generally like is not being compared with like.

Many of the studies included in the final review originate from the United States (30) several other countries (24) and the United Kingdom (10). In order to rationalise how the 64 papers are subsequently analysed and compared a geographical basis was chosen for three key reasons. First, nearly half of the papers (30/64) originated from the United

[13] A number of surveys were excluded from the final analysis on the basis that they were not 'adult based' surveys (e.g. Boone et al., 2007) and/or surveys which were not designed to measure physical activity (e.g. Besser & Dannenberg, 2005).

States (US) where the pioneering research into the field was conducted. Thus from both historical and quantity perspectives the US was seen as a distinct segment of the literature. Second, Northern Ireland is part of the United Kingdom (UK) and therefore from cultural and political perspectives it was important to be consistent with practices currently being employed in Northern Ireland and elsewhere in the UK. As part of the action research component of this study, the author was a member of a UK-wide home nations steering group that was working to harmonise the collection of sport and physical activity data. Third, the other international papers are culturally remote from the context of Northern Ireland and were therefore considered to be useful background but less immediately relevant than the papers from the US and the UK.

**United States**

In the US, physical inactivity is widely recognised as a risk factor for premature death and chronic diseases (U.S. Dept. of Health and Human Services, 1996). This is one of the reasons why a 'great deal of effort' has been devoted to promoting physical activity among Americans (Bouslaugh et al, 2005). As part of this effort, the Centre for Disease Control (CDC) and the American College of Sports Medicine (ACSM) issued a recommendation that every US adult should accumulate 30 minutes or more of moderate intensity physical activity on most, preferably all, days of the week' (Pate *et al.*, 1995).

A number of national surveys, including the BRFSS 2001, NHIS 1997 and the National Health & Nutrition Examination Survey (NHANES; National Centre for Health Statistics, 2001), have included questions intended to measure the respondents' physical activity level. These surveys, however, consider only leisure time activities, not physical activity performed as part of one's work in determining the individual's

activity level. For instance, the NHANES physical activity questions refer specifically to, 'exercise, sports, and physically active hobbies that you may have done in your leisure time or at school' and reports whether activity was performed in the last 30 days (National Centre for Health Statistics, 2001, pp. 14-112, cited in Bouslaugh *et al*, 2005).

The 1997-98 NHIS (National Centre for Health Statistics, 1997) introduces questions about 'physical activities (exercise, sports, physically active hobbies...) that you may do in your leisure time' and reports the frequency of such activity in terms of sessions per week (Barnes & Schoenborn, 2002, p.22, cited in Bouslaugh, *et al.* 2005). Although questions about combined leisure time, household and transportation related physical activities have been included in the 2001 BRFSS (Brown *et al.*, 2004; Kruger *et al.*, 2007) and the NHANES (Kruger *et al.*, 2007), this type of information has not customarily been combined when calculating physical activity levels. One explanation for this decision is that leisure activity that is under an individual's control and something that can be more easily be modified. In 2005, Bouslaugh *et al.* explored the extent to which the exclusion of work place activity may lead to an under-estimation of activity level in an adult population and whether the classification of physical activity differs by demographic group when work place activity is included. The study examined the effect of including the workplace physical activity in calculating the proportion of adults meeting Centre for Disease Control (CDC) physical activity guidelines. Data on leisure time and work place activity were collected from 1,090 black and white adults in St. Louis, Missouri. A series of assumptions were used to equate work place and leisure time physical activity and depending on the assumptions used, the researchers found an absolute increase of 5.5% to 8.4% of individuals meeting the moderate activity guidelines and an absolute increase of 1.5% to 1.7% for the vigorous activity guidelines. In particular, they found that men were significantly more

likely than women to be re-classified as meeting the vigorous standard when workplace activity was included.

Therefore, these finding suggest that the existing policy of excluding workplace activity in the definition of physical activity has led to an underestimation of adults meeting the CDC guidelines, especially among men. However, Bouslaugh *et al.* did acknowledge a number of concerns/limitations with their study: (1) the procedures used for this study were only an initial attempt to include work-based physical activity when evaluating an individual's activity level according to the CDC guidelines and that more specific measures that quantify the amount of work place physical activity are needed; (2) whether work place physical activity confers health benefits different to those provided by leisure time physical activity. In measures of physical activity such as those used in the 2001 BRFSS, the researchers argue that a decision to allow certain activities (e.g. housework and yardwork) to contribute toward meeting physical activity standards only when not performed for pay seems arbitrary. Furthermore, they recommended that further research is required to determine the link, if any, between work place physical activity and health outcomes as it would contribute greatly to improved measurement of physical activity and efforts to ascertain possible differences in health benefits accrued from leisure time physical activity versus workplace physical activity.

In the last decade, CDC has made an effort to include workplace physical activity when evaluating an individual's activity level. For instance, in May 2003, the CDC issued a paper using data from the 2000 NHIS (Barnes & Schoenborn, 2003), within which data regarding usual daily activity, as distinct from leisure-time physical activity, were collected. Activity levels for leisure time activity and usual daily activity were calculated separately and combined to create an estimate of total physical activity, in

five categories from 'never active' to 'high physical activity level'. The methodology of this study was different to Bouslaugh *et al.* (2005), but the general pattern of results was similar.

Besser *et al.* (2005) carried out a study to estimate the total daily time spent walking to and from transit (i.e. public transportation), and the predictors of achieving the 30 minutes of daily activity by doing so. Transit associated walking times for 3,312 transit users were examined among the 105,942 adult respondents to the 2001 National Household Travel Survey. The findings revealed that people who use transit spend a median of 19 minutes daily walking to and from transit; 29% achieved the greater or equal to 30 minutes of physical activity a day solely by walking to and from transit. They concluded that walking to and from public transportation can help to reduce levels of physical inactivity and promote and maintain active lifestyles across the population. This study is the first and only to examine the physical activity obtained by Americans who walk to and from transit and the predictors of achieving 30 minutes of transport related activity. On the downside, this survey only measured 'walking to and from transit' as a form of physical activity and did not attempt to capture information on other transport related activity (e.g. cycling/walking for recreation) or activities that were performed in other life domains such as a work, home and leisure. Furthermore, the level of exertion for each walking trip was not collected which means that it would be difficult to determine whether or not a health benefit had been accrued.

In 2003, Troped *et al.* examined the environmental correlates of both recreational and travel-related physical activity of 413 adults living in Arlington Massachusetts, USA. Data on physical activity were collected used the Arlington Physical Activity and Bikeway Survey. Recreational physical activity was determined with two questions on

frequency and duration of activity over the past four weeks. Transportation physical activity was determined with two questions relating to walking and cycling. The findings from the study suggested that physical environmental variables (e.g. heavy traffic, sidewalks, street lights) were associated with transportation physical activity, but not with recreational physical activity. Furthermore, the researchers noted that, as far as they were aware, this was the first study that had attempted to simultaneously examine correlates of both recreational and travel-related physical activity in a given population.

There have been a number of national surveys undertaken in the United States since 1997. Earlier surveys, such as NHIS (1997), only included questions designed to measure leisure time activities and not physical activity undertaken in other life domains including work, home and transportation. Although questions about combined leisure time, household and transportation related physical activities were included in later surveys such as BRFSS 2001, these types of information have not usually been combined when calculating total physical activity levels.

**Other Countries**

In parallel with this work in the US, evidence from this review indicates that there has been a number of large scale population based surveys carried in a number of other countries (7), all designed to assess physical activity levels and health related behaviours of their adult population. However, many of these surveys only considered occupational and/or leisure time activities, and not physical activities performed in the home or while travelling (see Table 2.12).

**TABLE 2.12: OTHER SURVEYS MEASURING OCCUPATIONAL AND/OR LEISURE TIME ACTIVITIES**

| COUNTRY | SURVEY | AUTHORS |
|---|---|---|
| Taiwan | Taiwanese National Interview Survey | Lan *et al.* (2007) |
| Taiwan | National Council on Physical Fitness Survey[14] | Ku et al (2006) |
| Australia | Active Australia Survey | Brown & Bauman (2000) |
| | Australian Longitudinal Study on Women's Health | |
| Belgium | Flemish Physical Activity Computerised Questionnaire | Duvigneaud *et al.* (2007) |
| Spain | Spanish National Health Survey | Gutiérrez - Fisac *et al.* (2002) |
| Sweden | Swedish Physical Activity Questionnaire | Lissner *et al.* (1996) |
| Canada | Canadian Fitness Survey (using adaptations of the Minnesota Leisure Time Physical Activity Questionnaire) | Craig *et al.* (2004) |
| Saudi Arabia | Saudi National Survey | Alsaif *et al.* (2002) |

Two of the studies were concerned with assessing physical activity levels and health related behaviours of the adults in their respective countries. First, Zaletel-Krageli *et al.* (2006) undertook research with the aim of assessing the prevalence of selected health behaviours and thereby identifying 'at risk' population groups in the adult population of Slovenia. The study focussed on unhealthy nutrition related to obesity and diabetes and insufficient physical activity. The data originated from the CINDI Health Monitor (CHM) survey carried out in 2001. A self-completion postal questionnaire was issued to 15,379 participants. An estimate of the average level of physical activity was derived by incorporating questions from the IPAQ (short form) into the existing CHM Questionnaire. IPAQ was specifically designed to measure the intensity, frequency and duration of physical activity undertaken in the past seven days across four life domains

[14] NCPFS was one of two surveys used to inform this study. No specific details on physical activity measurement was provided for the second survey - National Health Interview Survey, 2001

(work, home, transportation and sport/leisure), and not solely to focus on leisure time physical activities. In this study, the researchers acknowledged the usefulness of IPAQ questions as a tool measuring physical activity levels, but highlighted that its use could be problematic when incorporated into existing questionnaires owing to differences in the wording of questions asked.

Secondly, Turek *et al.* (2004) summarised the latest findings from a large cross sectional study aimed at assessing the health attitudes, knowledge behaviour and risks in the post-war Croatian population. The field study was undertaken over the period 1995-1997 and it included 10,000 adult volunteers in 30 randomly selected settlements from all 21 Croatian counties. Data were collected on the general knowledge and attitudes to health and information on the following: smoking behaviour, alcohol consumption, nutrition habits, physical activity, and family history. The patterns of physical activity were examined using information on occupational and spare time activities (home, leisure, active sports training) using the one week recall technique. Intensity of exertion was graded into four categories (light, medium, heavy and very heavy) and offered to the participants together with examples of physical activities for each category. It is reassuring to find that both countries involved in these national surveys have recognised the need and value of measuring total physical activity (work, home, transportation and leisure) rather than merely focussing on LTPA and/or occupational activity (WRPA). However, it is still worth noting, that there is little consistency in the survey design and methods employed in carrying out each survey.

**United Kingdom**

Evidence from the review indicates that at least five national surveys relating to adults' physical activity and health have been carried in the UK since 1992 (see Table 2.13). All of the studies listed, with the exception of Poortinga *et al.* (2007), have measured total physical activity, including, at work, leisure, home, and as a means of transport. However, as stated earlier, there is little consistency in the questionnaire wording, survey design and methods employed.

**TABLE 2.13: UK SURVEYS MEASURING PHYSICAL ACTIVITY LEVELS AND HEALTH**

| UK/REGION | SURVEY | AUTHORS |
|---|---|---|
| England | Allied Dunbar National Fitness Survey (ADNFS) | Fentem & Mockett (1998) |
| England | Bespoke National Survey to Assess the Impact of England's Active for Life Campaign | Hillsdon *et al.* (2001) |
| England | Health Survey for England (HSE) | Pootinga *et al.*. (2007) |
| Northern Ireland | International Physical Activity Questionnaire (IPAQ) | McGrady *et al.* (2007) |
| UK | British Women's Heart and Health Survey | Lawlor *et al.* (2002) |

In 1998, Fentem & Mockett used findings from the ADNFS[15], including measures of height, body weight, waist and hip girths, to explore differences between respondents reporting different levels of habitual physical activity. Data relating to physical activity described the type, frequency and intensity of current habitual activity physical activity and past patterns of participation, how physical activity fitted into lifestyle of respondents and also their attitude to physical activity. The findings from this study suggests that the strength of relationships between a range of physical activity and body composition indicators was weaker than expected as it appeared doubtful whether

[15] The ADNFS produced data on a representative sample of men and women aged 16-74 years. A total of 4,316 participants responded. The survey was conducted in two stages. Stage 1 involved an interview in the respondent's home. Stage 2 consisted of a physical appraisal conducted at a specially equipped mobile laboratory sited nearby. From the final sample, 3,024 participants agreed to take part in a physical appraisal. Measurements of weight and body composition and complete records of other relevant information were available for 2,758 subjects.

monitoring population changes in Body Mass Index (BMI) would detect early beneficial changes in obesity brought about by increases in physical activity. The researchers concluded that the waist-to-hip and waist-to-height ratios were more consistently related to activity in men and the waist-to-height ratio was related to vigorous activity in women. Unlike, the BRFSS prior to 2001 and the NHIS 1997, this survey was designed to collect information on physical activity at work, while travelling, in household duties and at leisure.

Poortinga *et al.* (2007) investigated the associations of physical activity with smoking and alcohol consumption using data from the 2003 Health Survey for England (HSE)[16]. This study examined whether these associations were due to people participating in organised sports (the sport hypothesis), and/or reflect the concentration of drinking and smoking in manual occupation groups (the occupation hypothesis). Key findings from this research will be discussed in Section 2.2.5, however it is important to note that this study collected information on people's involvement in sport and exercise activities, including swimming, cycling, workout at gym, aerobics, dancing, running/jogging, football, rugby, badminton, tennis, squash, exercises and 'other' sport and exercise and occupational activity. The level of occupational activity was based on the Standard Occupational Classification (SOC) code of people's current job in combination with the answer to a question about how physical active people feel they are in their job (very, fairly, not very, or not at all). In relation to the measurement of physical activity, like Bouslaugh et al 2005, the researchers concluded that it is worthwhile to distinguish between different types of physical activity (e.g. sport and exercise, occupational) as these different types vary substantially across different socio-demographic groups, and cluster differently with lifestyle risk factors such as smoking or heavy drinking.

[16] Limited information was provided on the 2003 HSE in this publication.

Even closer to home, McGrady *et al.* (2007) surveyed 1,074 General Practitioners (GPs) in Northern Ireland using the International Physical Activity Questionnaire (IPAQ) (short form) and questions relating to smoking and alcohol consumption in order to assess their levels of physical activity and other health related behaviours and then compared their reported levels of physical activity with those of the general population. This instrument was developed as a means for introducing an international standard for measuring physical activity (Booth 2000; Booth *et al.*, 1999 cited in Rzewnicki *et al.*, 2003). Long and short versions of IPAQ were developed, each with distinct purposes. The short IPAQ was developed for use by public health officials to monitor entire populations, and its reliability and validity has been tested in many countries (Craig *et al.*, 1999; Craig *et al.*, 2002, cited in Rzewnicki *et al.*, 2003). In contrast to some of the other surveys mentioned earlier, IPAQ was specifically designed to measure the intensity, frequency and duration of physical activity undertaken in the past seven days across four life domains (work, home, transportation and sport/leisure), and not solely focus on leisure time physical activity associated with exercise, which has been the case in many previous epidemiological studies (Guitiérrez-Fisac *et al.* 2002). Like 1992 ADNFS, IPAQ has been designed to provide, in a national survey context, a 'true' indication of an individual's total physical activity.

In 2002, Lawlor *et al.*, using data from women who participated in the baseline assessment for the British Women's Heart and Health Study, explored the prevalence of different types of physical activity among elderly British women (n=2,341), their association with obesity and the factors that determine physical activity. In this survey, each participant completed a detailed questionnaire providing information on socio-demographic, lifestyle and health factors; a nurse-led interview was used to provide

more cardiovascular disease information and a drugs history; a physical examination, including anthropometric measurement, lung function tests, and ECG was also undertaken. Physical activity levels were assessed by asking participants to indicate their usual duration of activity in hours per week for several types of activity: walking, cycling, physical exercise, light/heavy housework, light/heavy gardening and DIY. In addition, they were asked to indicate whether their usual walking pace was slow, steady, brisk or fast. Each type of activity was defined as moderate or vigorous based on the US Surgeon General's report on physical activity. The findings revealed that the achievement of recommended levels of physical activity depends on the criteria used; inclusion of domestic activities, in particular heavy housework, increased the proportion of elderly women who are active by over threefold. If domestic activities are excluded, then only 21% of their samples of British women aged 60-79 years were regularly active. Heavy housework, gardening and DIY have similar levels of energy expenditure as other moderate forms of moderate intense activities such as brisk walking and it is argued that people who spend similar amounts of time on either domestic activities or other forms of moderate activity should achieve equal health benefits (Blair, 1992). However, the researchers did conclude that further research is necessary in order to demonstrate the independent health benefits of participating in domestic activities.

Many of the national surveys conducted in the UK since 1992 were designed to measure total physical activity, including at work, leisure, home, and as a means of transport, however a key finding from this review is the fact that there is little consistency in the questionnaire wording, survey design and methods employed. Interestingly, two different survey instruments (ADNFS 1992 and IPAQ (short) 2001) used in two UK studies were designed specifically to collect information on physical activity at work, while travelling, in household duties and at leisure.

### 2.6.3 SURVEYING PHYSICAL ACTIVITY: CONCLUDING REMARKS

Scanning across all three geographical locations (US, Other Countries and the UK), it is apparent that many of the national surveys have been designed to measure levels of physical activity but in different ways and including: (1) Leisure time physical activity only, and not physical activity undertaken in other life domains including work, home and transportation (e.g. NHIS 1997); (2) Combined physical activity levels across four life domains – home, work, transportation and sport/leisure (e.g. BRFSS 2001); (3) Leisure time physical activity and activity that is undertaken at work (e.g. HSE 2003); and (4) Physical activity that is undertaken across four life domains - home, work, transportation and sport/leisure (e.g. IPAQ 2001 and ADNFS 1992). However, none of the surveys were designed to measure physical activity levels in all of the four key life domains of home, work, transport and sport/leisure robustly

A review of these studies also indicates that there is little consistency in the questionnaire wording and survey design or the procedures employed in carrying out each survey. For example, questionnaires have been either self-completed or administered by an interviewer and are variable in length and complexity.

In terms of cultural differences, there is little evidence to suggest consistent differences between each of the three identified regions.

1. First, US studies tended to only assess LTPA and not physical activity that may be performed in other life domains such as home, work and travel (Anderson *et*

*al.*, 2001; Patterson *et al.*, 2004; Zhu *et al.*, 2004; Reeves & Rafferty, 2005; Berrigan *et al.*, 2006; Swan *et al.*, 2008);

2. Second, studies in other countries (e.g. Australia, Belgium, Canada) measured physical activity in different ways (1) LTPA only, and not physical activity undertaken in other life domains including work, home and travel (e.g. Brown & Bauman, 2000; Brown & Miller, 2005); (2) Combined physical activity levels across four life domain – home, work, transportation and sport/leisure (e.g. Zaletel-Kragelj *et al.*, 2006); and (3) Leisure time physical activity (LTPA) and activity that is undertaken at work (WRPA) (e.g. Lissner *et al.*, 1996; Guitiérrez-Fisca, 2003); and

3. Finally, UK studies, in the main, focussed primarily on assessing combined physical activity, including at work, leisure, home, and as a means of transport (e.g. Hillsdon *et al.*, 2001; McGrath *et al.*, 2007).

This section considered relevant studies on a geographical basis, the next section will only consider studies that have included health and wellness variables.

## 2.7 EVALUATING HEALTH AND WELLNESS

Notwithstanding the growing attention paid to the prevention of overweight due to its impact on public health and healthcare costs, being overweight has escalated to become a global epidemic (Manson *et al.*, 2004, cited in Duvingneaud *et al.* 2007 p24). If society is to manage this epidemic, it is essential to understand the complex processes leading to an excess of adiposity. These processes involve the interactions of numerous factors including genetic predisposition, social, cultural, environmental and behavioural factors. Although it is commonly accepted that genetic aspects contribute significantly to the variability of body fatness, changes in lifestyles and the environment over the last decades are probably the most important cause of the overweight epidemic (Bray & Bouchard, 1998; WHO, 1998, Lyon & Hirschhorn, 2005; Hill & Melanson, 1999, cited in Duvingneaud *et al.* 2007 p24).

Eight studies in this review investigated and reported physical activity and its association with a number of health and wellness variables including smoking, alcohol consumption, dietary habits, self-reported body mass index (BMI) and subjective general health. These studies include, but are not limited to, the studies summarised in Table 2.14 and the supporting narrative thereafter.

**TABLE 2.14: SUMMARIES OF STUDIES ON PHYSICAL ACTIVITY AND HEALTH & WELLNESS VARIABLES**

| YEAR | AUTHORS | COUNTRY | HEALTH & WELLNESS VARIABLES |
|---|---|---|---|
| 1998 | Fentem & Mockett | United Kingdom | Smoking behaviour, alcohol consumption, dietary habits. |
| 2001 | Turk *et al.* | Croatia | Smoking behaviour, alcohol consumption, dietary habits. |
| 2002 | Gutiérrez - Fisac *et al.* | Spain | Smoking behaviour, alcohol consumption, *subjective health* and *self-reported BMI.* |
| 2004 | Zhu *et al.* | United States | Smoking behaviour, alcohol consumption, dietary habits. |
| 2005 | Reeves & Rafferty | United States | Smoking habits, alcohol consumption, *fruit and vegetable consumption* and *self-reported BMI* |
| 2006 | Lan *et al.* | Taiwan | Smoking behaviour, alcohol consumption, *self-reported BMI* and *subjective health.* |
| 2007 | Duvigneaud *et al.* | Belgium | Smoking behaviour and alcohol consumption. |
| 2007 | Poortinga *et al.* | United Kingdom | Smoking behaviour and alcohol consumption. |

Table 2.14 provides a summary of studies that have investigated and reported these issues. A total of nine different survey instruments have been used across six different countries (US, UK, Spain, Taiwan, Belgium and Croatia). At first sight many of the studies seem to have assessed physical activity levels and its relationship with one or more health and wellness variables. For example, the alcohol consumption, smoking behaviour, dietary habits has been recorded on 8, 8 and 4 separate occasions respectively. However, as will be described below, these apparent similarities are outnumbered by the methodological differences in each survey. In addition, two health-related variables, namely self-reported BMI and subjective health status appear to have only played 'peripheral roles' in many of the studies considered as both

variables have only been considered on three occasions, mainly in combination with other health and wellness variables.

As mentioned in Section 2.6.1, Fentem & Mockett (1998) used findings from the ADNFS[17], including measures of height, body weight, waist and hip girths, to explore differences between respondents reporting different levels of habitual physical activity. As an introduction to this study, the researchers highlighted the potential health benefits of successful national and local campaigns aimed at increasing individual physical activity levels among the general public, especially people in the middle age and older age groups, who are prone to becoming overweight and obese and suggested that the effectiveness of such interventions (e.g. local/national campaigns) in the alleviation of the problems of overweight and obesity could only be adequately determined using valid field measures of body size and composition which are reflective of population change.

The measures were available from ADNFS and the purpose of the paper was to determine which of the indices of body composition were most strongly related to levels of participation in physical activity. However, in addition to physical activity and anthropometric measurements, ADNFS was also designed to capture data relating to a number of 'lifestyle and health measures[18]' including diet, alcohol consumption, smoking behaviour, stress, and social support. Questions relating to 'diet' were based on other surveys (Stephens, 1983; Cox, 1987) and were selected to be a broadly

[17] The ADNFS produced data on a representative sample of men and women aged 16-74 years. A total of 4,316 participants responded. The survey was conducted in two stages. Stage 1 involved an interview in the respondent's home. Stage 2 consisted of a physical appraisal conducted at a specially equipped mobile laboratory sited nearby. From the final sample, 3,024 participants agreed to take part in a physical appraisal. Measurements of weight and body composition and complete records of other relevant information were available for 2,758 subjects.

[18] The exact wording of questions relating to dietary habits, smoking, and alcohol consumption were not included in this paper.

representative picture of nutritional intake, but not to provide a complete nutritional analysis of the respondent's diet. Alcohol consumption was assessed by asking questions about current and past drinking habits and was based on self-assessment of frequency and quantity of drinking (Fentem *et al.*, 1994). The questions on current drinking habits were very similar to those used in the 1987 General Household Survey, including a detailed record of drink consumed in units for the past four weeks. As a result it was possible to estimate the total alcohol consumption for the past four weeks for each respondent. Questions relating to smoking were based on standard epidemiological definitions in order to classify respondents by: (1) smoking frequency (regular/occasional) – current or past; (2) the number of cigarettes smoked per day – current or past; (3) the length of time since starting/stopping smoking. The reported analyses were primarily concerned with exploring the association between levels of habitual physical activity and some dimensions of body composition, and not its association with lifestyle factors such as smoking, alcohol consumption and dietary habits.

Similarly, in 2002 Turek *et al.* reported the main findings from a large cross sectional survey aimed at assessing the health attitudes, knowledge behaviour and risks within the post-war Croatian population. In this study, a questionnaire was used to gather data on smoking behaviour, alcohol consumption, nutrition habits, physical activity and family medical history. A range of physiological measurements, such as body mass index and blood pressure, were also taken. The findings revealed that 79% of males and 50% of females were overweight, the prevalence of both smoking and alcohol consumption was very high and that there were relatively low levels of physical activity in Croatia. This purpose of this study was to present the main findings from the first national health survey (The First Croatian Health Project) conducted in post-war Croatia and did not

seek to explore the relationships between physical activity levels and the range of lifestyle and health measures.

Gutiérrez - Fisac *et al.* (2002) used data from the 1993 Spanish National Health Survey (ENSE in Spanish) to explore the association of work-related physical activity (WRPA) and leisure-time physical activity (LTPA) with self-reported BMI and obesity in the Spanish adult population aged 20-60 years. The ENSE is a cross sectional study of a random sample of 21,061 people representative of the Spanish population. Data were gathered by household interview. The questionnaire was designed to capture data on WRPA, LTPA, BMI, smoking behaviour (smokers, ex-smokers, and non-smokers), alcohol consumption (yes/no), subjective health (very good, good/fair, poor, very poor) and presence or absence of chronic disease, based on self-reported data of medical diagnosis of health problems (e.g. high blood pressure, diabetes etc). Weight and height were self-reported by asking the following questions: Could you say about how much you weigh without your shoes or clothes on? About how tall are you without your shoes on? BMI was calculated as weight in kilograms divided by height in metres squared. A person was considered to be obese when their BMI was greater or equal to 30 $kg/m^2$. The findings from this study suggest that there is no association between sedentary work and BMI. Furthermore, both mean BMI and the proportion of obese persons increased with increasing levels of WRPA. In the case of LTPA the opposite occurred, with both the mean BMI and the percentage of obesity found to decrease with increasing levels of LTPA. The researchers concluded by asking why LTPA and WRPA have the opposite effect on obesity and suggest that diet, a factor much less frequently available in most studies at that time, is responsible for the null effect of WRPA on obesity. Thus, the energy expenditure derived from WPRA could be

neutralised by higher intake or by additional intake in individuals who are more active at work.

Zhu et al (2004) examined the relationship between metabolic syndrome[19] risk and lifestyle factors (diet, physical activity, and smoking and drinking habits) using data from the Third National Health and Nutrition Examination Survey (NHANES III) in the United States. This survey was conducted between 1988 and 1994 and includes 40,000 individuals over the age of two months during the evaluation period. This study involved 11,279 participants over the age of 20 years from four ethnic groups (non-Hispanic blacks, Mexican Americans, non-Hispanic whites and others). The NHANES III database includes information on socio-economic status, physical activity, dietary and smoking habits, as well as anthropometric and biochemical data that could be used to assess the prevalence of a metabolic syndrome. With reference to lifestyle factors, smoking was categorised as current, past and never smoked. Past smokers were identified as those who reported that they smoked at least 100 cigarettes during their lifetime but who did not currently smoke. Drinking was categorised as heavy, light-to-moderate, and nondrinking. Carbohydrate (CHO) intake and fat consumption was measured against dietary recommendations of the US Department of Health and Human Services (USDHHS): low, moderate, and high CHO intakes correspond to <40%, 40% to 60%, and >60% of dietary intake; and low, moderate, and high fat intakes corresponded to <30%, 30% to 40%, > 40% of dietary intake (USDHHS, 2010). The key findings revealed that metabolic syndrome is affected by lifestyle behaviours including physical activity, diet, smoking and drinking habits.

[19] Metabolic Syndrome is a global public health problem identified as a seminal cause of cardio-vascular disease and type II diabetes. It characterised by the clustering of cardiovascular risk factors, including insulin resistance, central obesity, hypertension, and atherogenic dyslipemia (Churilla & Zoeller, 2008).

Reeves & Rafferty (2005) used data from the BRFSS 2000 to report on the prevalence of healthy lifestyle characteristics (HLCs) and to generate a single indicator of healthy lifestyle. Four HLCs were defined in this study: healthy weight (BMI (calculated as weight in kilograms divided by the square of height in metres) of 18.5-25.0), non-smoking, consuming 5 or more portions of fruit and vegetables per day, and regular physical activity. The four HLCs were summed to create a healthy lifestyle index (range, 0-4), and the pattern of following all 4 HLCs was defined as a single health lifestyle indicator. The key findings suggested that 'a healthy lifestyle' - defined as a combination of 4 HLCs , was undertaken by very few adults in the United States (3%). The researchers identified a number of potential limitations to their study. First, as highlighted above, (1) BRFSS prior to 2001 only captured information on LTPA, which may under estimate total activity; (2) BRFSS estimates of daily fruit and vegetable consumption were lower than those based on more extensive food frequency questionnaires (Serdula *et al.*, 1993).

Lan *et al.* (2006) analysed data from the National Health Interview Survey in Taiwan (NHIS) 2001 to investigate the relationship between leisure-time physical activity and death outcome in the elderly. The NIHS is a periodic national survey aimed at understanding the general health of the Taiwanese population. Data were from the 2001 NHIS that incorporated a sample of 6,592 households. All members of a surveyed household were interviewed with a standard questionnaire. There were 2,113 participants involved in the study. The questionnaire was designed to capture information on LTPA and other baseline measures, such as smoking behaviour, alcohol consumption, self-reported BMI and subjective health status. BMI was calculated as weight in kilograms divided by the square of height in metres and categorised as normal (18.5-24), underweight (<18.5), overweight (24.1>27), and obese (>27), based on the

definition from the Department of Health in Taiwan. Self-rated health was graded as excellent, very good, good, fair, and poor and categorised as positive (excellent, very good, good), neutral (fair), and negative (poor). No specific details on how information was captured from participations on smoking behaviour, alcohol consumption were included in this paper. The findings revealed that there was no significant benefit of reduced mortality risk for individuals spending less than 1000 kcal on leisure activity per week[20] as compared with sedentary individuals.

In a cross sectional epidemiological study of Flemish adults (n=4903, aged 18-75 years), Dunvignead et al (2007), confirmed the contention that overweight is a multifactorial problem when they concluded that age and TV viewing are positively associated with overweight, while educational level and health related sports are negatively related to overweight in both genders. Furthermore, they found that in men alcohol consumption and smoking in the past are also among the lifestyle factors associated with overweight. The data for this study were collected by using a range of measurement tools to assess LTPA, alcohol consumption and smoking behaviour and anthropometry. Questions concerning alcohol consumption were based on the Belgian National Health Interview Survey. For drinking behaviour, the participants were categorised as never drinker, moderate drinker (1-3 drinks/day), infrequent drinker (>4 drinks weekday or weekend), frequent drinker (4 drinks every day). The WHO Monica Smoking Questionnaire was used to assess smoking. According to their responses, the participants were classified into 3 groups: (1) those who had never smoked (never smokers), (2) those who had smoked in the past, but had quit smoking (former smokers) and those currently smoking (current smokers).

[20] Older people are recommended to expend at least 1000 kcal per week through regular exercise for mortality reduction.

As referred to earlier, Poortinga *et al.* (2007) explored the positive associations of physical activity with smoking and alcohol consumption and whether these associations are due to people participating in organised sports (sport hypothesis), and/or reflect the concentration of drinking and smoking in manual occupation groups (the occupation hypothesis). The researchers found some support for both hypotheses. Sports activity and heavy drinking were prevalent among sports club members, and occupational activity and heavy drinking were more prevalent among manual occupational groups. On the other hand smoking was less common among sports club members and more common among manual occupational groups. Therefore, smoking was considered to be the more likely explanation for the association between physical activity and smoking. The researchers concluded that it is important to distinguish between different types of physical activity and that this distinction makes it possible to examine the associations of physical activity with smoking and alcohol are attributable to sports related or occupation related activity. They argued that their findings help to explain why some studies found a negative (Kvaavik *et al.*, 2004; Chiolero *et al.*, 2006) and others a positive (Poortinga, 2006b) clustering between physical activity and smoking: whereas former studies focussed on leisure time physical activity (LTPA), the latter considered people's overall physical activity, including occupational activity.

Whilst acknowledging the difficulties in understanding the complex processes involved which may lead to overweight and obesity, it is generally accepted that in recent years changes in lifestyles and the environment are probably the most important cause of obesity (Duvingneaud *et al.* 1997). However, many of studies included in this review (64) did not investigate levels of physical activity and its association with one or more health and wellness variables, including BMI. In fact, of the eight studies that did test this relationship, none appear to have investigated and reported all the listed health and

wellness variables (smoking habits, alcohol consumption, fruit and vegetable consumption, self-reported BMI, and perceived health and happiness) identified within the review assessment framework (Table 2.9). From originality and contribution to knowledge perspectives, these are gaps in the literature that help to inform the direction of the research and the evolution of the research instrument for use in Northern Ireland.

### 2.7.1 EVALUATING HEALTH AND WELLNESS: CONCLUDING REMARKS

In reviewing these studies the intention has been to gain an understanding of how adult involvement in physical activity has been measured at a population based level, and how, if at all, measurement has been refined and adjusted. It is recognised that most surveys used in the studies were designed for purposes other than the measurement of physical activity levels (e.g. National Health & Nutrition Examination Survey (NHANES)). Nevertheless it is important to have an understanding of the various population based approaches to measuring physical activity levels as it will provide a strong basis for the future development of SAPAS in Northern Ireland.

Although the evidence regarding the health benefits of moderate activity is robust, studies have largely examined the effects of brisk walking, leisure time physical activity and occupational activity rather than home related activities. Taken as a whole, and despite its limitations, the literature does help provide a solid foundation on which to build a robust research instrument for the purposes of the present research. This instrument should aim to build on the strengths of existing work while duly acknowledging its shortcomings, and without rehearsing arguments already advanced in this chapter, it is felt that the systematic review has succeeded in meeting this objective.

Any emerging survey instrument should endeavour to be as theoretically and methodologically 'pure' as possible and grounded in previous research. However, political and practical realities also dictate that pragmatism must also influence the research project notably securing buy in from stakeholders and ensuring their willingness to support the study in principle and financially.

## 2.8 KEY LESSONS FROM THE SYSTEMATIC REVIEW

With any systematic review, there lies the danger that the reader can be swamped by the sheer volume of information contained within, and the core messages can become obscured beneath the wealth of detail provided. This review is no exception. From a total of 565 articles first deemed eligible for inclusion, 64 articles were eventually subjected to more thorough examination. This is a considerable number and hence it was felt useful to further disaggregate in two ways, first by geographical location (UK, US and other countries), and second, to scrutinise a smaller subset of studies that specified health and wellness variables alongside physical activity.

For the purposes of informing a future national scale survey the systematic review can perhaps be distilled down into 10 key points that summarise the lessons learnt thus far. Each of these points is detailed below.

1. Sample sizes vary from 1074 (McGrath *et al.*, 2007) to 264,684 (Kruger *et al.*, 2007).

2. The methods used vary from postal surveys (Brown & Bauman, 2000; Zaletal-Krageli *et al.*, 2006), telephone surveys (Lawlor *et al.*, 2002; Craig *et al.*, 2004; Brown & Miller, 2005), in the home surveys (Hillsdon *et al.*, 2001; Turek *et al.*,

2001; Patterson *et al.*, 2004; Ku *et al.*, 2006; Lan *et al.*, 2006; Swan *et al.*, 2008) and in the home surveys using CAPI and objective measurements.

3. Reference periods vary from last 7 days (Brown & Bauman, 2000; Turek *et al.*, 2001; Craig *et al.*, 2004; Brown & Miller, 2005; McGrath *et al.*, 2007), previous 4 weeks (Hillsdon *et al.*, 2001), usual week (Duvigneaud *et al.*, 2007), past 2 weeks (Lan *et al.*, 2006), last 30 days (Anderson *et al.*, 2001; Kruger *et al.*, 2007) and last 3 months (Ku *et al.*, 2006).

4. Physical activity has been measured using a narrow definition such as LTPA only (Brown & Bauman, 2000; Anderson *et al.*, 2001; Zhu *et al.*, 2004; Brown & Miller, 2005; Craig *et al.*, 2004); a broad definition covering four life domains (Fentem & Mockett, 1998; Lawlor *et al.*, 2002; Brown *et al.*, 2004; Zaletel-Kragelj *et al.*, 2006; McGrath *et al.*, 2007); and a hybrid version (LTPA, transport and/or work related physical activity) (Gutiérrez – Fisac et a., 2002; Berrigan *et al.*, 2006; Kruger *et al.*, 2007; Poortinga, 2007).

5. The measurement of qualifying times varies with typical scores being 10 minutes ( Craig *et al.*, 2004; Zaletel-Kragelj *et al.*, 2006; Kruger *et al.*, 2007; McGrath *et al.*, 2007; Swan *et al.*, 2008), 20 minutes (Fentem & Mockett, 1998) , or 30 minutes (Ku *et al.*, 2006).

6. To measure physical activity in order to assess whether it contributes towards a health benefit requires knowledge of: prevalence, duration, intensity, and frequency.

7. Some surveys are designed to provide data that is consistent with the recommendations of a Chief Medical Officer (or equivalent) these prescription levels vary between countries and over time.

8. Health and wellness variables have the lowest incidence of inclusion (11%) relative to physical activity measures (22%) and methodological variables (67%) (See Table 2.10).

9. Health and wellness variables were least likely to be included in secondary analysis relative to other variables.

10. Most peer reviewed papers focused on highly specific secondary analysis of a subset of variables within the full data set. In order to see the wider picture a narrative literature review is required that examines some of the studies identified in the systematic review in greater depth as well as studies that are known about but which did not feature in the systematic review.

## 2.9 SYSTEMATIC REVIEW: CONCLUDING REMARKS

In summary, the review reveals that an extensive variety of survey techniques has been employed to measure physical activity over the years, with little evidence of a consensus around how best to capture and then report this information. With reference to the definitions of key terms as presented in Chapter 1, there is little to suggest that successive surveys have built on earlier work to thereby move towards the application of standard taxonomies of either physical activity (broadly defined) or related health and wellness indices. Instead, the landscape that is portrayed is one that undulates considerably, with some surveys characterised by narrow and rigid criteria while others

appear more liberal in including many forms of activity that could include a physical activity dimension.

One interesting and highly significant example relates to the recording of accumulated physical activity attached to everyday life as opposed to structured activities (including sport and recreation), for example walking to and from transit, or activity associated with employment itself. Too often, broad category labels have been applied (e.g. sedentary v non-sedentary; manual v non-manual; SOC category) that reveal little of calorific expenditure that is actually attached to a day's work. Hence, for the purposes of SAPAS there is no one survey that presents itself as a model of good practice but instead the current research will draw on lessons learned from across the literature to help inform the way forward and the design of the survey instrument itself. This developmental process is detailed in Chapter 4.

The limitations of the systematic review of literature in the UK context are best illustrated by the fact that surveys which have examined participation in sport and physical activity (General Household Survey, 1983, 1986, 1987, 1990, 1993, 1996, 2003; and the Active People Survey 2005/6 and 2007/8) were not revealed by the review. This does not mean that these surveys are of poor quality, rather that there has been no relevant analysis of their results published in peer reviewed journals. The author's awareness of these surveys and their omission from the systematic review searches provided a clear rationale for conducting a further search of the so called narrative literature[21].

[21] Narrative literature can be defined as a body of work that is not easily located through conventional channels such as publishers and online databases, but which is often original and typically recent. For the purposes of this research the Active People Survey in England is a good example.

# CHAPTER 3: A REVIEW OF THE NARRATIVE LITERATURE ON POPULATION BASED APPROACHES TO MEASURING PHYSICAL ACTIVITY LEVELS AND HEALTH AND WELLNESS CHARACTERISTICS

## Road map of the thesis

| Introduction | Review of Literature | Methodology | Results | Discussion | Conclusions |
|---|---|---|---|---|---|
| | Ch2 A Systematic Review of the Literature on Population Based Approaches to Measuring Physical Activity & Health | | Ch5 Exploratory Data Analysis I | | |
| Ch1 ► | Ch3 A Review of the Narrative Literature on Population Based Approaches to Measuring Physical Activity & Health | ► Ch4 ► | Ch6 Exploratory Data Analysis II | ► Ch4 ► | ► Ch8 |

## 3.1 INTRODUCTION

As highlighted in Chapter 2, this study seeks to evaluate population based approaches to measuring adult participation in sport and physical activity, and the relationship between physical activity and various demographic, physiological and psychological variables. Given the disparate nature of the physical exercise literature and to ensure that all potential material has been taken into account, the aim of this chapter is to complement Chapter 2 by going beyond standard academic sources and presenting findings of a narrative literature review.

In some fields, the need for a narrative literature review is not always paramount as searches of academic databases will uncover all relevant material. However, in relation to physical activity it was apparent from an early stage that a considerable number of significant population surveys may not necessarily have featured in peer reviewed papers and therefore would be invisible to the systematic review process. Having persuaded the steering group that the rigours of systematic review had not been revealing of literature that existed, the decision was taken to carry out a complementary review of the narrative literature, but on this occasion relying on more traditional literature searching procedures.

To aid the process, a number of organisations based in countries across the world (e.g. United Kingdom, United States, Canada, Australia etc.) that were known by the author to be involved in the commissioning, undertaking or cataloguing of relevant research were contacted by email or via their websites. These contacts led to other sources, supplemented by the author's knowledge of research that had helped to inform policy debates over recent years. While this review was less 'systematic' than that described in Chapter 2, it was anticipated that it would usefully supplement the earlier findings and

thereby yield a deeper and more holistic understanding of the full spectrum of physical activity and health research, including how this has impacted on policy development internationally. It will also help clarify the primary approaches that have been relied on to measure adult physical activity levels and health across the public domain and beyond academic research projects. In summary, in tandem with Chapter 2 but with a focus on narrative literature, the chapter aims to address the following objectives:

1. To highlight physical inactivity as a contemporary global disease (3.2);

2. To review the current evidence linking physical activity with health outcomes (3.3);

3. To examine the evidence as to how much physical activity is needed to derive health benefits (3.4);

4. To identify and critically evaluate previous survey methods for collecting information and measuring physical activity and/or health and wellness characteristics at a population level (3.5); and

5. To derive and state the aim and objectives of this study in light of the findings from both the systematic review and the review of the narrative literature (3.7).

Narrative literature, by definition in this study, is that which is associated not only with quantification but also with the practice of strategy/policy development and implementation. To the outsider, this literature can often appear disjointed and obscure (hence narrative) unless it is set squarely within the context in which it was initially

commissioned and then used to inform decision-making. Hence, the initial section of the chapter will endeavour to frame the narrative literature within its broader policy context, in the process building sequentially on issues that were first introduced in Chapter 1.

## 3.2 PHYSICAL INACTIVITY – A CONTEMPORARY GLOBAL DISEASE?

Physical inactivity is a global public health issue but the true extent of the problem around the world has been difficult to assess accurately, as Chapter 2 amply demonstrates. Before focusing on this assessment as laid out in the narrative literature and its impact on policy development, it may be useful to set the scene by considering 'physical activity' in the broader context of human and societal development.

To begin at the beginning, homo sapiens' early ancestors depended on their physical prowess in order to survive; they spent most of their lives hunting for food and avoiding death from accidents, natural disasters and wild animals. Blair *et al.* (1992) explained that, at this time, infectious disease was virtually non-existent, because the population lived in groups that were too small to harbour a reservoir of pathogens. Instead, the main causes of death in this period were starvation and violence. The agricultural period that followed, beginning more than 10,000 years ago, saw people growing crops and raising animals, activities which, to this day, require significant levels of physical effort. As society slowly became more sophisticated and mechanised, as a species inevitably we became less physically active, and even from the time of many early cultures (including the Ancient Greeks and Romans) it began to be acknowledged that there was a need to promote physical activity as a way of preventing ill-health and securing the well-being of the nation (Berryman, 1989).

Added to this slow trend, over time the growth of industrialisation presented further significant issues for promoting health and wellness. The industrial revolution of the 19th and early 20th centuries resulted in massive over-crowding in towns and cities, with people having to endure appalling working conditions allied to environmental pollution and little or no public health provision. It was not until 1854, when Dr. John Snow linked the cholera epidemic in London to the water supply from the Broad Street pump in Soho, that public health first became a priority issue (Summers, 1989). Life in this era was still relatively active for most people, while death was frequently caused either by infectious diseases or malnutrition.

As public health services improved and medical science developed, many infectious diseases became a thing of the past; however, at the same time, technology was advancing rapidly, and with it came the advent of labour saving devices such as the motor car, automated appliances (dishwashers and washing machines), elevators and escalators rather than stairs, television and computers for entertainment and leisure activities and email use for communications (Goran & Treuth, 2001). Haskell (1996) maintained that advances in communications technology have contributed to the reduction in daily expenditure of effort in occupational tasks for many people; Blair (1988) suggests that this period, which he called the 'nuclear/technological period' began in 1945, and it is since then that physically active lifestyles have continued to decline to the point where sedentary lifestyles are becoming endemic across the western world. Furthermore, Nigg (2003) suggested that technology's influence on physical activity and exercise has led to a secular decline in physical activity; however, in a more positive vein it has also presented opportunities for a) the proactive recruitment of large

populations into voluntary physical activities; and b) the individualisation of health-based interventions on a large scale.

Although there has been a fourfold decrease in daily calorific expenditure since the days of hunter gatherers (Eaton *et al.*, 2002), in essence our basic autonomy and physiology has remained relatively unchanged over the past 40,000 years, and the interrelationships between energy intake, energy expenditure, and physical activity requirements for modern people are still similar to those originally designed for our Stone Age forbearers (Astrand, 1994; Cordain *et al.*, 1998).

The concept that individuals could take responsibility for, and improve, their own health by eating the right food and taking enough exercise, as advocated by the ancient Greeks, is as relevant today as it was then; indeed they are exactly the same messages that health professionals are currently promoting in the 21$^{st}$ century. The reduction in daily physical activity has been identified as an important public health concern for all sections of the population, including children (Stone *et al.*, 1998), with major causes of present day morbidity and mortality being linked with unhealthy living habits, including physical inactivity (Blair *et al.*, 1989).

These longstanding social trends provide the backdrop against which physical activity interventions and strategies have slowly evolved over time. At various times throughout human history, including during wars and conflicts, there have been concerted drives to improve the nation's health through physical activity. These campaigns have been motivated by a host of factors including social reform but at the present time there is a renewed campaign driven primarily by the desire to quell the rising tide of weight gain sweeping across the globe.

## 3.3 PHYSICAL ACTIVITY & HEALTH: NATURE OF THE EVIDENCE

To begin by stating the obvious, a link between physical activity and health is now firmly established. Regular physical activity reduces the risk of premature mortality, coronary heart disease, colon cancer, diabetes mellitus and osteoporosis and helps reduce depression and anxiety, improve mood and enhance a person's ability to perform daily tasks (US Department for Health and Human Services, 1996; Department of Health, 2004; US Department of Human Services, 2008, Department of Health, 2011).

Evidence relating to health and physical activity takes a variety of forms and like evidence on many different topics, inevitably it is constrained by the nature of investigations and the methods employed. Research into physical activity and health can first be conveniently divided into either epidemiological or laboratory-based studies. (Hardman & Stensel, 2003), and within each category studies can be either observational or experimental. Although, in this particular field of interest, many epidemiological studies are observational and most laboratory-based studies are experimental.

In observational studies researchers allow nature to take its course and merely collect information about one or more groups of participants. In experimental studies researchers intervene to affect what happens to some or all of the individuals.

The most compelling evidence for the health benefits to be derived from increased levels of physical activity comes from those studies linking physical inactivity with cardiovascular disease (CVD), a disease of the heart and circulatory system. Lee *et al.* (2000) reviewed the epidemiological studies of the association between physical activity and all causes of mortality, and reported that the data from these studies have

shown that higher levels of physical activity are associated with decreased levels of coronary heart disease, stroke, hypertension, non-insulin dependent diabetes mellitus (NIDDM), osteoporosis, colon and possibly breast cancer. Further studies have linked physical inactivity with obesity and mental ill-health. Table 3.1 provides an overview of the current evidence base which highlights the relationship between physical activity and a number of health outcomes.

## TABLE 3.1: NATURE OF THE EVIDENCE: THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND HEALTH OUTCOMES

| HEALTH OUTCOME | NATURE OF THE ASSOCIATION | EFFECT SIZE | STRENGTH OF EVIDENCE |
|---|---|---|---|
| All-Cause Mortality | Clear inverse relationship between physical activity and all-cause mortality | There is approximately 30% risk reduction across all studies, when comparing the most active with the least active. | Strong |
| Cardiorespiratory health | Clear inverse relationship between physical activity and cardiorespiratory health. | There is a 20%-35% lower risk of cardiovascular disease, coronary heart disease and stroke. | Strong |
| Metabolic health | Clear inverse relationship between physical activity and risk of type 2 diabetes and metabolic syndrome. | There is a 30%-40% lower risk of metabolic syndrome and type 2 diabetes in at least moderately active people compared with those who are sedentary. | Strong |
| Energy balance | There is favourable and consistent effect of aerobic physical activity on achieving weight maintenance. | Aerobic physical activity has consistent effect on achieving weight maintenance (less than 3% change in weight). | Strong |
| | | Physical activity alone has no effect on achieving 5% weight loss, except for exceptionally large volumes of physical activity, or when an isocaloric diet is maintained throughput the physical activity intervention. | Strong |
| | | Following weight loss, aerobic physical activity has a reasonably consistent effect on weight maintenance. | Moderate |
| Musculoskeletal health | Bone: There is an inverse association of physical activity with relative risk of hip fracture and vertebral fracture.<br><br>Increases in exercise and training can increase spine and hip bone marrow density (and can also minimize reduction in spine and hip bone density). | Bone: Risk reduction of hip fracture is 36% to 68% at the highest level of physical activity. The magnitude of the effect of physical activity on bone mineral density is 1%-2%. | Moderate (weak for vertebral fracture) |
| Musculoskeletal health (continued) | Joint: In the absence of major joint injury, there is no evidence that regular moderate physical activity promotes the development of osteoarthritis. | Joint: Risk reduction of incident osteoarthritis for various measures of walking ranges from 22%-83%. | Weak |

| HEALTH OUTCOME | NATURE OF THE ASSOCIATION | EFFECT SIZE | STRENGTH OF EVIDENCE |
|---|---|---|---|
| | Participation in moderate intensity, low impact physical activity has disease-specific benefits in terms of pain, function, quality of life and mental health for people with osteoarthritis, rheumatoid arthritis and fibromyalgia. | Among adults with osteoarthritis, pooled effect sizes (ES) for pain relief are small to moderate. | Strong |
| | Muscular: Increases in exercise training enhance skeletal muscle mass, strength, power and intrinsic neuromuscular activation. | Muscular: The effect of resistance types of physical activity on muscle mass and function is highly variable and dose-dependent. | Strong |
| Functional health | There is observational evidence that mid-life and older adults who participate in regular physical activity have reduced risk of moderate/severe functional limitations and role limitations. | There is an approximately 30% risk reduction in terms of the prevention or delay in function and/or role limitations with physical activity. | Moderate to strong |
| | | Older adults who participate in regular physical activity have an approximately 30% lower risk of falls. | Strong |
| | There is evidence that regular physical activity is safe and reduces the risk of falls. | | Strong |
| Cancer | There is an inverse relationship between physical activity and risk of breast and colon cancer. | There is an approximately 30% lower risk of colon cancer and approximately 20% lower risk of breast cancer for adults participating in daily physical activity. | |
| Mental health | There is clear evidence that physical activity reduces the risk of depression and cognitive decline in adults and older adults. | There is an approximately 20% to 30% lower risk for depression and dementia, for adults participating in daily physical activity. | Strong |
| | There is some evidence that physical activity improve sleep | | Moderate |
| | There is limited evidence that physical activity reduces distress and anxiety. | There is an approximately 20%-30% lower risk for distress for adults participating in daily physical activity. | Limited |

[Department of Health (2011) Start Active, Stay Active: A report on physical activity for health from the four home countries' Chief Medical Officers, page 11]

### 3.3.1 NATURE OF EVIDENCE: CONCLUDING REMARKS

Promoting active lifestyles can help address some of the important health challenges facing the UK. As highlighted in Table 3.1, increasing physical activity levels has the potential to improve physical and mental health of the population, and reduce all-cause mortality. It can also save money by significantly easing the burden of chronic disease on health and social care services. By way of example, increasing cycling and walking will reduce transport costs, save money and help the environment (Troiano *et al.*, 2001; Department of Health, 2011).

Troiano *et al.* (2001) suggested that because physical inactivity is highly prevalent and strongly associated with increased morbidity and mortality, which are both costly and preventable, there should be closer surveillance of inactivity as a risk factor for chronic disease. Physical activity is the most prevalent of the modifiable risk factors for coronary heart disease in Northern Ireland: 67% of the adult population in Northern Ireland does not meet the minimum amount of physical activity needed to achieve a health benefit (NISRA, 2007). Therefore there is some justification for physical activity being described by Morris (1994) as 'today's best buy in public health'. However, despite this statement, one critical issue has yet to be satisfactorily resolved: the frequency, duration, intensity and type of activity necessary to bring about individual health benefits (Lee & Paffenbarger, 2000).

Identifying the specific type of exercise needed to yield specific health benefits remains unfinished business. Furthermore, without accurate measurement of physical activity levels across populations then the determination of the efficacy of any intervention or programme will be impossible. Indeed, in recognition of this fact Janz (2006) has

argued that getting this component right is a prerequisite for successfully discerning the relationship between physical activity and health outcomes, for setting efficacious and reasonable guidelines, for examining causal factors influencing activity choices, and for finally applying interventions to improve activity levels within and across communities. In a few words, this captures the *primum mobile* for the SAPAS project; without accurate baseline statistics on levels of physical activity then there is no opportunity for determining change over time or evaluating the effectiveness of any intervention.

## 3.4 PHYSICAL ACTIVITY – HOW MUCH DO WE NEED?

Put succinctly, while our ancestors' lives were active by necessity, for most people today's physical activity is not essential to survive and may even need to be prescribed in order to prevent illness. Hence the question of 'how much do we need' has become ever more critical. Over 25 years ago, the American College of Sports Medicine (ACSM) produced a position statement recommending the amount of 'exercise' that was needed to develop and maintain cardiorespiratory 'fitness' and body composition in healthy adults. The advice stated that individuals should 'train' on 3-5 days per week, at 60% to 90% of the maximum heart rate reserve, participating for between 15 and 60 minutes in continuous, aerobic activity. Duration was dependent on intensity, with higher intensity requiring shorter duration.

These were simple recommendations that were easy to understand, and meant that individuals, if they so wished, could develop their own activity programmes, depending on the desired outcome (Haskell, 1994). The recommendations were clearly aimed at improving physical fitness; however, many exercise promoters and authors of articles and books inferred that the recommendation was also aimed at improving 'health',

resulting in widespread confusion between the amount of physical activity necessary for 'health' versus 'fitness', and stimulating the debate on the dose-response relationship, i.e. how much activity is necessary for specific outcomes (Haskell 1994).

To address these and related issues, in 1995, the Centre for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM) released a new set of recommendations that were supposed to help combat physical inactivity among large sections of the American population. In response to the growing epidemic, a group of experts were gathered to review the clinical, physiological and epidemiological evidence; the group confirmed their worst fears, with sedentary people identified as having almost twice the risk of coronary heart disease (CHD) as physically active individuals (Pate *et al.*, 1995).

Other evidence from a number of empirical studies indicated that while sedentary lifestyles were both prevalent and dangerous to health, health benefits could still accrue regardless of the duration and type of activity, for example whether it was performed continuously or in short ten minute bouts, providing that the overall time spent on activity was the same in both cases (DeBusk *et al.*, 1990; Ebisu 1985). The new guidelines that emerged at this time highlighted the accumulation or amount of physical activity needed to prevent 'disease', rather than develop 'fitness'. These recommendations stated that every adult should accumulate thirty minutes or more of moderate intensity physical activity on most days of the week; for those that did not participate on a regular basis; the recommendation was to gradually build up to an additional 30 minutes of accumulated activity most days of the week.

The ACSM defined 'moderate' intensity as activity performed at an intensity of three to six METs, which is the a multiple of resting metabolic rate of oxygen consumed per kilogram of body mass per minute. In more simplistic terms, a 3-6 MET activity is three to six times the resting oxygen consumption and can be achieved by brisk walking (3-4 miles per hour), or even gardening, DIY, cleaning or housework (Pate *et al.*, 1995). More recently, Vuori *et al.* (1999) described moderate intensity as being 60% of maximum heart rate (MHR).

The notion of accumulated activity was at odds with previously held beliefs that aerobic capacity could only be increased by a single bout of activity lasting at least twenty minutes or more, five times per week. It is noteworthy that the collection and interpretation of information on physical activity levels in many, often cited population surveys has been based on this earlier single-dose recommendation, including:

- Allied Dunbar National Fitness Survey 1992;
- Northern Ireland Health and Activity Survey 1994;
- Active People Survey 2005; and
- Northern Ireland Health and Social Wellbeing Survey 2001 and 2005.

The finding that short and sporadic bouts of moderate intensity activity on most days of week can improve aerobic capacity and improve health outcomes in sedentary individuals continues to astonish sceptical specialists in the field. Despite this resistance, over the last 20 years numerous studies have investigated the effects of accumulated physical activity and links to health benefits and have found that relatively short bouts of activity, such as brisk walking for a few minutes, do indeed produce both

functional and anatomical benefits (Ebisu 1985; DeBusk 1990; Haskell 1994; Murphy and Hardiman 1998; Fulton *et al.*, 2001).

Critically, Pate *et al.* (1995) and others confirm that physical activity does not have to be 'special' but can be accrued by engagement in daily activities such as housework, gardening and stair climbing, as well as conventional sports, provided they are performed at an intensity equivalent to brisk walking, for an accumulated 30 minutes per day.

Looking at this relationship in more detail, Winett *et al.* (2000) compared the effects of physical activity and physical fitness on both morbidity and mortality. They found that 'aerobic capacity' was consistently and inversely related to morbidity and mortality risk, while the evidence for reducing risk through 'caloric expenditure', i.e. by doing any type of activity, was considerably weaker. In conclusion they suggested that there was very little evidence to support the position that aerobic capacity is increased by the 'duration' of activity, i.e. the 'volume' theory; rather, in order for adaptation to occur, a stimulus may only need to surpass a specific threshold of 'intensity' for a minimum period of time of 3-4 minutes, i.e. the 'threshold' theory.

Taking some, but not all, of this evidence on board, since 1996, the Department of Health in Great Britain has provided advice and guidance on recommended levels of physical activity. A systematic review of the literature on appropriate 'doses' of physical activity detailed in the 'At Least Five A Week' (2004) research revealed consensus in three key areas of recommendation for children, young people and adults:

Children and young people should achieve 60 minutes per day of moderate intensity physical activity per week. At least twice a week this should include activities to improve bone health, muscle strength and flexibility, for example swimming or team sports;

Adults should achieve a total of at least 30 minutes moderate intensity physical activity on five or more days per week. It is increasingly accepted that 30 minutes can be built up in multiples of 10 minutes. This level of activity will provide 'a general health benefit'; and

In order to prevent certain medical conditions such as overweight and obesity as well as their downstream consequences (coronary heart disease and type II diabetes), it is likely that 45-60 minutes of moderate intensity exercise is necessary on five or more days per week.

More recently, in 2008, the US Department of Health and Human Services published new American Physical Guidelines which were, to a large extent, similar to the 1995 recommendations at the core, but with some key elaborations based on emerging research evidence. The key changes/elaborations are outlined in Table 3.2.

## TABLE 3.2: KEY CHANGES TO THE AMERICAN PHYSICAL ACTIVITY GUIDELINES

| KEY CHANGES | SUPPORTING COMMENTARY |
|---|---|
| **Moderate intensity physical activity has been clarified** | The 1995 document simply specified 'most, preferably all days per week' as the recommended frequency while the new recommendation identifies five days per week as the recommended minimum. |
| **Vigorous intensity physical activity has been incorporated into the recommendation** | To acknowledge both the preferences of some adults for vigorous intensity physical activity and the substantial science base related to participation in such activity, the recommendation has been clarified to encourage participation in either moderate and/or vigorous intensity physical activity. Vigorous intensity physical activity was implicit in the 1995 recommendation. It is now explicitly an integral part of the physical activity recommendation. |
| **Specified: Moderate and vigorous intensity activities are complementary in the production of health benefits and that a variety of activities can be combined to meet the recommendation.** | This combining of activities is based on the amount (intensity x duration) of activity performed during the week and uses the concept of METs (metabolic equivalents) to assign an intensity value to a specific activity. |
| **Specified: Aerobic activity needed is in addition to routine activities of daily life** | The updated guidance now clearly states that the recommended level of aerobic activity (whether of moderate or vigorous intensity) is in addition to routine activities of daily living which are of light intensity, such as self-care, casual walking or grocery shopping, or less than 10 minutes of duration such as walking to the shops. Few activities in contemporary life are conducted routinely at a moderate intensity for at least 10 minutes in duration. However, moderate or vigorous intensity activities performed as a part of daily life (e.g., brisk walking to work, gardening with shovel, carpentry) performed in bouts of 10 minutes or more can be counted towards the recommendation. Although implied, this concept was not effectively communicated in the original recommendation. |
| **More physical activity is better** | The new recommendation emphasises the important fact that physical activity above the recommended minimum provides even greater health benefits. The point of maximum benefit for most health benefits has not been established but likely varies with genetic endowment, age, sex, health status, body composition and other factors. Exceeding the minimum recommendation further reduces the risk of inactivity-related chronic disease. Although the dose-response relation was acknowledged in the 1995 recommendation, this fact is now explicit. |
| **Short bouts of exercise** | Although the original recommendation introduced the concept of accumulating short bouts of physical activity toward the 30 minute goal, there was confusion regarding how short these episodes could be. For clarity, the minimum length of these short bouts is 10 minutes. |
| **Muscle-strengthening recommendation now included** | Muscle-strengthening activities have now been incorporated into the physical activity recommendation. Although the 1995 recommendation mentioned the importance of muscular strength and endurance, it stopped short of making specific declarations in this area. Available evidence now allows the integration of muscle strengthening activities into the core recommendation. |
| **Clarification in wording** | Minor wording changes in the recommendation have been made to enhance clarity in communications. For example, the term 'aerobic,' or endurance, has been added to clarify the type of physical activity being recommended and to differentiate it from muscle-strengthening exercises, which are now part of the core recommendation. |

These recommendations acknowledge that while moderate and vigorous activity (both clearly defined) is undoubtedly critical to well-being, how this 30 minutes per day of physical activity is actually accumulated is less important, so long as it involves bouts of at least 10 minutes on at least five days of the week.

Following the publication of these new Physical Activity Guidelines for Americans, along with similar work undertaken in Canada by the Canadian Society for Exercise Physiology and Public Health Agency of Canada, government representatives responsible for physical activity in the UK commenced work to review the current status of physical activity guidelines in each of the four home countries.

Subsequent to extensive discussion in the UK (December 2008 – June 2009) it was agreed that a project should be undertaken to review formally the current physical activity guidelines. An important driver of the work was the window of opportunity to capitalise on the recent and extensive scientific reviews already completed, particularly those undertaken for the same purpose in the USA and Canada. The primary aim of this work therefore was to review current physical activity guidelines in order to assess their currency and utility for use in the UK for the next 3-5 years. A secondary aim was to ensure that this project benefited from the recent experiences in both the USA and Canada, given their scientific review processes and to learn from their approaches to the translation of evidence into communication messages on the health benefits of physical activity across the lifespan.

The scope of work was limited to a focus on the preventative health benefits of physical activity for three population groups; Adults, Older Adults, and Young People. The primary output of this work was a Technical Report summarising a set of

recommendations for the updating of the physical activity guidelines in the UK. It was agreed that the Technical Report should be utilised by each home country government to update, develop and disseminate a set of physical activity guidelines across the lifespan. It was hoped that by undertaking this work as a collaborative venture, it would avoid duplication of the background scientific work and ideally achieve consistency in the physical activity recommendations across the four home countries.

In October 2009, over eighty delegates from England, Scotland, Wales and Northern Ireland attended a UK Physical Activity Guidelines Consensus meeting, led by Professor Fiona Bull (British Heart Foundation – National Centre, Loughborough University, UK), to begin the process of reviewing and updating the current UK physical activity guidelines. The meeting was structured to provide the delegates with an opportunity to discuss and review the relevant scientific evidence and thereby contribute to the recommendations for proposed modifications or clarifications of the physical activity guidelines. Some of Northern Ireland's key physical activity experts attended the meeting, including personnel from the following organisations in Northern Ireland:

- Professor Marie Murphy (University of Ulster);
- Dr David McKee (Stranmillis University College);
- Paul Donnelly (Sport NI and author of this thesis);
- Brian Delaney (Stranmillis University College); and
- Kim Kensett (Public Health Agency).

This work to develop new UK Physical Activity Guidelines was timely as it coincided with a number of significant events across the UK at that time. Specifically, in 2009 the

UK Government had launched the new physical activity national action plan for England, '*Be Active Be Healthy*' following from the 2004 report '*At Least Five a Week*'. In Scotland, a five year review of their national strategy '*Let's Get Scotland More Active*' had begun and later in 2009 there had been an assessment of the national Scottish data on physical activity prevalence. In Wales, a physical activity review was undertaken and a draft strategic plan '*Creating an Active Wales*' (launch date 2010). Finally, as mentioned earlier, in Northern Ireland, the Department of Health, Social Services and Public Safety had established an Obesity Prevention Steering Group that was tasked with developing a strategic framework for addressing overweight and obesity across the life course. A final document based on the work of this group, namely, '*The Framework for Preventing and Addressing Overweight and Obesity in Northern Ireland 2012-2022: A Fitter Future for All'*, was formally launched in March 2012.

Emanating from all these strategic initiatives were various national guidelines on physical activity. While these are broadly similar, it is perhaps disappointing that the October 2009 meeting did not achieve, at that time, one of its original goals, a single consensus statement on guidelines for all home countries. A summary of 'headline' Physical Activity Guidelines as used by each country in the UK to 2011 is provided in Table 3.3.

**TABLE 3.3: SUMMARY OF HEADLINE PHYSICAL ACTIVITY GUIDELINES IN USE IN UK (UP TO 2011)**

| COUNTRY | ADULTS | OLDER ADULTS |
|---|---|---|
| **ENGLAND** | A total of at least 30 minutes of at least moderate intensity physical activity a day, on 5 or more days a week. | The recommendations for adults are also appropriate for older people. |
| **SCOTLAND** | At least 30 minutes of moderate physical activity on most days of the week. | At least 30 minutes of moderate activity on most days of the week. 5 activities per week of strength and balance exercises are also recommended. |
| **WALES** | 30 minutes of moderate intensity on at least 5 days a week. | Not specified in 'Climbing Higher'. |
| **NORTHERN IRELAND** | A total of at least 30 minutes of at least moderate intensity physical activity a day, on 5 or more days a week. | A total of at least 30 minutes of at least moderate intensity physical activity a day, on 5 or more days a week. |

Although there is now considerable similarity between the guidelines offered by each of the four home countries in the UK, there are also differences in the scope, wording and the detail relating to each population group. For example, England, Wales and Northern Ireland specify at least 30 minutes of moderate intensity activity on at least five days a week for adults, while Scotland recommends 'most days'. Furthermore, the specific recommendations for older adults vary considerably between each country.

Although a single set of recommendations did not emerge initially for all UK countries, a very tangible output of the work of UK Physical Activity Guidelines Consensus meeting was the production of a Technical Report. This summarised recommendations on modifications to the current physical activity guidelines, as well as providing details of the process, the consultation and the consensus meeting. In turn, each home country government did use the Technical Report as the basis for the final development, adoption and dissemination of physical activity guidelines, thereby going some considerable way towards achieving a level of consistency across the UK.

Building on this earlier work, in July 2011, a new set of physical activity guidelines for the UK, *'Start Active, Stay Active: A Report on Physical Activity for Health from the Four Home Countries Chief Medical Officers*[22]*'*, was launched covering early years; children and young people; adults; and older adults. This is the first time that UK-wide physical activity guidelines have been produced across the four home countries. This report also represents the first time that guidelines have been produced in the UK for early years (under-fives) as well as sedentary behaviour, for which there is now evidence that this is an independent risk factor for ill-health. Like the American guidelines, these scientifically informed guidelines will help policy makers and health professionals, as well as individuals themselves, to understand how to reduce the risk of ill-health associated with inactivity and sedentary behaviours. The guidelines also emphasise the importance of physical activity for people of all ages and bring different aspects of physical activity together including a life course approach, the flexibility to combine moderate and vigorous intensity activities and reduce sedentary behaviour.

Despite an emerging consensus within the UK that is broadly in line with North American recommendations, it is obvious that there remains conflicting advice and recommendations internationally, and the on-going need for rigorous research on physical activity levels remains critical. This will help clarify not only 'who does what', but more importantly, what levels and types of activity lead to genuine improvements in health and wellness over time. While it is clear by now that some physical activity is better than none and more is better than some (Fletcher *et al.*, 1996; Dunn *et al.*, 1998; Department of Health, 2004; US Department of Health and Human Services, 2008; Department of Health, 2011), precisely how much and of what type, and

[22] http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_127931

with which sections of the population, remains a matter for some conjecture. Undoubtedly there is a pressing need to increase levels of activity within the population generally and the sedentary population in particular, but again, which types of intervention have been, and will be, more or less successful with which types of individual will remain poorly understood until accurate and systematic baseline data on physical activity levels are available.

As to whether this activity should be massed or distributed over time there is still some debate, although increasingly it would appear that it is the accumulation of activity that really counts, whether this is in one block or is attained incrementally in smaller doses throughout the day. While debate continues, yet again it is nevertheless imperative to collect baseline data on physical activity that is consistent with the recommendations of the CMO within the Northern Ireland population. Only then will it be possible to develop appropriate strategies to address existing and emerging issues.

## 3.5 POPULATION BASED APPROACHES TO MEASURING ADULT PHYSICAL ACTIVITY LEVELS AND/OR HEALTH AND WELLNESS CHARACTERISTICS IN THE UK, EUROPE AND BEYOND

Beyond the academic literature as detailed in Chapter 2, there have been other large scale surveys carried out by public bodies over the last 25 years, using a variety of instruments to assess levels of physical activity and one or more health and wellness characteristics in a variety of population groups. In this chapter, three groups of surveys are examined in greater depth. First, some of the surveys initially outlined in Chapter 2 are now reviewed in greater depth. The surveys included in this extended review were selected for further analysis on pragmatic grounds. Initially those surveys that covered the highest number of the 19 key variables (Table 2.9) were reviewed so long as they were freely available in the public domain in English. Second, those contemporary national scale surveys currently being undertaken in England (*Taking Part* and the *Active People Survey*) that were not identified in the systematic review were also included. Third, a detailed analysis of all relevant surveys conducted in Northern Ireland since 1983 was carried out. The review of this third group of surveys had both a methodological and a political function. Methodologically, it was important to understand not only the precise detail of previous local research but also any contextual issues attaching to potentially similar surveys conducted within Northern Ireland. Politically, it was important to demonstrate to the stakeholders that, in tandem with the findings of the systematic review, no stone had been left unturned in terms of relevant research and data germane to the Northern Ireland context.

The following sections (3.5.1-3.5.3) provide a brief overview of the three groups of surveys undertaken in other countries and within Northern Ireland. It was decided to

focus attention on this subset of surveys as they represent those are most closely aligned in design and procedure to SAPAS. Furthermore, these are surveys that are routinely cited in discussions of population-level data concerning physical activity and hence it is important to become familiar with the precise way in which data were collected and analysed. To start with, the review of the three groups is put into context by describing the first ever nationally representative survey of the physical recreation habits, physical fitness and health status of an entire population, namely the 1981 Canadian Fitness Survey.

**Canadian Fitness Survey**

The Canadian Fitness Survey of 1981 (CFI) actually predates the cut-off date for this literature review (1983) by two years but is included because of its salience and significance to later work. The CFI and its longitudinal follow-up in 1989, involved nearly 12,000 households in 80 urban and rural communities across Canada. Approximately 16,000 people, aged seven to 69 years, participated in a fitness test, while 22,000 completed a questionnaire. The results of the survey provided a comprehensive picture of fitness in Canada.

The lasting legacy of the CFI is that it provided a key benchmark for later national surveys to measure themselves against and it also helped to identify some of the key parameters within which this study (SAPAS), some 25 year later, was developed. These include:

- rationale for the study;
- sample size;
- nature of the survey (longitudinal rather than cross sectional);

- content (physical activity, fitness, and measures of health);
- reference periods e.g. 7 days, 4 weeks, 1 year; and
- the nature of objective physical measurements such as anthropometric details, physical fitness tests, blood pressure measurements, lung function tests and assessment of oral health.

The data collected provided Canada with a robust baseline position for a series of health promotion programmes, the success of which were assessed during a follow-up survey in 1989, and these continue to be monitored on a regular basis. The questionnaire used was very complex, with the survey carried out in the home by highly trained interviewers trained in both social science survey techniques and basic physiological testing.

### 3.5.1 SURVEY GROUP 1 - THOSE IDENTIFIED IN THE SYSTEMATIC REVIEW

The analysis of the surveys as initially identified through the systematic review highlighted four projects that were worthy of further investigation in the context of the narrative literature review. These four surveys and the number of 19 key variables that they cover are detailed below.

1. *Allied Dunbar National Fitness Survey* (1992) as reanalysed by Fentem and Mockett (1998), which featured 16/19 of the key variables.

2. *Active Australia* (1987) as reanalysed by Brown and Bauman (2000), which featured 13/19 of the key variables.

3. *National Health Interview Survey* (1998, and 2000) as reanalysed by Berrigan *et al.* (2006), Swan *et al.* (2008), and Patterson *et al.* (2004) which featured 15/19 of the key variables.

4. *Behavioural Risk Factors Surveillance System* (2000, 2001, 2003,) as reanalysed by Reeves and Rafferty (2005), Kruger *et al.* (2007), Brown *et al.* (2004) which featured 14/19 of the key variables.

**Allied Dunbar National Fitness Survey**

The Allied Dunbar National Fitness Survey – ADNFS (1992), is based on the Canadian Survey and was the first survey (yet to be repeated) to have measured on a statistically reliable basis the physical activity patterns and fitness levels of the English population. The then Sports Council and the Health Education Authority commissioned the survey jointly to assist government and other agencies involved in sport and health promotion in order to develop policies and set targets in this important area of public policy. It was also designed to raise public awareness of the contribution an active lifestyle can make to fitness and health. A total of 4,316 adults of all ages were surveyed with a significant proportion (circa 70%) receiving a physical appraisal including a range of fitness tests.

The survey had two stages of measurement: an interviewer-administered questionnaire in the participant's home; and physical fitness testing, which was carried out in mobile laboratories situated in central locations, mainly hospital sites.

The interview focused primarily on the previous four weeks and covered the following aspects:

- Levels of participation in sport and active recreation, current and past;
- Physical activity at work, in housework, DIY and gardening, walking, cycling and stair-climbing;
- Other lifestyle and health related behaviours;
- Current health status and history of illness;
- Sports related injuries;
- Knowledge about exercise and attitudes; and
- Psychological variables including well-being, social support, stress and anxiety.

Of those who were interviewed, 70% went on to take part in the physical fitness testing, after undergoing a medical examination that determined the level of medical supervision required during the test. The test included the following measurements:

- Body measurements (height, weight, skinfold thickness and hip girths) ;
- Blood pressure;
- Muscle function;
- Shoulder abduction; and
- Aerobic fitness.

Respondents were asked to recall physical activity behaviours over the last four weeks, which the authors argued was the longest period for which accurate detailed information about current physical activity could be recalled. They also argued that using four weeks, instead of seven days, as was the case in other previous surveys (Blair *et al.*, 1985) provided a more stable measurement of current activity.

Furthermore, to account for anticipated seasonal variations of sporting activities, respondents were asked questions relating to the previous 12 months, and since the age of fourteen, in order to build up a picture of lifetime activity.

**Active Australia Survey**

The *Active Australia Survey* (as known as the National Physical Activity Survey) was first developed and nationally implemented in 1997 to assess the effectiveness of the *Active Australia* campaign which was being run in New South Wales at the time in order to promote physical activity. Since then, the survey has been implemented nationally through the *National Physical Activity Surveys* in 1999 and 2000 and the *Australian Diabetes, Obesity and Lifestyle Study* in 1999–00. It has also been used in several state-based surveys, such as in Queensland, South Australia, and New South Wales.

The *Active Australia Survey* was designed to measure participation in leisure-time physical activity and to assess knowledge of current public health measures about the health benefits of physical activity. It offered a short and reliable set of questions that could be easily implemented via computer-assisted telephone interviewing (CATI) techniques or in face-to-face interviews.

A guidance manual was designed for the survey. It includes a copy of the survey, an implementation guide with instructions for interviewers, a guide to the measures that can be derived from the survey data, information on how these measures are calculated and examples of how they are usually reported. It also provides background information on the development of the survey and an example of CATI coding.

While this manual specifically focuses on the *Active Australia Survey*, it is worth noting that other surveys such as the Australian Bureau of Statistics (ABS) *National Health Surveys* also collected and presented data on participation in physical activity. However,

like many national surveys considered in the systematic and narrative literature reviews, the results are not directly comparable.

There are a number of core questions in the *Active Australia Survey*. These consist of eight questions to assess participation in various types of activity and five statements to assess awareness of current public health messages about physical activity. The core questions are supplemented by questions collecting demographic information (age, sex, and household information). Questions about other characteristics such as height and weight, or items of particular interest such as awareness of local interventions or use of facilities for physical activity, may also be added to the survey. The questions were developed and intended for use with persons aged 18–75 years.

**National Health Interview Survey**

The *National Health Interview Survey* (NHIS) is the principal source of information on the health of the civilian population of the United States and is one of the major data collection programmes of the National Center for Health Statistics (NCHS) which is part of the Centers for Disease Control and Prevention (CDC). The National Health Survey Act of 1956 stipulated the need for continuing surveys and special studies to secure accurate and current statistical information on the amount, distribution, and effects of illness and disability in the United States, as well as the services rendered for or because of such conditions. The survey referred to in the Act, now called the *National Health Interview Survey*, was initiated in July 1957. Since 1960, the survey has been conducted by NCHS, which was formed when the National Health Survey and the National Vital Statistics Division were combined.

NHIS data are used widely throughout the Department of Health and Human Services (DHHS) to monitor trends in illness and disability and to track progress toward achieving national health objectives. The data are also used by the public health research community for epidemiologic and policy analysis of such issues as profiling those with various health problems, determining barriers to accessing and using appropriate health care, and evaluating Federal health programmes.

While the NHIS has been conducted continuously since 1957, the content of the survey has been updated every 10-15 years. In 1996, a substantially revised NHIS questionnaire began field testing. This revised questionnaire, described in detail below, was implemented in 1997 and has improved the ability of the NHIS to provide important health information.

The main objective of the NHIS is to monitor the health of the United States population through the collection and analysis of data on a broad range of health topics. A major strength of this survey lies in the ability to display these health characteristics by many demographic and socioeconomic characteristics.

The National Health Interview Survey is a cross-sectional household interview survey. Sampling and interviewing are continuous throughout each year. The sampling plan follows a multistage area probability design that permits the representative sampling of households and non-institutional group quarters (e.g., college dormitories). The sampling plan is redesigned after every decennial census. The current sampling plan was implemented in 2006. The first stage of the current sampling plan consists of a sample of 428 primary sampling units (PSUs) drawn from approximately 1,900 geographically defined PSU's that cover the 50 States and the District of Columbia. A

PSU consists of a county, a small group of contiguous counties, or a metropolitan statistical area.

The NHIS sample is drawn from each State and the District of Columbia. Although the NHIS sample is too small to provide State level data with acceptable precision for each State, selected estimates for most states may be obtained by combining data years.

The expected NHIS sample size (completed interviews) is approximately 35,000 households containing about 87,500 persons. Survey participation is voluntary and the confidentiality of responses is assured under Section 308(d) of the Public Health Service Act. The annual response rate of NHIS is close to 90 percent of the eligible households in the sample.

The NHIS questionnaire that was used from 1982-1996 consisted of two parts: (1) a set of basic health and demographic items (known as the Core questionnaire), and (2) one or more sets of questions on current health topics. The Core questionnaire remained the same over that time period while the current health topics changed depending on current issues and needs. The Core questionnaire, while collecting useful data on health conditions and utilisation, did not collect any information on insurance, access to health care, or health behaviours. In addition, much of the interview time in the Core questionnaire was devoted to collecting detailed information on events such as doctor visits and hospitalisations rather than information that could be used to characterise the health status and behaviours of each individual. The 1997 revision of the NHIS questionnaire has attempted to address these and other shortcomings.

The revised NHIS questionnaire, implemented since 1997, has Core questions and Supplements. The Core questions remain largely unchanged from year to year and allow for trend analysis and for data from more than one year to be pooled to increase sample size for analytic purposes. The Core contains four major components: Household, Family, Sample Adult, and Sample Child.

The Household component collects limited demographic information on all of the individuals living in a particular house. The Family component verifies and collects additional demographic information on each member from each family in the house and collects data on topics including health status and limitations, injuries, healthcare access and utilization, health insurance, and income and assets. The Family Core component allows the NHIS to serve as a sampling frame for additional integrated surveys as needed.

From each family in the NHIS, one sample adult and one sample child (if any children are present) are randomly selected and information on each is collected with the Sample Adult Core and the Sample Child Core questionnaires. Because some health issues are different for children and adults, these two questionnaires differ in some items but both collect basic information on health status, health care services and health behaviours.

In the NHIS 2009, the Adult Health Behaviours section (AHB) contains questions related to smoking, leisure-time physical activity, alcohol use, height, weight and sleep. In particular, the section on leisure-time physical activity asked respondents to summarise their usual leisure-time physical activity – both in terms of frequency and duration. Respondents are offered any time unit that they volunteer (times per day, per week, per month, or per year). A recode converting all responses into frequency times

per week is provided for each type of activity. The set of leisure-time physical activity questions included every year in the sample adult core module is: frequency and duration of vigorous activities, frequency and duration of light or moderate activities, and, similar to the BRFSS 2011, frequency of strengthening activities.

The Bureau of the Census, under a contractual agreement, is the data collection agent for the NHIS. Nationally, the NHIS uses about 400 interviewers, trained and directed by health survey supervisors in each of the 12 Bureau of the Census Regional Offices. Interviewers receive thorough training in basic interviewing procedures and in the concepts and procedures unique to the NHIS.

The revised NHIS questionnaire, as fielded since 1997, uses a computer assisted personal interviewing (CAPI) mode. The CAPI version of the NHIS questionnaire is administered using a laptop computer and interviewers enter responses directly into the computer during the interview. This computerised mode offers distinct advantages in terms of timeliness of the data and improved data quality.

**Behavioural Risk Factor Surveillance System**

The *Behavioral Risk Factor Surveillance System* (BRFSS) is a state-based system of health surveys in the US that collects information on health risk behaviours, preventative health practices, and health care access primarily related to chronic disease and injury. For many states, the BRFSS is the only available source of timely, accurate data on health-related behaviors.

BRFSS was established in 1984 by the Centers for Disease Control and Prevention (CDC); currently data are collected monthly in all 50 states, the District of Columbia,

Puerto Rico, the US, Virgin Islands, and Guam. More than 350,000 adults are interviewed each year, making the BRFSS the largest telephone health survey in the world. States in the US use BRFSS data to identify emerging health problems, establish and track health objectives, and develop and evaluate public health policies and programmes. Many states also use BRFSS data to support health-related legislative efforts.

By the early 1980s, scientific research clearly showed that personal health behaviours played a major role in premature morbidity and mortality. Although national estimates of health risk behaviours among US adult populations had been periodically obtained through surveys conducted by the National Center for Health Statistics (NCHS), these data were not available on a state-specific basis. This deficiency was viewed as critical for state health agencies that have the primary role of targeting resources to reduce behavioural risks and their consequent illnesses. National data may not be appropriate for any given state; however, state and local agency participation was critical to achieve national health goals.

About the same time as personal health behaviours received wider recognition in relation to chronic disease morbidity and mortality, telephone surveys emerged as an acceptable method for determining the prevalence of many health risk behaviors within populations. In addition to their cost advantages, telephone surveys were especially desirable at the state and local level, where the necessary expertise and resources for conducting area probability sampling for in-person household interviews were not likely to be available.

As a result, surveys were developed and conducted to monitor state-level prevalence of the major behavioural risks among adults associated with premature morbidity and mortality. The basic philosophy was to collect data on actual behaviours, rather than on attitudes or knowledge, that would be especially useful for planning, initiating, supporting, and evaluating health promotion and disease prevention programs.

To determine feasibility of behavioural surveillance, initial point-in-time state surveys were conducted in 29 states from 1981–1983. In 1984, the Centers for Disease Control and Prevention (CDC) established the *Behavioral Risk Factor Surveillance System* (BRFSS), and 15 states participated in monthly data collection. Although the BRFSS was designed to collect state-level data, a number of states from the outset stratified their samples to allow them to estimate prevalence for regions within their respective states.

CDC developed standard core questionnaire for states to use to provide data that could be compared across states. The 'core' questions included in the 2011 BRFSS relate to the following areas that are relevant to this study:

- Exercise (Physical Activity);
- Tobacco use;
- Fruit and vegetable consumption;
- Smoking behavior; and
- Alcohol consumption.

In terms of 'exercise' the respondent is asked eight questions about the type, frequency and duration of exercise, recreation and physical activities (other than their regular job

duties) that they have been involved in over the past month. Interestingly, and in line with the new American guidelines for physical activity, a question is included which asks respondents to indicate the frequency of their participation in physical activities or exercises to strengthen their muscles such as yoga, sit ups, push-ups and free weights.

### 3.5.2 SURVEY GROUP 2 - CONTEMPORARY NATIONAL SCALE SURVEYS CURRENTLY TAKING PLACE WITHIN ENGLAND

The Department for Culture, Media & Sport (DCMS) and its Non Departmental Public Bodies (NDPBs) share a common need for quality-assured data on participation, attendance, attitudes and related factors across its sectors. Up-to-date information is needed so that the reach of the activities sponsored by the DCMS can be measured in order to inform policy and planning. The DCMS's current Public Service Agreements (PSAs) have a significant focus of increasing participation in arts, sport, museums and heritage, particularly by a range of 'priority groups'. The *Taking Part Survey* and *Active People Survey*, both initiated in 2005, have now become the mechanism for monitoring progress against several PSA targets until change of government in 2010. In fact, Active People is currently be used by Sport England to justify and monitor 'participation orientated' investment in national governing bodies of sport and local authorities. Further detail on each survey is provided in the next section.

#### Taking Part Survey

The *Taking Part Survey* (TPS) was first commissioned by DCMS in 2005, and has been running on a continuous basis since then, making 2010/11 its sixth year of fieldwork. It is the key evidence source for DCMS and was commissioned primarily to provide a single evidence source on participation in culture and sport. The survey is currently used to measure and inform departmental indicators, inform the development and

impact of DCMS policy, and to understand the drivers and barriers of participation in cultural and sporting activities.

TPS is a random probability survey of adults aged 16+ and of children aged 5-15 in England. In 2010/11, 14,002 adults and 1,116 children aged 11-15 were interviewed. Information was also collected from parents or guardians of 1,590 children aged 5-10. Interviews were conducted face-to-face in home by specially trained interviewers working on behalf of DCMS using Computer Assisted Personal Interviewing (CAPI).

The survey was designed to yield a representative sample of adults aged 16+ and of children aged 11-15 who are normally resident in England. Relevant adults also provided information about children aged 5-10 so this population was also covered. For practical purposes, residents of institutional accommodation (armed forces barracks, student halls of residence, hospitals, care homes, prisons etc.) were excluded as is normal practice.

The Residential Postal Address File (PAF) was used as the sample frame as this provided a list of almost all private residential addresses in the UK and is the most comprehensive frame available.

A key objective of the sample design for the 2008-2011 survey was to measure change in the key participation estimates between 2008/09 and 2010/11. A sample size of 14,000 in 2008/09 and 2010/11 would provide a high level of precision at the overall level and for most significant sub-group estimates. The sample of 2,500 in 2009/10 was sufficient to identify any substantial year-on-year changes in behaviour at the top level.

Prior to the TPS there was no single survey providing the required level of detail of data on participation and attendance across all cultural sectors, with the Department and NDPBs using national government sponsored surveys such as the General Household Survey (GHS) for England, *ad hoc* sector specific surveys, box office data or buying questions into existing 'omnibus' surveys. This same is true in Northern Ireland in relation to data on physical activity, sport and health.

A review of the TPS technical reports provided a good insight into the methodological approaches used, many of which were considered in the design, development and implementation of SAPAS. For example, a considerable amount of time and resources were dedicated to interviewer briefings covering the following topics:

- Background and information on the TPS and its use by DCMS.
- Information about sampling procedures; contact procedures and dwelling/respondent selection; the importance of high response rates, with methods of ensuring contact and encouraging co-operation; and the use of incentives;
- Description of the questionnaire, and interview procedures, including explanations of the more complex questions and question sequences. Particular attention was paid to the questions used to measure key participation measures.
- Group exercise to get interviewers to think of ways to respond to potential refusals on the doorstep; and
- In addition to attending the face-to-face briefing, interviewers were also required to read the written Interviewer Instructions and carry out at least two practice interviews before starting their first assignment.

**Active People Survey**

The *Active People Survey* (APS) was commissioned by Sport England, the lead sports development agency in England. Ipsos Mori was awarded the contract to carry out the survey in July 2005.

The primary objective of the APS was to measure the levels of participation in sport and active recreation and its contribution to improving the health of the nation. Sport and active recreation included walking and cycling for recreation in addition to more traditional formal and informal sports. When measuring participation in sport the survey not only recorded the type of activity but also the frequency, intensity and duration of the activity. In addition, a range of other sports related measures were included such as club membership, involvement in competition, receiving tuition or coaching and contributing to sport through voluntary activity. The survey also provided wide ranging demographic information to enable the identification of participation by different social groups.

The sample comprised of individuals aged sixteen plus living in England. A minimum of 1,000 interviews was achieved in each of 351 of the 354 Local Authorities (LAs) in England. In total 363,724 interviews were carried out between October 2005 and October 2006.

The interviews in each LA were spread over the 12 month fieldwork period in order to ensure that results were not biased by variations associated with seasonal differences in participation in different sports and active recreational activities.

The survey was conducted via telephone using Random Digit Dialling (RDD) to generate a sample of telephone numbers.

### 3.5.3 SURVEY GROUP 1 & 2: CONCLUDING REMARKS

Many of the large scale surveys included in this section of the narrative literature review are increasingly rigorous in design and execution, and are able to gather useful data but still the issue of consistency between each survey remains unresolved, thus limiting opportunities for direct comparison. At the same time, in combination a review of these major surveys is able to provide very valuable information that can help inform the design and execution of SAPAS, and for this reason these surveys were subject to close scrutiny and critical examination. For the sake of brevity, rather than detail all 'lessons learned' at this point, instead it was the knowledge gained more generally by scrutinising these surveys that was invaluable during the design of SAPAS.

In terms of general approach however, it would be fair to say that all these surveys have in common the fact that they are largely atheoretical. In other words their primary concern is with capturing the 'who, what, where and how' of physical activity, but with little emphasis on understanding the meanings that individuals attach to physical activity or modeling the motives that encourage or discourage exercise at various times across the lifespan. Without this additional dimension then any survey is likely to limit its potential, and this message was taken on board during the design and execution of the current survey.

### 3.5.4 SURVEY GROUP 3: POPULATION BASED APPROACHES TO MEASURING ADULT PHYSICAL ACTIVITY LEVELS AND/OR HEALTH AND WELLNESS CHARACTERISTICS IN NORTHERN IRELAND 1983 – 2010

Northern Ireland's population has been subject to almost three decades of continuous promotions designed to encourage 'more people' to take 'more physical activity' and to lead 'healthier lifestyles'. Since 1983 and in every following year, except 1985 and 1989, large scale surveys of the adult population have collected information about people's levels of physical activity, including sport and physical recreation, and other health and wellness characteristics (e.g. smoking behaviour, alcohol consumption etc.). Therefore, the purpose of this section is to (1) undertake a thorough review of each of the surveys carried out in Northern Ireland since 1983; (2) consider the methodological differences between each survey; and (3) identify some implications for the future development of a new research instrument relevant to this study. It is also worth noting at this stage that the section also builds on earlier work by Sport NI (previously Sports Council for Northern Ireland) which reviewed how adult participation in sport and physical recreation was assessed using physical activity questionnaires (Sport Council for Northern Ireland, 1994).

**Review of Surveys Undertaken Since 1983**

Following an in-depth desk review of relevant research publications and documentation (e.g. technical reports, questionnaires) provided by a range of organisations in Northern Ireland (e.g. Sport Northern Ireland, Public Health Agency, Northern Ireland Statistics and Research Agency), seven survey instruments were identified which have measured involvement in sport and physical activity in relation to a number of health and wellness

characteristics (e.g. smoking behaviour, alcohol consumption, dietary habits, self-reported body mass index and subjective health).

Table 3.4 provides a brief description of each survey carried out in Northern Ireland since 1983 and the methods by which data were captured.

**TABLE 3.4: GENERAL OVERVIEW OF THE POPULATION BASED SURVEYS DESIGNED TO MEASURE ADULT PARTICIPATION IN SPORT & PHYSICAL ACTIVITY AND/OR HEALTH RELATED VARIABLES IN NORTHERN IRELAND (1983-2010)**

| YEAR DATA COLLECTED | SURVEY INSTRUMENT | MEASUREMENT OF SPORT AND PHYSICAL ACTIVITY | METHOD OF MEASUREMENT AND POPULATION SURVEY | SAMPLE SIZE | HEALTH RELATED VARIABLES |
|---|---|---|---|---|---|
| 1983 | Continuous Household Survey | Type; Where undertaken; Frequency. | Self-Assessment by interviewer led questionnaire. NI population 16+. | 4,500-5,500 | **Smoking behaviour** |
| 1984 | Continuous Household Survey | Type; Where undertaken; Frequency. | Self-Assessment by interviewer led questionnaire. NI population 16+. | 4,500-5,500 | **Smoking behaviour, Alcohol consumption** |
| 1986 | Continuous Household Survey | Type; Where undertaken; Frequency. | Self-Assessment by interviewer led questionnaire. NI population 16+. | 4,500-5,500 | **Smoking behaviour, Alcohol consumption** |
| 1986/87 | Diet, Lifestyle & Health Survey | Frequency; Intensity; Duration. | Self-Assessment by interviewer led questionnaire. NI population 16+. | 750 | **Smoking behaviour, Alcohol consumption, Dietary habits** |
| 1987 | Change of Heart Survey | Where undertaken; Frequency; Intensity; Duration. | Self-Assessment by interviewer led questionnaire. NI population 12-64. | 10,000-11,000 | **Smoking behaviour, Alcohol consumption** |
| 1987/88 | Change of Heart Baseline Clinical Survey | Type; Where undertaken; Frequency; Intensity; Duration. | Self-Assessment by interviewer led questionnaire. NI population 12-64. | 5,000-6,000 | **Smoking behaviour, Alcohol consumption** |
| 1990/91 | Continuous Household Survey | Type; Where undertaken; Frequency. | Self-Assessment by interviewer led questionnaire. NI population 16+. | 4,500-5,500 | **Smoking behaviour, Alcohol consumption** |
| 1991 | Sport Participation Survey | Type; Where undertaken; Frequency; Intensity; Duration; Club Membership. | Self-Assessment by interviewer led questionnaire. NI population 16-65. | 4,000-5,000 | **Not captured** |

| YEAR DATA COLLECTED | SURVEY INSTRUMENT | MEASUREMENT OF SPORT AND PHYSICAL ACTIVITY | METHOD OF MEASUREMENT AND POPULATION SURVEY | SAMPLE SIZE | HEALTH RELATED VARIABLES |
|---|---|---|---|---|---|
| 1991/92 | Continuous Household Survey | Frequency, Where undertaken. | Self-Assessment by interviewer led questionnaire. NI population 16+ (CAI). | 4,500-5,500 | **Smoking behaviour, Alcohol consumption** |
| 1992 | Northern Ireland Health & Physical Activity Survey | Type; Where undertaken; Frequency; Intensity; Duration; History of Involvement in activity. | Self-Assessment by interviewer led questionnaire. NI population 16+ (CAI). | 1,000-2,000 | **Smoking behaviour, Alcohol consumption, Dietary habits** |
| 1993/1994 | Continuous Household Survey | Type; Where undertaken; Frequency. | Self-Assessment by interviewer led questionnaire. NI population 16+ (CAI). | 4,500-5,500 | **Smoking behaviour, Alcohol consumption** |
| 1996/1997 | Continuous Household Survey | Type; Where undertaken; Frequency. | Self-Assessment by interviewer led questionnaire. NI population 16+ (CAI). | 4,500-5,500 | **Smoking behaviour, Alcohol consumption** |
| 1997 | NI Health & Social Well-Being Survey | Type; Where undertaken, Frequency. | Self-Assessment by interviewer led questionnaire. NI population 16-44. | 1,500-2,500 | **Smoking behaviour, Alcohol consumption, Subject health status** |
| 1999/2000 | Continuous Household Survey | Type; Where undertaken; Frequency. | Self-Assessment by interviewer led questionnaire. NI population 16+ (CAI). | 4,500-5,500 | **Subjective health status** |
| 2001 | Northern Ireland Health & Wellbeing Survey | Type; Where undertaken, Frequency. | Self-Assessment by interviewer led questionnaire. NI population 16-44. | 1,500-2,500 | **Smoking behaviour, Alcohol consumption** |
| 2003/04 | Continuous Household Survey | Type; Where undertaken; Frequency. | Self-Assessment by interviewer led questionnaire. NI population 16+ (CAI). | 4,500-5,500 | **Subjective health status** |
| 2004/05 | Continuous Household Survey | Type. | Self-Assessment by interviewer led questionnaire. NI population 16+ (CAI). | 4,500-5,500 | **Smoking behaviour, Alcohol consumption** |
| 2005/06 | Continuous | Type; Where undertaken; | Self-Assessment by interviewer led | 4,500-5,500 | **Subjective health status** |

| YEAR DATA COLLECTED | SURVEY INSTRUMENT | MEASUREMENT OF SPORT AND PHYSICAL ACTIVITY | METHOD OF MEASUREMENT AND POPULATION SURVEY | SAMPLE SIZE | HEALTH RELATED VARIABLES |
|---|---|---|---|---|---|
| | Household Survey | Frequency. | questionnaire. NI population 16+ (CAI). | | |
| 2005/06 | NI Health & Wellbeing Survey | Type; Where undertaken; Frequency. | Self-Assessment by interviewer led questionnaire. NI population 16-44. | 1,500-2,500 | **Smoking behaviour, Alcohol consumption** |
| 2006/07 | Continuous Household Survey | Type; Frequency. | Self-Assessment by interviewer led questionnaire. NI population 16+ (CAI). | 4,500-5,500 | **Smoking behaviour, Alcohol consumption** |
| 2007/08 | Continuous Household Survey | Type; Frequency, Duration, Intensity. | Self-Assessment by interviewer led questionnaire. NI population 16+ (CAI). | 4,500-5,500 | **Smoking behaviour** |
| 2008/09 | Continuous Household Survey | Type; Where undertaken; Frequency. | Self-Assessment by interviewer led questionnaire. NI population 16+ (CAI). | 4,500-5,500 | **Smoking behaviour, Alcohol consumption** |
| 2009/10 | Continuous Household Survey[23] | Standard: Type; Frequency; Duration.<br><br>IPAQ: Intensity; Frequency; Duration | Self-Assessment by interviewer led questionnaire. NI population 16+ (CAI). | 4,500-5,500 | **Smoking behaviour, Subjective health & well-being status (e.g. using GHQ[24] & Warwick-Edinburgh Mental Well-Being Scale)** |
| 2010/11 | Continuous Household Survey | Type; Frequency, Duration. | Self-Assessment by interviewer led questionnaire. NI population 16+ (CAI). | 4,500-5,500 | **Smoking behaviour, Alcohol consumption, Subjective health status** |

[23] The edition of CHS include two measures of involvement in sport and physical activity: (1) standard questions relating to the type, frequency and duration of the activity or activities that the respondent has taken part in the last 12 months/normal week, and (2) the use of the IPAQ [Short-Form) which asked respondents about the time that they spent being physical active in the last 7 days across four life domains (home, work, active travel, leisure activities)

[24] GHQ – General Health Questionnaire

A total of seven different survey instruments have been used covering 20 separate periods of measurement. None of the instruments used were solely dedicated to the measurement of sport and physical recreation. In Northern Ireland, CHS is the most accurate long running instrument; it collects information on a range of issues and is not devoted to sport and physical recreation alone. Other surveys carrying questions on sport and physical recreation have been premised on broader or more inclusive notions of physical activity. Sport and physical recreation represent only one form of this physical activity.

Like several of the survey instruments used in the studies included in the systematic review, many of the Northern Ireland based surveys listed in Table 3.5 appear similar. For example, the frequency and type of activity undertaken has been recorded on 15 and 14 separate occasions respectively. Where activity took place, its intensity and duration was recorded on 17, 6 and 7 occasions respectively. Again, methods of data collection appear analogous with all but one of the surveys, the 1987 *Change of Heart Survey*, collecting information using structured questionnaires in face-to-face interviews in respondents' homes. However, these apparent similarities, again, are far outnumbered by methodological differences. For example, the age of the population surveyed has variously started from 12, 16 and 18 years and over. These differences place severe constraints on making meaningful comparison of results across and between surveys.

In reviewing these surveys, the intention was to gain an understanding of how involvement in sport and physical activity has been measured in the past, and how measurement has been refined and adjusted. It was felt that it would have been a laborious task for the author and a tedious task for the reader to examine every aspect of each survey. Therefore, instead it was decided that only key elements of each survey

would be examined and in particular those that have a critical bearing on the current study. For instance,

- Design; Was the survey part of a continuous process or a 'one off'?
- Sampling Method; Was the survey probability or non-probability based?
- Sample Size Achieved; Was it sufficient to answer questions asked of the data?
- Data collection: Were prompt cards used?
- Response Rates; What were the number of usable returns?
- Questionnaire Content; What was asked of the respondents' participation in sport and physical activity and were other health related variables considered?

(See Table 3.5 Column 4 for a summary comparison). With these considerations in mind, the following sections present a detailed review of the seven Northern Ireland based survey instruments.

**Continuous Household Survey**

The *Continuous Household Survey* is a continuous stratified sample survey of approximately 1% of domestic properties in Northern Ireland, or about 4,500 addresses. The survey contains a number of different modules on a range of topics such as sport and leisure activities, health, religion, education, employment, child health. Information is collected by interviewers from households throughout the year and from the population aged 16 and over.

Questions relating to involvement in sport and physical recreation have been carried in the survey at irregular intervals and under variously named modules since 1983. The years were: 1983; 1984; 1986; 1990/91; 1991/92; 1993/94; 1999/00; 2003/04; 2005/06;

2006/07; 2007/08; 2009/10; 2010/11. The module carrying questions was known as the 'Leisure Section' up until 1986 but became 'Sports & Physical Activities' Section in 1990/91; 'Sport & Entertainment' in 1991/92; 'Sport & Physical Activities' again in 1993/94; 'Sport & Leisure' in 1999/00, 2003/04 and 2005/06; 'Culture, Arts & Leisure' in 2006/07, 2007/08, 2009/10 and 2010/11.

The CHS represents the only consistent source of data on changes in adult sport participation in Northern Ireland over the last 25 years. Changes made to phrasing and methods of eliciting responses have, however, resulted in the time series being broken. For instance, only data collected as part of the 1990/91; 1993/94; 2003/04 and 2005/06 are strictly comparable.

Table 3.6 shows changes made in questions phrasing and methods of eliciting responses from interviewees between 1983 and 2010/11. Since 1983 there has been a methodological shift from eliciting responses unprompted, towards the prompting of responses mainly through the use of show cards listing sporting activities. For example, in 1983 an activity was recorded only if the respondents mentioned this activity. Cards listing sports were not shown to the respondents to prompt answers. By contrast, in 1984 the questions on participation in sport and physical activities were not as specific as 'Do you do...' Rather the interviewer asked about '...other things done in leisure time'. A specific instruction was given to the interviewer to prompt generally for participation in 'physical exercise'. Any activities mentioned were recorded. The interviewer then prompted further involvement through the use of a card listing sports and physical activities, and these were then recorded.

In 1986 the procedure for eliciting responses changed again. This time no specific instruction was given to the interviewer to prompt for general involvement in sport and

physical activities before specifically prompting involvement using a list of sports shown to the respondent. In contrast to the 1983 and 1984 '...other things done in leisure time...' question carried in 1986 included activities undertaken on holidays.

The 1990/91 survey introduced three further changes. Firstly, the notion of participation in sport was explicitly broadened to include 'training, coaching and refereeing'. Interviewers were instructed to prompt respondents to 'pick up' these activities. Secondly, specific questions were asked about participation in walking, swimming, soccer and bowls. Thirdly, data were gathered on people's participation during the previous 12 months. Respondents were prompted about their participation using a list of 40 sports and physical activities.

Further changes were witnessed in the surveys undertaken over the period 1999/00 to 2005/06. To begin with, the concept of participation in sport and physical activities was again redefined to exclude 'teaching, coaching and refereeing'. Respondents were only asked questions about walking or hiking activities that they took part in the last 12 months and 4 weeks.

The 2007/08 survey included the largest and most comprehensive set of questions on sport and physical activity since 1983. The definition of sport and physical activity was broadened to include 'physically active jobs around the home' such as gardening, DIY and vacuuming and, for the very first time, respondents were asked a series of questions about the frequency, intensity and duration of the activities (exercise/playing sport/physically active jobs in the last seven days).

In the 2009/10 survey two sets of questions were used: (1) standard questions which focused on capturing information from respondents' about the type, frequency and duration of participation in their listed sport(s) and physical activities in the last 12 months and seven days; and (2) several questions included within the International Physical Activity Questionnaire (IPAQ) (Short Form) which asked respondents about the time that they spent being physically active in the last seven days across four life domains (at work, as part of their housework, to get from place to place and in their leisure time).

Finally, questions relating to one or more health related variables (i.e. smoking behaviour, alcohol consumption, subjective health status) have been carried in the survey at irregular intervals since 1983 (see Table 3.5, Column 6). However, like the many of the modules relating to 'Sport and Physical Activities', the health related modules ('Smoking' & 'Drinking') have differed slightly over the last number of years, particularly in terms of their structure and content. For example, the 2006/07 survey included several questions relating to the respondents' smoking behaviour (e.g. How soon after waking do you smoke your first cigarette of the day?), intention to quit (e.g. Thinking of the last time that you tried to stop smoking – how long ago was this?) and its impact on health (e.g. Do you think inhaling other people's tobacco smoke can damage people's health?). In the 2010/11 survey only four questions were included which were primarily concerned with capturing information on the people who smoke (e.g. First of all have you ever smoked a cigarette, a cigar or a pipe?), whether or not they smoke regularly (e.g. Have you ever smoked regularly?) and when they stopped smoking (e.g. When did you stop smoking cigarettes?). As highlighted in Table 3.6, questions relating to smoking behaviour and alcohol consumption were recorded on 13 and 10 occasions respectively and similar to findings from the systematic review

(Chapter 2), other relevant health and wellness variables (subjective health status, self-reported body mass index, perceived happiness) appear to have played 'peripheral roles' in the various editions of the CHS.

These changes may appear relatively minor. However, simply changing the activities on a showcard, for example including activities which respondents may have thought of as sporting activities, can have a major effect on responses. The 1990/91 CHS used showcards which were expanded on the aide-memoire cards previously used in the 1986 survey. These changes were introduced in line with changes made in the General Household Survey undertaken in Great Britain.

Methodological change was premised on a need to avoid the possibility of 'missing' sports that people took part in. Reported increases in the number of people participating in sport between 1986 and 1990/91 are likely to be in part the result of this methodological change. According to Matheson (1987), who examined the effect of changes in methodology on responses to questions on participation in sport between versions of the General Household Survey:

> The introduction of the prompt card and the use of other methodological changes increased the overall number of sports activities mentioned by clarifying to all informants the activities to be included.
>
> [Matheson, 1987, page. 9]

Therefore, there is no reason to believe that the CHS operating in Northern Ireland is any different in this respect.

The phrasing of questions and the manner in which responses are prompted aside, there are some dominant question themes running through nearly all the CHSs undertaken.

For example, since 1991/92, all surveys have recorded the type of sport and physical recreation participated in. A large number of different activities have been recorded. However, given the relatively small numbers of people contacted by the survey (N = 4,500 - 5,500: NI population c. 1.7 million), the fact that 'sport' is composed of a number of activities played by relatively small numbers of people, and the resulting small effective samples sizes for each sport, this information is of little value in terms of further analysis.

The frequency with which someone engages in an activity has been measured for the previous four week period prior to interview in all surveys except 1983, when the period referred to the previous seven days. In 1990/91 a twelve month reporting period was introduced alongside the four week period. Attempts to measure the intensity and duration of participation in exercise/sport/physically active jobs (e.g. DIY, gardening) was only introduced in 2007/08, three years after the Chief Medical Officer's physical activity guidelines were introduced[25], and the questions included in this edition of the survey have not been repeated since. In fact, the 2009/10 survey made attempts to measure the intensity, frequency and duration of physical activity (across four life domains – home, work, travel and leisure) using the IPAQ (short form); however, the results of this survey have been treated with some caution given the reported weaknesses of the IPAQ as an instrument for accurately measuring physical activity levels of the general population (Janz, 1999).

[25]The report recommends that for general health, adult should undertake a total of 30 minutes a day of at least moderate intensity physical activity on five or more days of the week and that the 30 minutes of physical activity necessary can be built up in bouts of 10 minutes or more.

**Change of Heart Baseline Clinical Survey**

The *1987/88 Change of Heart Baseline Clinical Survey* was an extension of previous MONICA[26] surveys which was carried out only within the administrative boundary of the Eastern Health and Social Services Board within Northern Ireland. The survey was designed to be repeated and to be able to detect important changes in risk factors associated with CHD across Northern Ireland.

A stratified random sample, by age and sex, was drawn from patients registered with General Practitioners throughout Northern Ireland. Some 5,230 respondents aged between 12-64 years were screened and an overall response rate of 58% achieved. Overall the sample was representative of the population of Northern Ireland within the age bands specified.

Respondents were screened, a process that included being interviewed on a range of questions concerning health. The final section of the interview was concerned with physical activity. The questionnaire was administered in health centres, clinics and general practitioners' surgeries although it is not clear from the published report who actually carried out the interviews. Contact with those aged under 16 years was made through the parent or guardian.

Of all the questions asked, only seven of 183 were directly related to sport and exercise. Table 3.7 summarises the questions relating to sport and physical activity in the 1987/88 survey. As in the 1983, 1984, 2007/08 and 2009/10 Continuous Household Surveys, a seven day recall period was used for exercise and sporting participation. The questionnaire contains no specific prompts as to what might be interpreted as exercise

[26] Multinational MONitoring of trends and determinants in CAdiovascular disease (MONICA)

and/or sport, although respondents were asked to specify the type of exercise undertaken. Those answering 'yes' to taking exercise may also have answered 'yes' to spending time participating in sports. The implied distinction cannot be determined from the questionnaire, and whether a respondent made any distinction is not known.

In line with the survey's objective of detecting changes in risk factors associated with CHD respondents were asked about the intensity and duration of their participation. In particular, respondents were asked whether exercise caused them to perspire or be short of breath, a proxy measure of health benefiting exercise. Whether activities were undertaken in work and/or leisure time was also recorded.

Time spent on exercise and sporting activity was recorded in minutes per week. Additionally, an annual assessment of involvement in sport was recorded by whether or not the respondent took part all year round, in the summer, or during winter. The type of sporting activity was also recorded.

**Diet, Lifestyle and Health Survey**

One of the objectives of the *Diet, Lifestyle and Health Survey 1986/87* was to investigate relationships between dietary intake and health status. A stratified random sample of the population aged 16-64 achieved an effective sample of 616 respondents with a good response rate of 77%.

Data was collected using seven fieldwork assistants – students recruited from a local university – all of whom received training in respondent identification using the Kish method of randomly selecting an individual in each household. This formed the second stage of the two stage sampling method, the first using the Rating Valuation List. The

main report of the survey details the comprehensive training received by fieldwork assistants and the methods employed to gather data including questionnaires, diaries and blood sampling.

A small section of the survey measured occasions of light, moderate and strenuous physical activity lasting more than 20 minutes during the previous week. Show cards giving examples of activities rated as light, moderate and strenuous were used in all three categories. For example, bowling and sailing were included in the light category, cycling to and from work, swimming, jogging, golf and cricket in the moderate category, and basketball, competitive cycling and swimming and training for sports in the strenuous category.

While all given examples of strenuous activities were sports, some moderate activities included non-sporting activities such as 'heavy do-it-yourself' and 'disco-dancing'. Therefore, although all three categories contained examples of sporting activities only those people who categorised their activity as strenuous can be regarded solely as sports participants.

As with the early CHSs and the *Change of Heart Baseline Clinical Survey*, a seven day recall period was used. However, unlike the CHS which did not ask about the length of time spent exercising or participating in sport, the *Diet, Lifestyle and Health Survey* only measured participation lasting 20 minutes or more.

**Change of Heart Survey**

The *Change of Heart Survey* was undertaken in 1987 to provide a baseline picture of the attitudes and behaviour of people aged 12-64 years regarding their health. A constraint placed on the survey was the need to provide data for each of the four Health Boards in Northern Ireland. Identical sample sizes were drawn for each Board using quotas based on a market research company's 'sampling stations' throughout Northern Ireland. Through 'pseudo-random sampling', 50 households were chosen from 120 sampling stations selected – 30 in each Health Board. This method ensured a representative geographical spread, a pre-requisite of the survey.

The sampling yielded a non-probability sample with weighting procedures introduced to allow for failures in the quota control system after data had been collected. The source of the established data used to re-weight the responses is not given in the published Volume 1 of the report.

On contacting a household an interviewer attempted to interview the head of household, then left a self-completion questionnaire booklet for each resident aged 12-64 years to complete. A total of 10,461 booklets was distributed and 5,863 (56%) returned. This response increased the probability of bias in the achieved sample. Thus, responses were weighted to match the known population structure of each Health Board and then as a second stage in weighting, to match the Northern Ireland population as a whole.

Questions on involvement in sport and physical activity carried in the *Change of Heart Survey* were identical to those included in the *Diet, Lifestyle and Health Survey* of 1986/87. The only differences were in the wording of the *Change of Heart Survey* which referred to physical activity outside the 'normal working day', and because of the

self-completion nature of the questionnaire, lists of activities were typed onto the questionnaire and not given on a show card. In total 72 questions were asked about lifestyle and diet of which three related to sport and physical activity. A series of supplementary questions, largely to do with attitudes to exercise, were given to a part of the original sample – other respondents were given questions on smoking, food and alcohol. One of these questions asked about involvement in indoor sport in recreation centres, although unlike the 1983 and 1984 CHS, usage referred to the previous year rather than a seven day or four week period.

**Sports Participation Survey**

Although referred to as the *Sports Participation Survey 1991*, questions relating to involvement in sport and physical activity were merely inserted into a quarterly omnibus survey of individuals aged 16 years and over. The survey is based on a non-probability sample of approximately 1,000 adults per quarter. The survey carried the most comprehensive set of questions relating to sporting participation of any survey undertaken in Northern Ireland up until 1991. However, a limited budget constrained design and restricted sample size, and ultimately the accuracy of results.

Data were collected in four waves throughout 1991 to reflect the seasonality of sporting participation. These data were then consolidated for the year. A total of 4,412 completed returns represented the achieved sample size collected by personal interview using a structured questionnaire.

Information was collected on the frequency, intensity, duration, and type of sporting participation. Frequency of participation referred to a four week period, intensity to an activity which caused breathlessness and/or sweating, and duration to the length of time

spent on an activity excluding travel and changing time. Participation indoors and outdoors was also recorded.

Participation in sport was prompted using show cards listing 57 different sporting activities. Information on positions of responsibility held within sporting clubs was elicited using a show card listing various club roles, for example secretary, treasurer, and coach. Specific instructions were written on the questionnaire in order that interviewers recorded answers in line with the definitions used by the sponsoring agency. For example, club membership excluded membership of darts, billiards and snooker clubs.

**Northern Ireland Health and Activity Survey**

The main objective of the *Northern Ireland Health and Activity Survey 1992* was to provide comprehensive data for the population of Northern Ireland on physical activity undertaken while at home, in work, and during sport and physical recreation. These data were related to information on fitness levels measured by a combination of self-assessment and the results of anthropometric and physiological testing. For example, aerobic fitness was measured using a treadmill. This survey was designed to measure levels of physical activity in general and was not a dedicated survey of participation in sport and physical recreation.

The survey used a two stage stratified probability sample. Stage one involved the random selection of 1,600 addresses from the Rating Valuation List. The sample was stratified by Belfast, East of Northern Ireland, and West of Northern Ireland to ensure representative geographical coverage. Stage two involved the use of the Kish method to randomly select one person from each household for detailed interviewing. Finally, the

sample was weighted to allow for variation in household size. A representative sample was achieved with an overall response rate of 70% or, 1,020 completed interviews.

Data was collected using Computer Assisted Personal Interviewing (CAPI) with the interviewer directly inputting data in the presence of the interviewee. The type, frequency, intensity and duration of all activities were documented. Physical activity was defined as a component of sport and exercise, other leisure activities, occupation and household duties. Details of all activities in the four week period prior to the interview were recorded together with sporting activity in the previous 12 months and in previous years. The survey carried approximately 120 questions.

**Northern Ireland Health and Social Wellbeing Survey**

The *Northern Ireland Health and Social Wellbeing Surveys* have been conducted on three occasions in the last 15 years, 1997, 2001, and 2005/06. The surveys were designed to monitor the health and wellbeing of the Northern Ireland population and focus on a range of different health issues including cardiovascular disease, mental health and ill-health, physical activity, smoking and drinking.

The questionnaire consists of a household interview followed by an individual interview with each person in the household aged 16 and above. The individual interview consists of core modules and modules that will recur on a regular cycle. Core items include accommodation, tenure, employment status, educational qualifications, family information, smoking and drinking and health and ill-health, non-core items include physical activity and sexual health.

The 1997 edition of the survey also included a physical measures module, completed by one respondent selected at random from each household. Qualified nurses were employed to record details of all prescribed medication that the respondent was taking, measure height, waist, hip, weight and blood pressure. A blood sample was also taken to measure the level of cholesterol (non-fasting). The Clinical Biochemistry Laboratory at the Royal Victoria Hospital carried out analysis of cholesterol levels.

The 2001 and 2005/06 surveys were based on a systematic random sample of 5,000 addresses drawn from the Land and Property Services Agency's property database. The LPSA addresses were sorted by district council and ward, so the sample was effectively stratified geographically. The 1997 study involved the selection of a stratified random sample of 3,520 addresses from the Land and Property Services Agency list of private addresses in Northern Ireland. Prior to selection, the list of addresses was stratified by Health and Social Services (HSS) Board area and an equal number of addresses were selected from each area to facilitate analysis at HSS Board area level.

Fieldwork for the 2005/06 survey was spread over a one year period from February 2005 to March 2006. Fieldwork for the 2001 and 1997 surveys was spread over a six month period from January to July. Each interviewer received a monthly allocation of addresses and collected the information covered in the survey by computer assisted personal interviewing (CAPI). Interviews were sought of all adult members (those aged 16 and over) of eligible addresses to yield a representative sample across Northern Ireland.

In 2005/06 the results were weighted by age and sex to compensate for differential non-response. In the 2001 survey, no weights were used in the analysis. In 1997 the survey was designed to select equal samples from each of the four HSS Boards, which meant that overall the survey would not accurately reflect the Northern Ireland population. Individuals living in a HSS Board area with a large population had a lower chance of being included in the sample than individuals from a smaller HSS Board area. Therefore a Northern Ireland weight was applied to the data to permit analysis at the Northern Ireland level. This weighting process adjusts the results to those that would be achieved if the sample had been drawn as a random sample of addresses in Northern Ireland.

A weight was also required for the physical appraisal element of the 1997 study. Only one adult was selected from each household for the physical measures, therefore individuals living in large households had a lower chance of being included in the sample than individuals in small households. This weighting process adjusts the results to those that would have been achieved if the sample had been drawn as a random sample of adults rather than addresses

**TABLE 3.5: SPORT AND PHYSICAL ACTIVITY QUESTIONS CARRIED IN THE CHS: CHANGES IN QUESTION PHRASING AND METHOD OF ELICITING RESPONSES 1983-2010**

| YEAR OF DATA COLLECTION | QUESTIONS | METHOD OF ELICITING RESPONSES |
|---|---|---|
| 1983 | Do you do any physical exercise or play and sports nowadays?<br>Do you belong to any sporting club or association even as a non-playing member?<br>How many times do you exercise or play sport altogether in the last 7 days? | Those answering yes were asked what the activity was and this was recorded. Walks over 2 miles were regarded as exercise and prompted. |
| 1984 | What other things have you done in your leisure time in the 4 weeks ending last Sunday?<br>Did you take part yourself or were you just watching. Specific question on swimming outdoors and walking.<br>On how many days did you (activity) in the 4 weeks/last seven days ending last Sunday?<br>Did you swim using a public swimming pool?<br>Was activity done indoors or outdoors?<br>So you belong to any sporting club or association as a playing/non playing member? | The interviewer was instructed to prompt for any physical exercise or sports as part of a look at what people did generally in their leisure time. Each activity was then recorded.<br>Respondents were then specifically prompted using a show card with 41 sports and asked if they had done any: these activities were recorded. |
| 1986 | What other things have you done in your leisure time (or on holiday) in the 4 weeks ending last Sunday? Specific questions on walking and swimming.<br>On about how many days did you do (activity)?<br>Was activity done indoors or outdoors? | Same as 1984 with question on physical activity/sport forming part of broader look at use of leisure time but this time no specific prompt for general involvement in sport was used as in 1984. Specific participation in sports prompted as in 1984 using show card. |
| 1990/91 | I am now going to ask you some questions about some physical activities that you may have taken part in.<br>Specific question on walking with prompted distances and number of days walked for 4 weeks and 12 months.<br>Specific question on swimming/soccer/bowls did you play last 12 months/4 weeks and a number of days in 4 weeks, and whether indoors and outdoors.<br>Going back to/still in last 12 months, did you take part in any of the sports or physical exercises shown on these cards either indoors or outdoors? Same question for 4 weeks and number of times in 4 weeks recorded. | Interviewers instructed that participation by respondents could include training, coaching and referencing.<br>Specific checks on distances walked, swimming, indoor, outdoors and number of days spent swimming.<br>Respondents prompted on 41 sports participated in during the last 12 months, and 4 weeks. |
| 1991/92 | In the last 12 months, have you taken part in any of the sports or physical exercises shown on this card indoors?<br>Question repeated for outdoor sports. Question repeated for 4 week | Participation includes training, coaching, and refereeing. Prompt card of sports used.<br>No specific activities were recorded. |

| YEAR OF DATA COLLECTION | QUESTIONS | METHOD OF ELICITING RESPONSES |
|---|---|---|
| | period and whether indoor or outdoor sports. | |
| 1993/94 | As 1990/91. | As 1990/91. |
| 1996/1997 | Survey information not available | Survey information not available. |
| 1999/2000 | I am now going to ask you some questions about physical activities that you have taken part in.<br>In the last 12 months, have you been for a walk or hike of 2 miles or more?<br>Now thinking of the 4 weeks ending yesterday, did you go for a walk of 2 miles or more during these 4 weeks?<br>On this card is a list of sports and physical activities. Tell me if you took park in any of them in the last 12 months?<br>For each sport and physical activity (1-40), did you take part in the past four weeks?<br>On how many days in the last 4 weeks have you played/gone to – any of the listed of sports?<br>At which places have you played/participated in the last 4 weeks? | Respondents were then specifically prompted using a show card with 40 sports and asked if they had done any: these activities were recorded.<br>Respondents were asked not to count teaching, coaching or refereeing they may have done.<br>Respondents were then specifically prompted using a show card with a list places (indoors/outdoors) where these activities took place. |
| 2003/04 | As 1999/2000. | As 1999/2000. |
| 2004/05 | The next set of questions are about participation in sports, the arts, museums and public libraries in Northern Ireland.<br>I would like you tell me if you have taken part in or played any of the following sports during the last year?<br>Have you taken part in or played any other sports during the last year?<br>Please tell me what the other sport (s) and physical activity (ies) were? | Respondents were then specifically prompted using a show card with 40 sports and asked if they had done any: these activities were recorded.<br>Respondents were asked not to count teaching, coaching or refereeing they may have done. |
| 2005/06 | As 1999/2000 and 2003/04. | As 1999/2000 and 2003/04. |
| 2006/07 | The next set of questions are about participation in sports, the arts, museums and public libraries in Northern Ireland.<br>I would like you tell me if you have taken part in or played any of the following sports during the last year?<br>Have you taken part in or played any other sports during the last year?<br>Please tell me what the other sport (s) and physical activity (ies) were?<br>Looking back over the last 12 months, how often do you usually participate in any sports? | Respondents were then specifically prompted using a show card with 40 sports and asked if they had done any: these activities were recorded.<br>Respondents were asked not to count teaching, coaching or refereeing they may have done. |

| YEAR OF DATA COLLECTION | QUESTIONS | METHOD OF ELICITING RESPONSES |
|---|---|---|
| 2007/08 | The next set of questions are about participation in sports, the arts, museums and public libraries in Northern Ireland.<br>How much do you enjoy doing sport and physical activity (this means exercise that makes you out of breath)<br>Do any of the things listed on the showcard put you off doing sport and physical activity?<br>I would like you tell me if you have taken part in or played any of the following sports during the last 12 months?<br>Please tell me what the other sports or physical activity (ies) were?<br>How many times in the last 12 months have you played/done the listed sport (s)/physical activity (s) and how many times in the last week have you played/done these activities?<br>And in the last week, how much time (in minutes) did you spend playing/doing the listed sport (s)/physical activity (ies)?<br>At the moment, how many days per week (0-7) do you normally take part in sport and physical activity?<br>In the last week, on how many days did you walk continuously for at least 10 minutes at a time?<br>In the last week, how much time (in minutes) did you spend walking?<br>In the last week, on how many days (0-7) have you done any physically active jobs around the home (e.g. gardening, vacuuming, DIY?<br>And during the last week, how many minutes in total have you done any of these physically active jobs?<br>Now moving on to consider intensity of exercise or physical activity, how often do you exercise/play sport/do physically active jobs so much so that you get out of breath or sweat?<br>How many times a week do you usually exercise/play sport/do physically active jobs so much so that you get out of breath or sweat? | Respondents were asked to select one of the following: a lot; a little; not very much; not at all.<br>Respondents were then specifically prompted using a show card with 19 reasons that may put them off doing sport/physical activity.<br>Respondents were then specifically prompted using a show card with 40 sports and asked if they had done any: these activities were recorded.<br>Respondents were asked not to count teaching, coaching or refereeing they may have done.<br>Respondent could include walking to walk/walking for recreation or leisure.<br>Respondents were asked to select one of the following: everyday, 4-6 times a week; 2-3 times a week; once a week; once a month, less than once a month, never. |
| 2008/09 | Survey information not available. | Survey information not available. |
| 2009/10 | Two sets of questions were used in this survey (1) standard CHS questions and (2) questions included within the IPAQ short form.<br>The next set of questions are about participation in sports, the arts, museums and public libraries in Northern Ireland.<br>I would like you tell me if you have taken part in or played any of the following sports during the last 12 months?<br>Please tell me what the other sport (s) and physical activity (ies) were? | Respondents were then specifically prompted using a show card with 40 sports and asked if they had done any: these activities were recorded.<br>Respondents were asked not to count teaching, coaching or refereeing they may have done. |

| YEAR OF DATA COLLECTION | QUESTIONS | METHOD OF ELICITING RESPONSES |
|---|---|---|
| | At the moment, how many days per week (0-7) do you normally take part in sport and physical activities?<br>And how much time per week (hours/minutes) would you normally take part in sport and physical activities?<br>The IPAQ short form asked questions about the time spent being physically active in the last 7 days. | The interviewer passes the computer to the respondent to complete a set of 7 questions.<br>Respondents are asked to think about activities they did at work, as part of their housework, to get from place to place and in their leisure time. |
| 2010/11 | As 2009/10 (standard questions). | As 2009/10 (standard questions). |

**TABLE 3.6: SPORT AND PHYSICAL ACTIVITY QUESTIONS CARRIED IN LARGE SCALE SURVEYS OTHER THAN CHS: QUESTION PHRASING AND METHOD OF ELICITING RESPONSES 1986-2006**

| YEAR OF DATA COLLECTION | QUESTIONS | METHOD OF ELICITING RESPONSES |
|---|---|---|
| 1987/88<br><br>Change of Heart Baseline Clinical Survey | During the past 7 days have you taken any exercise?<br>Specify exercise taken at work, in leisure time/intensity. Did this physical activity make you perspire or short of breath? Duration measured in minutes per week.<br>Do you spend time on sporting activity?<br>Type of sport, specify period undertaken during the year, and intensity – slow, briskly/vigorously and maximally.<br>What is the greatest distance you have ever run/jogged in a day in the last 3 years? | No specific instructions/prompts given on questionnaire used. No explicit instruction on difference between exercise and sport. |
| 1986/87<br><br>Diet, Lifestyle and Health Survey | In the past week, on how many occasions were engaged were you engaged in light/moderate/strenuous physical activity for more than 20 minutes? | A card showing examples of light, moderate and strenuous activities was used to prompt responses. Sport and physical recreational activity came under moderate and strenuous categories. Competitive and training sessions under the strenuous category. |
| 1987<br><br>Change of Heart Survey | The following questions are concerned with physical activity outside the normal working day.<br>In the past week, on how many occasions were you engaged in light/moderate/strenuous physical activities for more than 20 minutes each time?<br>Have you exercised or undertaken some physical activity in a multipurpose sport and leisure centre in the past 12 months? | Self-completion booklets distributed with lists of physical activities of light/moderate and strenuous nature used, identical to the 1986 Diet, Lifestyle and Health Survey. |
| 1991<br><br>Sport Participation Survey | Which of the following outdoor/indoor sports and activities have you taken part in within the last 4 weeks?<br>How many times within the last 4 weeks have you taken part in (activity)? Intensity recorded using sweat/breathless scale.<br>Thinking about your most recent activity, how long do you usually take part in (activity)?<br>Have visited a sports or leisure centre to participate in sport in the last 4 weeks?<br>Are you one of your club's officials? | Show cards listing 57 sports used to prompt responses.<br><br>Excludes travel, dressing time. Scale of 30 minutes to 5 hours used. |
| 1992 | Specific questions on walking and cycling. | Prompting for distance and time walked and cycled. |

| YEAR OF DATA COLLECTION | QUESTIONS | METHOD OF ELICITING RESPONSES |
|---|---|---|
| NI Health and Activity Survey | Now I would like to ask you to think about any sport or exercise activities…you've done during the past year?<br>During the months that you (activity) how many times a month on average did you do it?<br>Questions repeated for 4 week period and length of time and intensity recorded using sweat/breathless scale.<br>Questions on history of participation in sport and comparison with 1992 activity levels. | Booklet showing activities shown to prompt responses.<br><br>Check for other sports and activities by interviewer. |
| 2001<br><br>NI Health & Social Wellbeing Survey | Now I'm going to ask you about the time you spent being physical active during the last 7 days.<br>During the last 7 days, on how many days (0-7) did you do activities which took vigorous or hard effort, for at least 10 minutes at a time, like running, aerobics, heavy gardening or anything else that caused large increases in breathing or heart rate?<br>On each day you did vigorous activity for at least 10 minutes, how much time on average (in minutes) did you spend doing this?<br>During the last 7 days, on how many days (0-7) did you do activities which took moderate effort, for at least 10 minutes at a time, like running, aerobics, heavy gardening or anything else that caused large increases in breathing or heart rate?<br>On each day you did moderate activity for at least 10 minutes, how much time on average (in minutes) did you spend doing this?<br>Specific questions on walking.<br>Thinking now about regular physical exercise, by that I mean: taking part in exercise or sports 2-3 times per week for a minimum of 20 minutes at a time, or more general activities like walking, cycling or dancing 4-5 times a week accumulating to at least 30 minutes per day. With this in mind can you look at this card and tell me which statement best describes how physical active you have been over the last six months.<br>Specific questions relating to motivators/barriers to participation. | Show card displaying 5 statements which best describes how physically active respondents have been over the last six months. |

| YEAR OF DATA COLLECTION | QUESTIONS | METHOD OF ELICITING RESPONSES |
|---|---|---|
| 2005/06<br><br>NI Health & Social Wellbeing Survey | Now I going to ask you about the time you spent being physical active during the last 7 days.<br>During the last 7 days, on how many days (0-7) did you do activities which took vigorous or hard effort, for at least 10 minutes at a time, like running, aerobics, heavy gardening or anything else that caused large increases in breathing or heart rate?<br>On each day you did vigorous activity for at least 10 minutes, how much time on average (in minutes) did you spend doing this?<br>During the last 7 days, on how many days (0-7) did you do activities which took moderate effort, for at least 10 minutes at a time, like running, aerobics, heavy gardening or anything else that caused large increases in breathing or heart rate?<br>On each day you did moderate activity for at least 10 minutes, how much time on average (in minutes) did you spend doing this?<br>Specific questions on walking.<br>Thinking now about regular physical exercise, by that I mean: taking part in exercise or sports 2-3 times per week for a minimum of 20 minutes at a time, or more general activities like walking, cycling or dancing 4-5 times a week accumulating to at least 30 minutes per day. With this in mind can you look at this card and tell me which statement best describes how physical active you have been over the last six months.<br>Can you tell me if you have done any activities on this card during the last 4 weeks (include teaching, coaching, training and practice sessions). Which have you done in the last 4 weeks? | Show card displaying 5 statements which best describes how physically active respondents have been over the last six months.<br><br>Show card listing 10 activities. Respondents asked to tick all that apply. |

### 3.5.5 METHODOLOGICAL DIFFERENCES OF POPULATION BASED SURVEYS MEASURING PARTICIPATION LEVELS IN SPORT AND PHYSICAL ACTIVITY

The previous section (3.5.4) highlighted some of the differences between individual surveys undertaken in Northern Ireland since 1983. The following sections attempt to draw together some broad themes emerging from the review of individual surveys.

**Survey Design**

In terms of design some surveys have been 'one offs', for instance, the *Change of Heart Survey 1987* and the *Northern Ireland Health and Activity Survey 1992*. The CHS has been repeated many times, however, there is no intention to repeat others with the exception of the new *Northern Ireland Health Survey 2010/11*.

The procedures followed by each survey were quite different, making direct comparison of results problematic over time. For example, the *Sport Participation Survey* collected data in a series of quarterly 'sweeps' of the adult population, while the CHS collects data on a month by month basis. The *Health and Activity Survey* data was collected over an eight month period from February to October using Computer Assisted Interviewing (CAI). The *Change of Heart* data was collected, using self-completion booklets, between March and May of 1987.

These design variations affect both response rates and the ability to check the reliability and validity of results. For example, in the case of the *Sports Participation Survey*, adding the phases of repeat 'sweeps' together in order to produce average annual estimates of participation is not without drawbacks. One likely outcome is that a non-

participant could be counted more than once when perhaps he or she may have later been a participant.

Furthermore, it cannot be assumed that answering a question in one month of one quarter accurately represents participation in each of those months. When combined with non-probability sampling, accuracy inevitably suffers. However, it must be noted that it is often constraints on resourcing large scale surveys, such as time, cost and expertise, which results in unfortunate methodological compromises.

**Sampling Frame**

The majority of surveys reviewed used some form of probability sampling. In other words, this means that the probability of selecting someone is known, or can be determined, or that individuals selected for a particular survey are chosen and not someone else. Surveys using non-probability sampling such as the *Change of Heart* and *Sports Participation Survey*, and which use general population based quota controls cannot accurately relate the sample to the phenomenon being studied, in this case sports participation. Quotas are limited because a person is selected to meet the quota, or 'fill' a particular category, for example a male aged 16 and 19. Should someone refuse to answer, the interviewer moves on to another person until the quota of males aged 16-19 years is met. It matters little who is chosen, other than that person fulfils the quota control.

Quota based samples are also limited as regards measuring the prevalence of behaviour. Using repeat surveys and adhering to strict quality controls ensuring comparability, still cannot ensure that measurements are made without bias as they still will not allow the calculation of error in samples selected. Moreover, similarity of results between

different surveys, especially those based on non-probability random sampling, must be interpreted cautiously especially if used in policy formulation and planning. For example, the 1986 *Continuous Household Survey* (44%), the 1987/88 *Change of Heart Baseline Survey* (42%) and the 1990/91 *Sport Participation Survey* (42%) all reported similar findings in relation the proportion of adults in Northern Ireland that took part in sport and physical recreation; however, this apparent order or similarity is down to chance and is not premised on design.

**Interviewee Fatigue**

The design of omnibus surveys, including those using random probability sampling, that contain large numbers of unrelated questions may introduce the possibility of 'interviewee fatigue'. For example, the 'Sport and Leisure Activities' questions used in all the CHSs were only a small series of questions within the larger survey. It is not known at which point in the interview the sport and physical activity questions were asked of respondents but if they came at the end of a long interview then this positioning may have affected the accuracy of the response. The possibility of fatigue could be reduced either by employing a dedicated sport and physical activity survey, by having fewer questions within surveys and/or by using CAPI as a means of capturing information from the interviewee.

**Sample Size**

The sample size used in most of the listed surveys range from 616-5,500. In common with other large scale surveys, it is a major factor affecting sampling error and the degree of accuracy which can be afforded to the results.

## 3.6 NARRATIVE LITERATURE REVIEW: CONCLUDING REMARKS

In keeping with the findings outlined in Chapter 2, this review of the narrative literature around physical activity confirms the priority that is now attached to this policy area by governments around the world, the positive health benefits that attach to the maintenance of at least moderate levels of physical activity, and the growing concerns that an increasing number of people are not achieving levels of activity that will sustain physical health and well-being. There is no need to dissect these messages minutely at this time as they are well established through the sheer volume of research that has been carried out over many years.

Unfortunately however, it may be the case that while the quantity of research is unquestionable; the quality of individual research projects does not always stand up to close scrutiny. That is not to say that there are not good examples of large scale surveys that have captured robust data but in almost all cases there are potential sources of bias that must be acknowledged honestly.

A forensic examination of this literature reveals that too often research enterprises have failed to learn from previous endeavours but instead merely exacerbate the errors of the past. This reflects in the employment of research instruments and methodologies that are not always 'fit for purpose' and in particular with regard to measuring population trends against stipulated guidelines and recommendations. For example, until very recently the definition and delineation of what 'counts' as 'physical activity' has shown wide variability, making comparisons between studies fraught with danger.

Despite these limitations, the UK's home countries have pressed ahead in reaching broad agreement as to what levels of physical activity may yield positive health

benefits. However, in order to assess whether these performance indicators and targets are met or exceeded over coming years it is imperative that more sophisticated research instruments are brought into play that have the capability of accurately measuring clearly defined physical activity levels across different groups within society, and also are able to correlate these behavioural variables with other indices of health and well-being.

As the previous chapters also reveal, too often in the past, research has been narrowly focused around a particular initiative, intervention or contemporary issue. The emerging data inevitably are partial and therefore limited in their scope to explain and interpret population trends and the interaction that may involve one or more socio-economic, personal, demographic or health variables. This is only possible with the use of large scale population surveys that are able to incorporate a complete set of relevant variables, and which thereby offer the opportunity to model the relationship between these factors, and how they may impact on health and well-being over time.

SAPAS has evolved to meet these ambitious goals and probably represents a new generation of physical activity surveys that will be able to genuinely marry theory, policy and practice. Within the narrative literature in particular, there are examples of large scale surveys that are beginning to capture reliable data around physical activity and are sufficiently broad in scope to be able to answer questions relating to the complexities of what drives and sustains physical activity, and what effect this has on health and wellness.

It is to be hoped that the new generation of population surveys will not each develop in glorious isolation but will routinely share questions, formatting and survey

methodologies, thereby allowing for legitimate longitudinal and cross-cultural comparisons. This is a problem that has dogged previous research in this field. Given the global nature of contemporary social epidemics linked to physical inactivity, and including obesity, their coordination and standardisation must remain research priorities, but such matters are beyond the bounds of this research study.

Equally, it is to be hoped that in the future, physical activity surveys will not be seen as 'one-offs' but will be able to establish baseline data against which social trends can be easily tracked. Accurate, longitudinal data is vital to genuinely determine whether policies, strategies and initiatives have effected change, but again, that remains a challenge for the future. Instead, the thesis now turns from a review of the past work and towards the development of a research instrument that can be a part of this extensive and critically significant international research strategy.

## 3.7 RESEARCH AIM & OBJECTIVES

As discussed in Chapter 2 and 3, the literature review (systematic and narrative) revealed five key findings which have helped to shape formative research objectives can now be reformed and refined following the synthesis of previous work:

1. A surprisingly wide and inconsistent array of techniques have been employed to measure physical activity or related health and wellness variables over the years with little evidence to suggest that successive surveys have built on earlier work to thereby move towards the application of standard taxonomies. For example, as highlighted in section 2.6, most studies included in the systematic review measure physical activity by questionnaire but there seems to be little consistency in questionnaire wording and survey design.

2. Over the last 25 years many national surveys, across three geographical locations (US, Other Countries and the UK) were designed to measure levels of physical activity, but in different ways. Furthemore, none of the surveys reviewed robustly measure physical activity levels in all four life domains (home, work, travel and sport/leisure) in order to provide an accurate indication of an individual's total physical activity. This finding suggests that a policy of excluding one or more life domains from the measurement of adult physical activity levels may have, in the past, led to an underestimate of adults meeting physical activity guidelines.

3. Evidence from the literature reviews suggests that the four of the main preventable causes of morbidity and mortality (smoking, excessive alcohol use, an unhealthy diet, and physical inactivity) are not randomly distributed across

the population, but occur in combination with one another (Chiolero *et al.*, 2006; Poortinga, 2006b). Most associations between lifestyle risk factors are positive, however, recent research suggests that physical activity is negatively associated with smoking and heavy drinking (Poortinga, 2006b). Therefore, in light of this evidence the current research provided an opportunity to explore and model the range of possible associations of physical activity (across four life domains) with smoking, alcohol consumption and other health and wellness characteristics. Furthermore, by conducting exploratory data analysis on the final SAPAS dataset it was anticipated that the study could report on the following questions: (1) whether or not there is such a thing as a'model citizen' and (2) if such people exist what their characteristics are. For example, are they the wealthy, the well-educated, and those who take part in physical activity?

**4.** There have been no national population based studies that have explored the relationship between perceived happiness and those achieving physical activity recommendations for health.

**5.** There is still an urgent need to monitor the amount of physical activity that adults are actually undertaking, and whether or not this is sufficient to derive a health benefit. By developing and applying a more sophisticated and robust research instrument (SAPAS) it is anticipated that Northern Ireland and the UK as whole would be in a better position to develop policies, strategies and programmes aimed at addressing physical inactivity and improving public health.

In summary, an extensive array of survey techniques has been used to measure physical activity and/or health and wellness variables over the last 30 years and that there is little evidence to suggest that successive surveys have yet been successful in accumulating a common stock of knowledge on which to base future research instruments. This deficit presents significant challenges to any project endeavouring to track physical activity in its various forms across a diverse population. At the same time, lessons learned from previous endeavours are manifold and have helped forge a view as to what is achievable realistically and more critically, can help to shape formative research objectives that may have been present prior to the review. The primary aim of the thesis was well formed prior to the reviews, but has been confirmed as being to:

**'Quantify levels of physical activity amongst the adult population (16 years +) in Northern Ireland accurately in order to investigate their relationship with various measures of health and wellness'.**

Over and above this primary aim, the reviews have helped to fashion five further research objectives (3 primary and 2 secondary). Table 3.7 details each research objective for this study.

**TABLE 3.7: RESEARCH OBJECTIVES**

| | OBJECTIVE | STATUS |
|---|---|---|
| 1. | **To derive an appropriate research instrument that will gain acceptance with stakeholders in the form of a national baseline survey of physical activity in Northern Ireland.** | Primary |
| 2. | **To quantify the physical activity levels amongst the adult population in Northern Ireland in the four domains of home, transportation, work, and sport/leisure relative, and to assess this activity against the UK Chief Medical Officer's recommendations;** | Primary |
| 3. | **To identify the characteristics associated with physical activity levels and their relationship with physiological measures such as self-reported height and weight (in order to compute BMI); lifestyle factors such as smoking, alcohol consumption and healthy eating habits; and perceived health and happiness measures.** | Secondary |
| 4. | **To examine the correlates with participation in physical activity.** | Secondary |
| 5. | **To examine the implications for government policies relating to the achievement of positive health outcomes using physical activity as a driver.** | Primary |

# CHAPTER 4: METHODOLOGY

## Road map of the thesis

| Introduction | Review of Literature | Methodology | Results | Discussion | Conclusions |
|---|---|---|---|---|---|
| | Ch2 A Systematic Review of the Literature on Population Based Approaches to Measuring Physical Activity & Health | | Ch5 Exploratory Data Analysis I | | |
| Ch1 ► | Ch3 A Review of the Narrative Literature on Population Based Approaches to Measuring Physical Activity & Health | ► Ch4 ► | Ch6 Exploratory Data Analysis II | ► Ch7 ► | ► Ch8 |

## 4.1 THEORETICAL CONSIDERATIONS

Before beginning to describe the methods used in the design, administration and analysis of the survey, it is important to briefly consider the theoretical basis for this study. The way in which research is conducted must be underpinned by a research philosophy, which then translates into the research strategy employed and the research instruments eventually utilised in the pursuit of research objectives. It is too easy to move to the latter stages of the process without reflecting on theoretical underpinnings and while these may not be 'written large', nevertheless they are an integral and core feature of the entire research enterprise.

The research objectives for this study have been outlined in Chapter 3. Previous research in this area has not tended to place great emphasis on theoretical constructs or derivatives but instead has often been driven by practical considerations and outcomes. The review of literature provides a clear and accurate reflection on the low priority that has been afforded to the role of theory in interpreting and modelling previous results. To go some way towards remedying this perceived deficit in earlier research, the following sections will briefly (1) consider ontological and epistemological assumptions, (2) the relevance of theory, (2) the appropriateness of method and the reliability of data, all of which will help understand the theoretical and methodological approaches adopted in the study.

### 4.1.1 ONTOLOGICAL AND EPISTEMOLOGICAL ASSUMPTIONS

Ontological assumptions are the foundation of all research and can easily lead on to very different views of what appears as the 'same' social phenomena (Grix, 2002). The term 'ontology' refers to the subject of existence and concerns what is real, or what

exists. There is a wide range of labels used by different authors in relation to ontology and epistemology; however, this study distinguishes between two ontological terms (essentialist and constructivist) and four epistemological terms (positivist approach, interpretivist approach, critical realist approach, and postmodernist approach). Essentialist and foundational assumptions assert that there is reality 'out there' which exists separately and independently of the human mind. Constructivism assumes that reality is continually produced and reproduced by social actors thus implying that reality can be constantly revised through social interaction. Although these two ontological positions are quite different, they are both concerned with what the researchers believe constitute social reality.

Epistemological is often confused with 'ontology'. Grix (2002) acknowledges that if ontology is about what we may know, then epistemology is about how we come to know what we know. Thus the term 'epistemology' concerns knowledge and focuses on the knowledge gathering process. A positivist approach aims to establish universal generalisations to be used to explain further observation. It primarily focuses on observable and measurable social phenomena, seeks similarities between these phenomena, and identifies regularities or associations. In terms of ontology, positivism takes essentialist/foundational assumptions, that is, it assumes there is an independent social reality that exists outside from social actors which might be observed and described in terms of essential characteristics. It is a kind of inductive approach which usually starts with observations and ends with generalisations of relationships; it is essentially descriptive and does not aspire to interpret or explain what has been observed. Positivists believe that if observations are systematic and objective, they are able to provide generalisations as 'true' descriptions of reality. A positivist tends to

prefer quantitative analysis, through, for example, questionnaires, in order to determine causal relationships and produce 'objective and generalisable' findings.

The aim of an interpretive approach is to describe and explain the differences between social phenomena, often couched in terms of social actors' accounts. The ontological base of interpretivists is that social reality is not independent of social actors; instead, reality is socially constructed by people who inhabit it and is in a constant state of revision. An interpretivist aims to seek social actors' own interpretations of their world through an abductive approach which is based on developing theory that is derived from social actors' activities, language, and meanings. Furthermore, interpretivism accepts that each group or society with the same values and interests has its 'own truth' and there may be multiple realities in any social situation since the mind determines categories in shaping or constructing these. Fitzpatrick (2005) concludes that unlike positivists who look for observable empirical regularities and statistically significant correlations between variables, interpretivists are concerned with the meanings people attach to social situations (alternatively called a hermeneutic approach). The methods typically applied in an interpretive approach are interviews focus groups, content/discourse/documentary analysis and observation (participant).

In contrast to both the positivist and interpretivist approaches, critical realists attempt to construct a bridge or balance between these two sets of assumptions. The main ontological assumptions of a critical realist approach are that reality has an existence independent of social actors but that it is socially constructed. Critical realists aim to discover underlying mechanisms to explain observed regularities which require both a description and an explanation of social phenomena. Critical realism has adopted a retroductive approach which begins with observation of connections between social

phenomena, and then seeks to demonstrate the real existence of these hypothesised relations (Fitzpatrick, 2005). In terms of methods, a combination of qualitative and quantitative methods is utilised in a critical realist approach. Qualitative data is used to understand the processes of social construction and qualitative data is used to understand the effects of structure.

A postmodernist approach emphasises the defining natures of discourse. The place of language and other forms of symbolic communication are thus privileged in postmodernist explanation. The ontological assumption here is constructivism which sees reality as socially constructed through the language use of different discourse communities. Postmodernists deny universal claims of truth, or that truths bridge across or are shared by all discourse communities. As a result they seek only partial or local claims within particular discourse communities. With regards to a methodology, the most common approach adopted by postmodernists is deconstruction through discourse analysis.

Having considered each philosophy discussed above, in essence this study adopts a positivist approach (quantitative) that aspires to establish relationships between both independent and dependent variables, and assumes that some sort of order can be established to help understand, predict and control future behaviour. The approach adopted is also undoubtedly nomothetic as it endeavours to establish generalities across the sample, and does not have the capacity to explore individual life worlds (an idiographic approach) or the meaning that may lie behind individual behaviours (a hermeneutic approach). That work may be left to those who in future may wish to adopt a more qualitative methodology to explore issues in greater depth but at this juncture it

was felt appropriate to use the research to establish robust baseline population measures and thereby to open avenues for further research

On the whole it is believed that no single research methodology is intrinsically any better than any other methodology (Bryman, 1989). All methods are valuable if used appropriately and research can include elements of both a positivist and interpretivist approaches, if managed carefully. The concern for this study is that the research undertaken should be both relevant to the research objectives as set out in Chapter 3 and rigorous in its operationalisation. Overall it is believed that quantitative methods are required for achieving the research objectives. The rationale for this selection is that to provide meaningful population baseline statistics then there is the need for a large randomised sample and the merit then lie in the fact that the results are generalisable. For example, the second objective of this study is to quantify the physical activity levels amongst the adult population in Northern Ireland by conducting preliminary analysis of the SAPAS data. The adoption of quantitative methods allows the author to make generalisable and objective statements on the phenomena observed. Also, statistical significance can be determined in terms of the variations among observations (e.g. differences in physical activity levels between various demographic sub-groups).

### 4.1.2 RELEVANCE OF THEORY

As Kurt Lewin put it many years ago, with reference to applied social psychology, '*There is nothing so practical as a good theory*' (1951: 169). This statement emphasises the critical role that theory plays when carrying out high quality applied or action research, by providing a framework for interpretation and understanding of emerging findings; however this view has been contested by many researchers. For example, Scriven (1991) regards theories as a luxury in evaluation research, while

Thomas (1997), writing in the context of education, advocates the abandonment of all theory because of its stifling effect on practice. 'Theory' can mean very different things to different people. In very general terms it is an explanation of what is going on in the situation, phenomenon or whatever that is being investigated. Theories can range from formal large scale systems developed in academic disciplines to informal hunches or speculations from laypersons, practitioners, or participants in the research (Robson, 2002).

Obviously, there are advantages if links can be made to current formal theories, such as those described below, as this provides the researcher with some assurances that what they are doing is in line with other researchers' attempts to understand what is happening. Equally, it may be important to model emerging findings in a way that makes sense. However, given the pluralistic nature of contemporary social science, it may not always be possible to make a connection between a research topic and existing theories in real world studies. For example, a particular research topic may be novel, there may be no consensus as to a 'best fit' theory or time pressures may be such that there is not the opportunity to explore the literature (Robson 2002).

Furthermore, in real world research a distinction is sometimes made between 'theory verification' and 'theory generation'. Positivist methodology starts with theory, deduces formal hypothesis from it, and designs the study to test these hypotheses. In stark contrast, the tradition in grounded theory studies is not verification but theory generation. Here researchers do not start with a theory but aim to end up with one, developed systematically from the data collected, and these two approaches stand diametrically opposed to each other.

Working within the former, positivist tradition, theoretical activity can be classified into four levels: *conceptual frameworks*; *middle range theory*; *grand theory*; and *meta theory*. Each level of theoretical activity has defined characteristics and purpose that are specific to the level. *Conceptual frameworks* provide interpretations of relationships between concepts and are intended to apply to a wide range of situations (Stoker, 1995). *Middle range theory* lies between grand theory and conceptual frameworks. This kind of theory does not attempt to deal with all social contexts; rather, its focus is limited to specific phenomena. *Grand theory* is applied to large scale social phenomena and presents a master conceptual scheme that is intended to represent the important features of a total society. *Meta theory* articulates a set of ontological and epistemological assumptions which provides perspectives for looking at the social world such as how the social world is constructed and how it can be known. It lays down the foundation for what might constitute an adequate theory at any level.

The purpose of the current study is to quantify accurately levels of physical activity (across four domains – home, work, travel, sport and recreation) amongst the adult population in Northern Ireland in order to investigate their relationship with various measures of health and wellness (self-reported height and weight [to compute BMI], smoking behaviour, alcohol consumption, health eating habits and perceived health and happiness). As such, at first glance it represents the more traditional positivist approach to social science, as fundamentally the study aims to explore relationships between established hypothetical constructs. At the same time however, the absence of any theoretical consensus in the field of sport participation makes verification difficult. Successive reviews of this literature reveal no agreement as to the underlying mechanism of sport participation, and instead a myriad of theories and models continue to be applied to help explain various parts of the process whereby individuals translate

an intention to take part in physical activity into participation, continuance and disengagement (Biddle *et al.*, 2007; Allender *et al.*, 2006; Foster *et al.*, 2007) and instead the research offers the opportunity to ground emerging models in the data as and when appropriate. Hence despite the wealth of previous research, data analysis can still be exploratory in order eventually to determine a 'best fit' with any existing theoretical perspective, thereby in essence representing a grounded approach to data analysis.

Whilst there is no single theoretical base for the present research, there has been a considerable contribution to knowledge and theory in the subject area of physical activity and health, particularly in relation the process (i.e. stakeholder consulation, systematic review, narrative review, pilot and cognitive testing) that has been used to derive a new research instrument that is capable of capturing reliable data on adult physical activity levels across four life domains (i.e. home, work, travel and sport) and a range of health and wellness variables.

### 4.1.3 APPROPRIATENESS OF METHOD & RELIABILITY OF DATA

Methods are specific research techniques including quantitative and qualitative techniques; Morgan and Smirch (1980) mention that:

> The choice of and adequacy of a method are based on interrelated sets of assumptions regarding the nature of knowledge and the methods through which that knowledge can be obtained, as well as a set of root assumptions about the nature of the phenomena to be investigated.
>
> [Page 491]

Adoption of an inappropriate method raises the possibility that researchers' theoretical concepts will fail to express adequately the phenomena under investigation. Traditionally, the choice of methods has been limited to either qualitative or quantitative

but it is becoming increasingly accepted that both qualitative and quantitative orientated methods can act in tandem at different stages or at the same time in a research project (Bryman, 1992, Robson, 2002, Creswell, 2003). In support of this stance, Creswell (2003) postulated that all methods have limitations; and a mixed methods approach could help neutralise or cancel some of the biases inherent in a single method. However, in relation to this project and at this stage of the research, given the intent of accurately quantifying baseline levels of physical activity amongst the adult population in Northern Ireland and investigating their relationship with various measures of health and wellness, it was felt that quantitative methods only should be employed but that this orientation would not exclude the possibility of more qualitative research at some later date.

More generally, there are two criteria by which any research study can be assessed, reliability and validity (Sliverman, 2005). Reliability refers to the extent to which the same findings will be achieved if the same procedure is carried out by a different researchers or at a different time (Kirk and Miller, 1986), and validity relates to the degree to which the correctness or credibility of a description, conclusion, explanation, or interpretation of an account will be obtained (Maxwell, 1996). Silverman (2005) highlights that for any research project it is worth considering how far the methods used would provide reliable, valid and objective data and it is worth reflecting on these issues at the early stages of methodological design.

In relation to the reliability and validity of SAPAS, a number of the items on the instrument were carefully selected through a multiple methods approach which crosschecked accounts both by secondary sources (systematic review of relevant literatures, a review of the narrative literature) and primary interviews (piloting of the

draft survey (n=50) and cognitive testing (n=30). In addition, SAPAS was reviewed by knowledge experts to provide adequate content validity (Litwin, 1995). Subsequent to data collection, the criterion and construct validity of SAPAS was tested by implementing a test retest reliability method study.

### 4.1.4 METHODOLOGICAL CONSIDERATIONS: CONCLUDING REMARKS

Section 4.1 briefly outlines the methodological issues addressed in the current study. The absence of a consensus as to how best to measure physical activity presents considerable challenges for new research in this field. Available models have helped provide a steer as to which methods best capture reliable data, but do not offer definitive guidance. In order to develop a research instrument that was fit for purpose, the present research adopted a pragmatic and selective approach to extract those techniques and methods that have been shown to be most appropriate across diverse populations. Underpinning the adopted methodology is no single theoretical perspective, but it is hoped that the derived data will help inform future theoretical discussions.

## 4.2 METHODOLOGY: A GENERAL OVERVIEW

A key aim of this study was to review existing research and use this work to help design and test a new survey instrument for quantifying levels of physical activity within the adult population (16 years +) of Northern Ireland. Building on the findings from the systematic review and the review of the narrative literature a new survey instrument (SAPAS) evolved to measure adult physical activity levels in Northern Ireland and to monitor associated health benefits. A recent study by Poortinga (2007), exploring the associations between physical activity and smoking and alcohol consumption, has shown that it is necessary to make precise distinctions between different types of

physical activity, and hence SAPAS tries to capture data on physical activity in a manner that will allow for more fine grained analyses of activity type than was ever possible in previous studies in Northern Ireland.

The remainder of this chapter will outline the technical and methodological approach to the design, delivery and analysis of the survey instrument, SAPAS. Each stage of implementation was informed by the experience of previous research, with an attempt made to follow best practice principles on all possible occasions while operating within available resources. As previously mentioned, existing research has tended to employ a wide variety of questions and to follow procedures that are often significantly at variance. SAPAS attempted to follow those protocols that had been shown to yield the most valid, reliable and robust data sets. Further detail of the selection process will be provided in the forthcoming section.

## 4.3 THE SAMPLE

In 2007, as Policy, Planning and Research Manager within Sport Northern Ireland, the author developed a business case to secure the necessary resources needed to undertake the largest and most comprehensive survey on sport and physical activity in Northern Ireland since 1994. Once the business case was approved by DCAL, terms of reference for the study were tendered in Official Journal of the European Community (OJEC is now recognised as OJEU - the Official Journal of the European Union)[27]. Following this exercise four tenders that were received from experienced research centres in the UK were assessed by the PSG. On 12 December 2008, Ipsos MORI was commissioned to undertake the survey on behalf of Sport Northern Ireland.

[27] This is the publication in which all tenders from the public sector which are valued above a certain financial threshold according to EU legislation must be published.

The sample comprised all individuals aged 16 plus living in Northern Ireland at the time of survey. In total, 4,653 interviews were conducted during the course of one year (23 July 2009-10 August 2010). The survey was conducted face-to-face, in-home, using Computer Assisted Personal Interviewing (CAPI). A stratified random sampling approach was applied for the selection of households and the last birthday rule used to select respondents within households.

The initial target number of interviews was approximately 4,600 to be carried out over a 12 month period. The number of interviews across Northern Ireland was designed to be proportionate to the 26 Local Government Districts (LGDs) apart from Belfast and Derry which had a booster sample of approximately 1,000 interviews in each of these two LGDs (see Table 4.1 below).

**TABLE 4.1: NUMBER OF TARGET INTERVIEWS ACROSS NI**

| LGD Overall | Overall Target | Target Per Quarter |
|---|---|---|
| Belfast | 1,000 | 250 |
| Derry | 1,000 | 250 |
| Rest of Northern Ireland LGDs (24) | 2,600 | 650 |
| Total | 4,600 | 1,150 |

For the selection process, the LGDs of Belfast and Derry were treated separately to the other 24 LGDs. A three stage process was used to construct the random probability sample.

### 4.3.1 SAMPLE FOR THE 'REST OF NORTHERN IRELAND' LGDs

**Selection of Primary Sampling Units**

Firstly, a random selection of Primary Sampling Units (PSUs) was drawn which comprised output areas within Electoral Wards. In order to provide a representative sample from the 24 LGDs a proportionate number of wards per LGD were selected. The proportion of wards was based on the residential population size using the 2007 mid-year estimates provided by the Census Office for Northern Ireland. The information was drawn from the residential demographic table, 'age of resident (single year)'. A summary of the population proportions is provided in Table 4.2 broken down by those aged under 16 and those aged 16 or over. For the purposes of this study only residents aged 16 or over were of interest.

**TABLE 4.2: 2007 MID YEAR POPULATION ESTIMATES**

| Local Government Districts* | Number of wards | Under 16 | 16 and over | All |
|---|---|---|---|---|
| Antrim | 19 | 12,243 | 40,378 | 52,62 |
| Ards | 23 | 15,170 | 61,947 | 77,11 |
| Armagh | 22 | 13,517 | 44,168 | 57,68 |
| Ballymena | 24 | 12,856 | 49,262 | 62,11 |
| Ballymoney | 16 | 6,491 | 23,250 | 29,74 |
| Banbridge | 17 | 10,301 | 36,148 | 46,44 |
| Carrickfergus | 17 | 8,319 | 31,707 | 40,02 |
| Castlereagh | 23 | 12,955 | 52,607 | 65,56 |
| Coleraine | 22 | 11,658 | 45,157 | 56,81 |
| Cookstown | 16 | 8,187 | 27,242 | 35,42 |
| Craigavon | 26 | 19,758 | 69,062 | 88,82 |
| Down | 23 | 15,427 | 53,761 | 69,18 |
| Dungannon | 22 | 12,486 | 41,820 | 54,30 |
| Fermanagh | 23 | 13,064 | 48,227 | 61,29 |
| Larne | 15 | 6,181 | 25,163 | 31,34 |
| Limavady | 15 | 7,879 | 26,549 | 34,42 |
| Lisburn | 30 | 25,922 | 87,598 | 113,5 |
| Magherafelt | 16 | 10,078 | 33,021 | 43,09 |
| Moyle | 15 | 3,471 | 13,269 | 16,74 |
| Newry and Mourne | 30 | 23,273 | 72,221 | 95,49 |

| | | | | |
|---|---|---|---|---|
| Newtownabbey | 25 | 16,675 | 65,015 | 81,69 |
| North Down | 25 | 14,538 | 64,119 | 78,65 |
| Omagh | 21 | 11,861 | 39,647 | 51,50 |
| Strabane | 16 | 9,189 | 30,241 | 39,43 |
| **TOTAL** | **501** | **301,499** | **1,081,579** | **1,383,** |

* List of 24 LGDs with Belfast and Derry removed

66 PSUs were selected each quarter giving a total of 264 PSUs for the year. The number of selected wards per LGD per quarter ranged from 1 to 5 (see Table 4.3). A target number per PSU per quarter was approximately 10 interviews

**TABLE 4.3: SUMMARY OF POPULATION PROPORTIONS BY THOSE AGED 16 AND UNDER AND THOSE AGED 16 AND OVER**

| Local Government District* | 16 and over | Proportion | PSUs |
|---|---|---|---|
| Antrim | 40,378 | 3.7% | 2 |
| Ards | 61,947 | 5.7% | 4 |
| Armagh | 44,168 | 4.1% | 3 |
| Ballymena | 49,262 | 4.6% | 3 |
| Ballymoney | 23,250 | 2.1% | 1 |
| Banbridge | 36,148 | 3.3% | 2 |
| Carrickfergus | 31,707 | 2.9% | 2 |
| Castlereagh | 52,607 | 4.9% | 3 |
| Coleraine | 45,157 | 4.2% | 3 |
| Cookstown | 27,242 | 2.5% | 2 |
| Craigavon | 69,062 | 6.4% | 4 |
| Down | 53,761 | 5.0% | 3 |
| Dungannon | 41,820 | 3.9% | 3 |
| Fermanagh | 48,227 | 4.5% | 3 |
| Larne | 25,163 | 2.3% | 2 |
| Limavady | 26,549 | 2.5% | 2 |
| Lisburn | 87,598 | 8.1% | 5 |
| Magherafelt | 33,021 | 3.1% | 2 |
| Moyle | 13,269 | 1.2% | 1 |
| Newry and Mourne | 72,221 | 6.7% | 4 |
| Newtownabbey | 65,015 | 6.0% | 4 |
| North Down | 64,119 | 5.9% | 4 |
| Omagh | 39,647 | 3.7% | 2 |
| Strabane | 30,241 | 2.8% | 2 |
| **TOTAL** | **1,081,579** | **100.0%** | **66** |

Within each LGD, wards were initially ranked by the percentage of permanently sick/disabled people as a socio-demographic indicator from census data to randomise the list of wards and to ensure that all wards had an equal chance of selection. A random start point was chosen and the wards were selected with a fixed interval, i.e. on a '1 in n' basis. For each quarter of the fieldwork a different set of PSUs were chosen in such a way as to not allow any output area to be sampled more than once.

**Selection of Output Areas**

Once the electoral wards had been chosen, one output area (a concentrated collection of around 125 addresses) was randomly chosen from that ward. A sample of addresses was randomly drawn from each of the selected output areas using the Royal Mail's Postal Address File (PAF), depending on the final number to be achieved along with an estimate of the likely response rate. In order to select the addresses within the selected wards all the addresses that fell within the output area were listed in order of postcode. As with the selection of PSUs, a random start point was chosen and the addresses were selected with a fixed interval, i.e. on a '1 in n' basis. These addresses were issued to the fieldwork interviewers quarterly and formed the basis for the survey sample.

**TABLE 4.4: SUMMARY OF TARGET INTERVIEWS AND ADDRESSES IN EACH LGD**

| Local Government District* | Interviews per quarter (target) | Interviews per year (target) | Addresses per quarter (approx.) | Total Addresses (approx.) |
|---|---|---|---|---|
| Antrim | 20 | 80 | 42 | 168 |
| Ards | 40 | 160 | 84 | 336 |
| Armagh | 30 | 120 | 63 | 252 |
| Ballymena | 30 | 120 | 63 | 252 |
| Ballymoney | 10 | 40 | 21 | 84 |
| Banbridge | 20 | 80 | 42 | 168 |
| Carrickfergus | 20 | 80 | 42 | 168 |
| Castlereagh | 30 | 120 | 63 | 252 |
| Coleraine | 30 | 120 | 63 | 252 |
| Cookstown | 20 | 80 | 42 | 168 |
| Craigavon | 40 | 160 | 84 | 336 |
| Down | 30 | 120 | 63 | 252 |
| Dungannon | 30 | 120 | 63 | 252 |
| Fermanagh | 30 | 120 | 63 | 252 |
| Larne | 20 | 80 | 42 | 168 |
| Limavady | 20 | 80 | 42 | 168 |
| Lisburn | 50 | 200 | 105 | 420 |
| Magherafelt | 20 | 80 | 42 | 168 |
| Moyle | 10 | 40 | 21 | 84 |
| Newry and Mourne | 40 | 160 | 84 | 336 |
| Newtownabbey | 40 | 160 | 84 | 336 |
| North Down | 40 | 160 | 84 | 336 |
| Omagh | 20 | 80 | 42 | 168 |
| Strabane | 20 | 80 | 42 | 168 |
| **TOTAL** | **660** | **2,640** | **1,386** | **5,544** |

* List of 24 LGDs with Belfast and Derry removed.

When calling at an address, interviewers determined whether it was residential and occupied. The interviewers then determined the number of properties or self- contained dwelling units at the address. If there was more than one property at the address, the interviewer informed a member of the field management team who randomly selected the property in a systematic way using a random table select grid. The same procedure was used in instances where there was more than one household at the selected property.

**Respondent Selection**

Finally, individuals aged 16 and over within each selected household were randomly selected to take part in the survey, using the 'last birthday rule'. This random selection took place during an initial screening interview with an adult member of the household. The selected respondent was randomly chosen, regardless of whether or not they happened to be at home at the time of this initial call. If he/she was not available at that time a minimum of four follow-up calls were made to seek an interview.

### 4.3.2 SAMPLE FOR BELFAST AND DERRY

Based on the target number of 10 interviews per PSU per quarter, 25 PSUs for both Belfast and Derry were selected to achieve the target of 250 interviews per quarter. As per the selection procedure above, the wards within Belfast and Derry were initially ranked by socio-demographic indicators from census data before 10 were chosen from the total number of wards (shown below).

| Local Government Districts | Number of wards |
|---|---|
| Belfast | 51 |
| Derry | 30 |

Output areas per ward were randomly selected as described earlier for the other 24 LGDs.

A sample of addresses was drawn from each of the selected PSUs using the Royal Mail's Postal Address File (PAF).

| Local Government District | Interviews per quarter (target) | Interviews per year (target) | Addresses per quarter (approx.) | Total Addresses (approx.) |
|---|---|---|---|---|
| Belfast | 250 | 1,000 | 525 | 2,100 |
| Derry | 250 | 1,000 | 525 | 2,100 |
| **TOTAL** | **500** | **2,000** | **1,050** | **4,200** |

## 4.4 BRIEFING AND TRAINING OF INTERVIEWERS

Before the start of the main stage fieldwork, a comprehensive briefing of 60 interviewers working on this project took place on 21 July 2009. The author attended the briefing as the lead researcher and as a member of the SAPAS Project Steering Group.

The success of the survey was entirely dependent on the quality of the data collected by the interviewers. All the interviewers involved in the SAPAS fieldwork were registered on Ipsos MORI's select list of trained and experienced survey personnel.

The first key aim of the briefing session was to provide interviewers with the full context and rationale for the study, so that they were fully engaged with the process from the outset. A suite of training materials was developed by Ipsos MORI, using its CAPI survey experience with similar studies. These included interviewer instructions, 'Frequently Asked Questions', and an appropriate covering letter to demonstrate that it was a *bona fide* survey.

The second aim of the briefing session was to train the interviewers fully on the survey instrument itself. The interviewers were taken through the CAPI script several times, covering different scenarios and respondent types. Interviewers then carried out role

plays and practiced completing the surveys with each other. The author and representatives from Ipsos MORI were on hand to answer any queries.

## 4.5 ADVANCE LETTERS

An advance letter was sent to all potential respondents two weeks before the planned interviewing dates to inform the householders about the survey and its importance. A copy of this advance letter is attached at Appendix 3.

## 4.6 ACHIEVED NUMBER OF INTERVIEWS & RESPONSE RATES

Interviewers completed a contact report for each address. The final outcome codes which were used are detailed in Table 4.5.

## TABLE 4.5: SUMMARY OF FINAL OUTCOME CODES USED FOR THE INTERVIEWERS CONTACT REPORT

| | Outcome Code | Outcome Description | Outcome Type |
|---|---|---|---|
| 1 | Successful Interview | Successful interview conducted at target address | VALID |
| 2 | Refused before Respondent Selection | Respondent refused to participate before the interviewer had completed the selection process. | VALID |
| 3 | Refused after Respondent Selection | Interviewer has completed the selection process, but the selected respondent does not wish to participate | VALID |
| 5 | Unable to access block/scheme/gated apartments | Interviewer unable to gain access to accommodation at target address | VALID |
| 6 | Occupied, no contact at address after 5+ | Address is definitely occupied, but interviewer was unable to make contact with anyone | VALID |
| 7 | No contact with selected resident, 4+ Calls | Interviewer has successfully carried out the selection process, but has been unable to make contact with the selected respondent despite up to 4 attempts | VALID |
| 8 | Occupier in but not answering door after 5+ calls | Evidence would suggest that occupier is present at target address, but will not answer the door to the interviewer | VALID |
| 9 | Unsure if occupied, no contact after 5+ Calls | Interviewer cannot be certain that the target address is actually occupied | INVALID |
| 10 | Property vacant | Property is currently empty | INVALID |
| 11 | Property derelict | Property is definitely not inhabited | INVALID |
| 12 | Property demolished | Property is definitely has been demolished | INVALID |
| 13 | Non-residential property | Property is a commercial premises, or is used as a holiday home | INVALID |
| 14 | Property not found | Interviewer was unable to locate the target address | INVALID |
| 15 | Too ill to participate | Selected Respondent is unable to take part in survey due to ill health | VALID |
| 16 | Away during fieldwork | Selected Respondent does live at target address, but is currently away and will not be back before the end of the fieldwork period | VALID |
| 17 | Unsure if household eligible | Interviewer has made contact at target address, but has not been able to establish whether any eligible respondents live there | VALID |
| 18 | Mother tongue required | Respondent does not speak English well enough to be able to conduct the survey interview | VALID |
| 19 | Other (WRITE IN) | Other Outcome not listed above | VALID |
| 20 | Withdrawn by head office | Respondent made contact with Ipsos MORI | VALID |

Fieldwork was conducted from 23 July 2009 to 10 August 2010 and over that period 4,664 interviews were conducted. The overall response rate was 55%. .

The response rate was calculated as successful interviews divided by valid addresses. The refusal rate was calculated by the number of people who refused to take part in the interview ('refusals') divided by valid addresses.

**Reserve points**

In total 24 'reserve points' were selected to allow for substitutions due to high number of ineligible properties etc. There were five selected in Belfast, five in Derry, with the remaining 14 selected across the other 24 LGDs. In total three reserve points were used, one in Derry, one in Lisburn and one in Newry and Mourne.

## 4.7 QUESTIONNAIRE DEVELOPMENT AND CONTENT

The questionnaire was designed to investigate all aspects of physical activity behaviour (across four life domains - at home, while at work, as transport, in sport & leisure) and a range of health and wellness characteristics (smoking behaviour, alcohol and fruit & vegetable consumption, self-reported BMI and perceived health and happiness) within the Northern Irish adult population. It was adapted and devised in line with other large scale population based surveys, which addressed all aspects of physical activity behaviour and/or one or more health and wellness characteristics (i.e. NIHAS 1994, ADNFS, 1992; BRFSS 2001).

In particular, a number of questions included within SAPAS were adopted and adapted from the Active People Survey (APS) that was conducted by Ipsos MORI on behalf of

Sport England in 2005. Although, APS was only designed to measure participation in sport and active recreation and not participation in other life domains (unless for the purpose of recreation), it did construct, test and provide a bank of questions that could measure the intensity, frequency and duration of participation in sport and active recreation. It was on this basis that SAPAS was adapted to encompass the broader definition of participation in sport and physical activity so as to enable the robust collection of data to measure the participation levels in other life domains (i.e. home, work etc.). In practical terms, each of the eligible activity domains (sport and recreation, home, work and travel) were treated and asked about in the same way that data was recorded for sport and active recreation on the ASP.

During the process of designing the questionnaire, regular consultations were held with members of staff from a range of organisations, including:

- University of Ulster, Jordanstown (Professor Marie Murphy);
- Queens University, Belfast (Dr John Kremer);
- Loughborough University (Professor Fiona Bull);
- Sport England (Nick Rowe);
- Sportscotland (Jon Best);
- Sport Council Wales (Dr Rachael Hughes);
- Public Health Agency (Dr Gillian Gilmore);
- UKCRC Centre for Public Health (Professor Frank Kee); and
- Northern Ireland Research & Statistics Agency (Dr Kieron Moore).

The final questionnaire had 15 sections, six of which were designed in line with the aims and objectives of the study with the remaining sections included to gather baseline

information in relation other priorities identified within Sport Matters[28]; these are outlined in Table 4.6, and the full questionnaire is included in Appendix 4. The accompanying letter for the questionnaire is presented in Appendix 3.

**TABLE 4.6: SUMMARY OF KEY VARIABLES TO BE ASSESSED BY THE NEW SURVEY INSTRUMENT**

| Section | Contents |
|---|---|
| *Section 1* | *Sport Participation & Other activity* |
| *Section 2* | *Motivation & Barriers to participation* |
| *Section 2a* | *Non-Participants* |
| *Section 2b* | *Ex-Participants* |
| *Section 2c* | *Respondents who have never participated* |
| *Section 2d* | *Barrier statements and encouragement* |
| *Section 2e* | *Participants* |
| Section 3 | Coaching |
| Section 4 | Club membership |
| Section 5 | Competition |
| Section 6 | Volunteering |
| Section 7 | Paid sports work |
| Section 8 | Facilities |
| Section 9 | Spectating |
| Section 10 | Satisfaction |
| Section 11 | Economic and related questions |
| *Section 12* | *Perceived health and happiness* |
| *Section 13* | *Fruit & Vegetable Consumption* |
| *Section 14* | *Alcohol consumption and smoking* |
| *Section 15* | *Demography* |

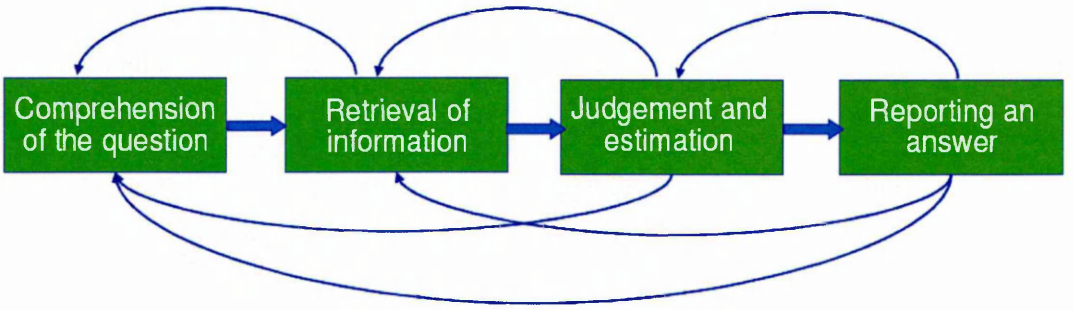
Following this drafting of the new survey instrument both cognitive testing and a thorough pilot were conducted.

### Cognitive Testing

Cognitive testing is a diagnostic technique that explores the processes employed by

[28] Sport Matters: The Northern Ireland Strategy for Sport and Physical Recreation 2009-19

people when answering survey questions, such as comprehension, recognition, recall and decision-making.




A flexible mix of 'think aloud' (whereby respondents are explicitly instructed to verbalise their thought processes as they answer the survey questions) and 'verbal probing' techniques were employed, which were adapted to suit individual respondents (with both concurrent and retrospective probing). In particular, the following issues were analysed in detail:

- The introduction to the survey and its suitability to ensure a high response rate.
- The approach of assessing people's levels of physical activity in the getting about, home, work and sport domains, in particular, people's ability to recall the types, frequencies and intensities of activities they had carried out over the last seven days.

In total, 30 cognitive testing interviews were carried out in Belfast. Respondents were selected with regard to gender, age, working status and their level of sport participation, in order to ensure the questionnaire was tested with a wide range of different members of the general public.

The results of the cognitive testing interviews and all amendments to the questionnaire were discussed with the author and other PSG members in detail.

**Piloting of the New Survey Instrument**

After the cognitive testing, 50 pilot interviews were conducted with members of the general public across Northern Ireland (via CAPI and in-home) in order to:

- Test the questionnaire under real life conditions.
- Provide an estimation of the questionnaire length.

All interviewers involved in the piloting received an intensive briefing before the interviews took place and provided detailed feedback on a range of issues, e.g. the ability of respondents to understand terms and definitions used; the motivation of respondents during the interview and any problems that occurred when setting up or conducting the interview.

The pilot was conducted by highly experienced CAPI interviewers and the pilot interviews took place in a range of locations and with different types of respondent, e.g. people who were inactive, a bit active, very active etc. to ensure the questionnaire was understood by all.

Once these interviews were completed, the interviewers were required to produce a detailed comment sheet which was reviewed by the author and PSG before amendments were made to the questionnaire.

**Introducing the New Survey Instrument**

A great deal of time was spent by the author and PSG members in the design of the introduction to the survey in order to maximise response while eliminating bias as far as possible.

The main potential bias was that refusal rates would be higher amongst those who were most sedentary, i.e. participating in little or no sport, so the introduction was carefully designed so that it would not knowingly introduce this kind of bias by not mentioning 'sport' or 'Sport Northern Ireland' and stated only that the survey was about 'people's leisure and recreational activities'.

In order to maximise response it was agreed (and tested during cognitive testing and piloting) that the introduction needed to be short to minimise the chance of refusal during the introduction i.e. giving too much information could provide more reasons for people to decline to participate. However, it was still essential to cover the following within the introduction:

- Name of interviewer and organisation they were calling from (Ipsos MORI);
- The subject of the research (leisure and recreational activities); and
- How the information would be used and by whom.

The final version of the introduction was worded as follows:

*'Good morning/afternoon/evening, my name is ..... from Ipsos MORI, the research organisation, and we are carrying out a survey among local people about your leisure or free time. The research is being conducted on behalf of a government funded body and will be used to improve local services in your area. At the end of the survey we want to ask you some questions about your general health and lifestyle. We are not selling anything; we would just like to ask you some questions.*

*The interview will take about 30 minutes. I would like to assure you that all the information we collect will be kept in the strictest confidence and used for research purposes only. We guarantee that it will not be possible to identify any particular individual or address in the results'*

**Included Activities**

As mentioned earlier, data were collected on activities in the getting about, home, work and sport and leisure domains which were undertaken by the respondent. Table 4.7 provides an overview of all activities on which respondents were prompted (using showcards). The completeness and relevance of these activities were tested in the cognitive testing and piloting of the questionnaire.

## TABLE 4.7: OVERVIEW OF ALL PROMPTED ACTIVITIES BY

| Domain | Activity |
|---|---|
| Home activities that raised the breathing rate | Housework that raised your breathing rate (for at least ten minutes) |
| | DIY (for at least ten minutes) |
| | Gardening (for at least ten minutes) |
| | Other activity – specify |

| Domain | Activity |
|---|---|
| Work activities | Walking about while at work (for at least 10 minutes) |
| | Manual labour (of bouts of at least 10 minutes) |
| | A cycle ride while at work (for at least 10 minutes) |
| | Other exercise / physical activity while at work (for at least 10 minutes) |

| Domain | Activity |
|---|---|
| Getting about activities | A walk for recreation (for at least 10 minutes) |
| | A walk to get somewhere (for at least 10 minutes) |
| | A cycle ride for recreation (for at least 10 minutes) |
| | A cycle ride to get somewhere (for at least 10 minutes) |

| Domain | Activity |
|---|---|
| Sport activities | American football |
| | Angling/fishing |
| | Badminton |
| | Basketball |
| | Bowls – indoors |
| | Bowls - outdoor / lawn |
| | Canoeing |
| | Camogie |
| | Cricket |
| | Cycling |
| | Darts |
| | Dance |
| | Exercise bike / running machine / spinning class / other exercise machines |
| | Football/soccer indoors (including 5-a-side) |
| | Football/soccer outdoors (including 5-a-side) |
| | Gaelic Football |
| | Golf, pitch and putt, putting (exclude crazy and miniature) |
| | Gymnastics |
| | Hockey (exclude ice or roller) |
| | Horse riding (exclude polo) |
| | Hurling |
| | Ice skating (exclude roller skating) |
| | Jogging |

Keep fit, aerobics
Martial Arts (include self defence, tai chi, Taekwondo, Judo and Karate)
Motor sports
Netball
Rugby (union or league)
Shooting
Skiing
Snooker, pool, billiards
Snowboarding
Squash
Swimming or diving
Table Tennis
Tennis
Tenpin bowling
Track and field athletics
Walking
Weight training/lifting/body building
Windsurfing/boardsailing
Yachting or dinghy sailing
Yoga
Other – specify

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**Questions for Determining Frequency of Participation**

The following questions were asked separately for each domain (getting about, home, work, and sport).

**Question 1**

*'Can you read through the list of activities and tell me which, if any, of them you have done over the last 12 months.'*

**Question 2** (for all activities mentioned in question 1)

*'Which if any of them you have done over the last four weeks?'*

**Question 3** (for all activities mentioned in question 2)

*'On which days have you done [activity] in the last 7 days?'*

It is important to note that in this survey the *number of days* an activity had been carried out was captured. This is not the *number of sessions* i.e. the number of times the activity has been undertaken in the last four weeks. For example someone cycling for 30 minutes twice in one day would be recorded as 'one day'.

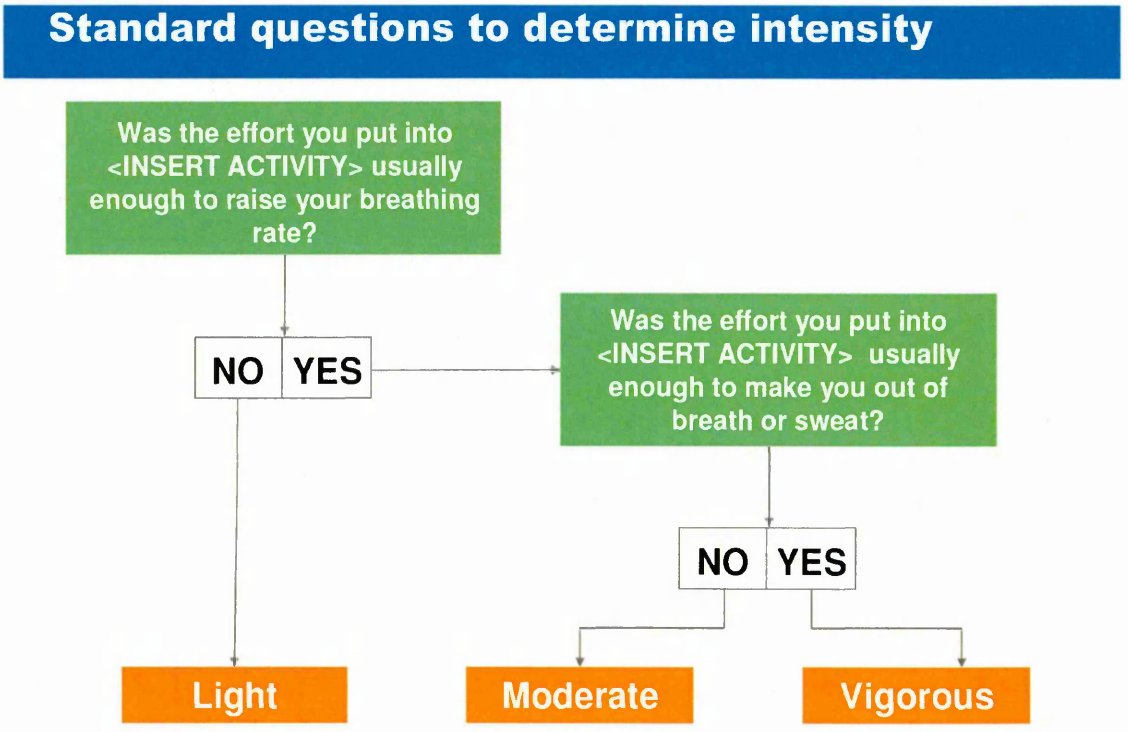
In order to calculate the amount of time a respondent spent engaging in an activity the following question was asked for each activity in the last seven days before the interview: *'How long in total have you spent doing [activity] in the last 7 days?'*

**Classification of Activities**

Following the recommendations of the Chief Medical Officers in the UK (Department of Health 2004) that adults should accumulate thirty minutes of moderate intensity activity on most days of the week, the questions included in the new survey instrument were designed to ascertain a complete picture of physical activity among the respondents. In order to describe levels of physical activity across four life domains (home, work, transportation and sport & leisure), and in light of the literature, all activities were classified according to the intensity with which they had been undertaken. This was captured in three different ways, depending on the activity:

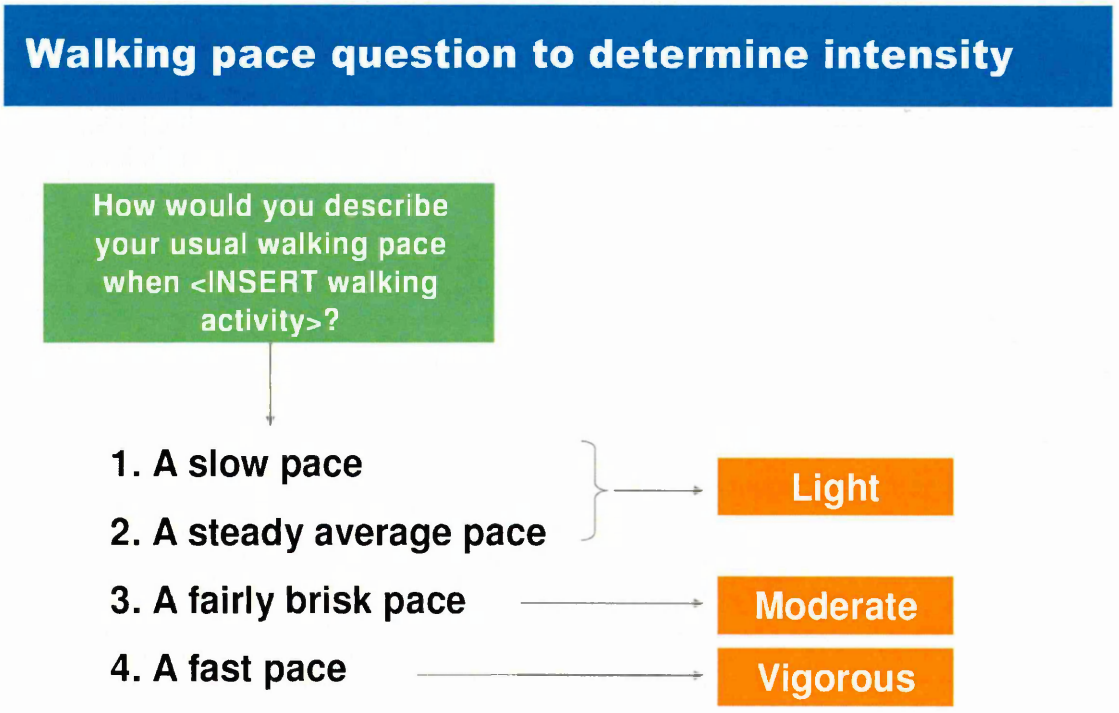
Degree of increased breathing rate / sweating

Two standard questions were asked:



Walking

The intensity of walking (for recreation/to get somewhere/while at work/at sport) was classified by using a question about walking pace:



Pre-classifying activities

Some sporting activities were pre-classified with regard to the intensity level, as shown in Table 4.8. If an activity was classified as light or vigorous, none of the standard questions (see 1. above) were asked. If any activity was classified as light or moderate only the first standard question was asked. If an activity was classified as moderate or vigorous, only the second standard question was asked. For example, swimming/diving (indoors) would never be classified as a light intensity activity, therefore, there was no need to ask the intensity question 'when you participate in swimming/diving does it raise your breathing rate?' This activity would therefore only need to be routed to the intensity question which asked whether when participating, it made the respondent out of breath or sweat (i.e. determining whether the activity is moderate or vigorous). Again, this approach to the pre-classification of sporting activities was adopted from APS.

## TABLE 4.8: PRE-CLASSIFICATION OF SPORTING ACTIVITES WITH REGARD TO INTENSITY LEVEL

| | SPORT | PRECODED INTENSITY LABEL |
|---|---|---|
| 1 | American football | VIGOROUS |
| 2 | Angling/fishing | LIGHT |
| 3 | Badminton | MODERATE OR VIGOROUS |
| 4 | Basketball | MODERATE OR VIGOROUS |
| 5 | Bowls – indoors | |
| 6 | Bowls - outdoor / lawn | |
| 7 | Canoeing | |
| 8 | Camogie | MODERATE OR VIGOROUS |
| 9 | Cricket | MODERATE |
| 10 | Cycling | |
| 11 | Darts | LIGHT |
| 12 | Dance | |
| 13 | Exercise bike / running machine / spinning class / other exercise machines | MODERATE OR VIGOROUS |
| 14 | Football/soccer indoors (including 5-a-side) | MODERATE OR VIGOROUS |
| 15 | Football/soccer outdoors (including 5-a-side) | MODERATE OR VIGOROUS |
| 16 | Gaelic Football | VIGOROUS |
| 17 | Golf, pitch and putt, putting (exclude crazy and miniature) | MODERATE |
| 18 | Gymnastics | MODERATE OR VIGOROUS |
| 19 | Hockey (exclude ice or roller) | VIGOROUS |
| 20 | Horse riding (exclude polo) | MODERATE OR VIGOROUS |
| 21 | Hurling | VIGOROUS |
| 22 | Ice skating (exclude roller skating) | MODERATE OR VIGOROUS |
| 23 | Jogging | VIGOROUS |
| 24 | Keep fit, aerobics | MODERATE OR VIGOROUS |
| 25 | Martial Arts (include self defence, tai chi, Taekwondo, Judo and Karate) | |
| 26 | Motor sports | |
| 27 | Netball | MODERATE OR VIGOROUS |
| 28 | Rugby (union or league) | VIGOROUS |
| 29 | Shooting | LIGHT |
| 30 | Skiing | MODERATE OR VIGOROUS |
| 31 | Snooker, pool, billiards | LIGHT |
| 32 | Snowboarding | MODERATE OR VIGOROUS |
| 33 | Squash | MODERATE OR VIGOROUS |
| 34 | Swimming or diving | MODERATE OR VIGOROUS |
| 35 | Table Tennis | |
| 36 | Tennis | MODERATE OR VIGOROUS |
| 37 | Tenpin bowling | |
| 38 | Track and field athletics | VIGOROUS |
| 39 | Walking | |
| 40 | Weight training/lifting/body building | MODERATE OR VIGOROUS |
| 41 | Windsurfing/boardsailing | MODERATE OR VIGOROUS |
| 42 | Yachting or dinghy sailing | |
| 43 | Yoga | |
| 44 | Other - specify | |

**Measuring Health and Wellness Characteristics**

Along with an accurate description of physical activity, the survey was designed to capture health and wellness characteristics of the Northern Irish adult population, thereby providing an opportunity to explore possible relationships in a meaningful way. While previous research surveys may have captured one of these dimensions systematically, it is rare that both have scrutinised and recorded in a manner that can help facilitate future fine grained analyses. Questions on health and wellness were designed with this priority to the fore.

Questions on the health and wellness characteristics were selected to include smoking behaviour, alcohol consumption, fruit & vegetable consumption, perceived health and happiness and self-reported BMI; and were adopted from a number of existing survey instruments (Northern Ireland Health and Social Wellbeing Survey 2001-2006, Continuous Household Survey 2008-11) which have successfully captured data on these variables in the past. As highlighted earlier, previous studies have reported that the four main preventable causes of morbidity and mortality, smoking, excessive alcohol abuse, an unhealthy diet, and physical inactivity, are not randomly distributed across the population but occur in combination with one another (Emmons *et al.*, 1994; Fine *et al.*, 2004; Chiolero *et al.*, 2006, Poortinga., 2006b cited in Poortinga., 2007)). Most of the associations between these lifestyle risk factors are positive, in particular, between smoking and drinking (Castro *et al.*, 1989; Jensen *et al.*, 2003 cited in Poortinga, 2007). However, recent research by Poortinga (2006b) suggests that physical inactivity is negatively associated with smoking and heavy drinking. This study found that people meeting the recommended levels of physical activity are more likely to smoke and drink heavily. Furthermore, a number of previous studies which included the concept of

sedentary behaviour[29] found an important association with overweight and BMI (Ching *et al.*, 1996; Coakley *et al.*, 1998; Jeffery & French., 1998 cited in Gutiérrez-Fisac *et al.*, 2002). In light of the findings of the systematic and narrative literature reviews, the new survey instrument included 10 questions designed to gather information on five health and wellness characteristics (smoking behaviour, alcohol consumption, fruit & vegetable consumption, perceived health and happiness and self-reported BMI). The decision was critical to the study given that no other national survey reviewed had been designed to capture information on all five health and wellness variables in addition to total physical activity patterns of the adult population.

Following consultation with stakeholders, including the Public Health Agency, a number of key terms and definitions relating to physical activity behaviour and health and wellness characteristics were agreed. The agreed definitions that relate to four of the five chosen health and wellness characteristics are included in Table 4.9.

[29] Estimated as the number of hours spent watching television, using the computer and certain related activities

**TABLE 4.9: DEFINITIONS USED FOR HEALTH AND WELLNESS CHARACTERISTICS**

| Health & Wellness Characteristics | Definition |
|---|---|
| **Body Mass Index (BMI)** | A diagnostic tool to identify weight problems. The BMI is calculated as<br>$\frac{weight(kg)}{(height(m))^2}$<br>Classifications are:<br>underweight: < 18.5<br>healthy: 18.5 - 25<br>overweight: 25 - 30<br>obese: > 30 |
| **Recommended limits of alcohol consumption** | Men: No more than 21 units of alcohol over the course of the week.<br>Women: No more than 14 units of alcohol over the course of the week. |
| **Smoker / non-smoker** | Those who smoke daily or occasionally but not every day are classified as smokers |
| **Recommended levels of fruit and vegetable consumption** | All adults to eat at least 5 portions (400g) of a variety of fruit and vegetables each day |

### Questionnaire Length and Field Force

The average length of time taken to complete the interview was 20 minutes, and during the 12 month period the survey was carried out by approximately 60 interviewers across Northern Ireland.

## 4.8 WEIGHTING OF THE SAPAS DATA (OVERALL)

It had been agreed at the outset of the study that the data captured would need to be weighted to correct for gender and age of respondent as these factors would strongly

influence the rate and intensity of sport and physical activity. In addition to gender and age, the author and PSG also wanted to correct for the time of year that the interview was carried out and as such the data needed to be weighted as many sports (e.g. skiing, football) and physical activities (e.g. gardening) are more likely to see higher levels of participation at certain times of the year.

The weighting involved a 2-step process. First, design weights were calculated to account for the random selection methodology (random selection of wards within LGDs, random selection of output areas within wards, random selection of addresses within output area, random selection of adults within households [last birthday rule]). This was carried out for each season in turn. Secondly, non-response weights were calculated using rim weighting. The rims were i) age and gender interlocked, ii) LGDs and iii) season. In detail, the weighting process involved the following steps:

Calculation of selection probabilities and response / design weights

P(sample member) = (# wards selected in relevant LGD) / (# wards in LGD)

* ($1^{a}$[30] / # Output Areas (OAs) in selected ward)

* (# addresses selected in relevant OA / # addresses in OA)

* ($1^{a}$ / # eligible adults in household)

An unscaled design weight was then calculated as the inverse of this:

W(des) = 1/P (sample member)

[30] [a]Note: The number 1 was used as there was a 1:1 relationship between ward and Output Area within each season, and only 1 person was interviewed in each household.

Calculation of non-response (post stratification) weights

Population figures for the age / gender combinations and the LGDs were produced using mid-year estimates 2007 Population figures for the seasons were the total 2007 estimate divided by four into each season.

Sample figures for the age / gender combinations, the LGDs and per season were produced. Use tables from a) and b) to deliver non-response adjustment factors d). This was done by rim weighting using the design weight as pre-weight. The resulting weights were rescaled, so the final weights had a mean of 1.

Design weights were used to rebalance the sample to represent more accurately the population from which it has been drawn. The consequence of using weighting was to reduce the effective sample size which in turn reduced the inferential power of the statistics. Rim weighting uses a mathematical algorithm to help provide an even distribution of results across the entire dataset while balancing certain categories such as age or gender to pre-determined totals. In this study it weighted the specified characteristics simultaneously and disturbed each variable as little as possible. The raw data in its first iteration was broadly representative of the population and rim weighting can be looked upon as an attempt to fine tune the data. In practice, the major variances between the sample and population were that women and older people were over-represented and consequently men and younger people under-represented. This is a common finding in surveys of this type as demonstrated consistently in the Active People surveys conducted in England since 2005-06.

**Design effect**

The design effect was calculated by squaring the final weights, summing up the weights and the squared weights. The design effect was calculated by dividing the sum of the squared weights by the sum of the weights. The design effect was calculated to be 2.0.

**Effective sample size**

The effective sample size was calculated by dividing the sample size with the design effect. It was calculated to be 2,283. It is also important to note that excessively high weights were capped prior to rim weighting (around 2.0% of the cases).

## TABLE 4.10: SUMMARY OF HOW THE WEIGHTING AFFECTED GENDER, AGE, SEASON AND LGD

| Gender | Before weighting (N) | Before weighting % | After weighting % | Variance |
|---|---|---|---|---|
| Male | 1,967 | 42.3 | 48.5 | +6.2 |
| Female | 2,686 | 57.7 | 51.5 | -6.2 |
| **Age group** | | | | |
| 16-29 | 914 | 19.6 | 24.8 | +5.2 |
| 30-49 | 1,611 | 34.6 | 34.8 | +.0.2 |
| 50+ | 2,111 | 45.4 | 40.1 | -5.3 |
| **Season** | | | | |
| Spring | 1,619 | 34.8 | 25.0 | -9.8 |
| Summer | 1,267 | 27.2 | 25.0 | -2.2 |
| Autumn | 880 | 18.9 | 25.0 | +6.1 |
| Winter | 887 | 19.1 | 25.0 | +5.9 |
| **Local Government District** | | | | |
| Antrim | 75 | 1.6 | 2.9 | +1.3 |
| Ards | 163 | 3.5 | 4.5 | +1.0 |
| Armagh | 129 | 2.8 | 3.2 | +0.4 |
| Ballymena | 137 | 2.9 | 3.6 | +0.7 |
| Ballymoney | 64 | 1.4 | 1.7 | -0.3 |
| Banbridge | 78 | 1.7 | 2.6 | +0.9 |
| Belfast | 918 | 19.7 | 15.6 | -4.1 |
| Carrickfergus | 84 | 1.8 | 2.3 | +0.5 |
| Castlereagh | 128 | 2.8 | 3.8 | +1.0 |
| Coleraine | 130 | 2.8 | 3.3 | +0.5 |
| Cookstown | 88 | 1.9 | 2.0 | +0.1 |
| Craigavon | 151 | 3.2 | 5.0 | +1.8 |
| Derry | 1,037 | 22.3 | 6.0 | -16.3 |
| Down | 113 | 2.4 | 3.9 | +1.5 |
| Dungannon | 129 | 2.8 | 3.0 | +0.2 |
| Fermanagh | 133 | 2.9 | 3.5 | +0.6 |
| Larne | 77 | 1.7 | 1.8 | +0.1 |
| Limavady | 76 | 1.6 | 1.9 | +0.3 |
| Lisburn | 204 | 4.4 | 6.4 | +2,0 |
| Magherafelt | 59 | 1.3 | 2.4 | +1.1 |
| Moyle | 34 | 0.7 | 1.0 | -0.3 |
| Newry and Mourne | 129 | 2.8 | 5.2 | +2.4 |
| Newtownabbey | 158 | 3.4 | 4.7 | +1.3 |
| North Down | 175 | 3.8 | 4.6 | +0.8 |
| Omagh | 99 | 2.1 | 2.9 | +0.8 |
| Strabane | 85 | 1.8 | 2.2 | +0.4 |

The variances column in Table 4.10 presents the difference between the actual sample and the weighted sample after correcting for imbalances using design weights. For gender, in the raw data women were overrepresented by 6.4 percentage points relative to their incidence in the population as a whole. By weighting the data using the proportions of the population found in the 2007 mid-year population estimates, the weighted data now reflects the true population more accurately by increasing the effective sample of men. Similar techniques are used to correct for deviances in age profiles, the time of year when interviews were conducted and location. There are two keys points of note here. First, the booster samples in Belfast and Derry (n=600) required downweighting and as a result the majority of other LGDs were upweighted. Second, the net total impact of weighting should be zero as demonstrated by the 6.2 increase in men and 6.2 decrease in women. In practice, not all of the weightings applied to all of the variables sum to zero due to rounding errors. In Chapters 5 and 6 all results are presented on the basis of the weighted rather than the unweighted data.

**Weighting SAPAS data for Belfast and Derry**

Weights were then also calculated for the two booster samples of Belfast and Derry. This created two new variables on the data file 'weight_Belfast' and 'weight_Derry' which were then applied when the data file was analysed using just the data captured in each of these LGDs respectively. As per the overall weights, gender, age and season were corrected. Tables 4.11 and 4.12 provide a summary of how the weighting affected both Belfast and Derry.

**TABLE 4.11: SUMMARY OF HOW THE WEIGHTING AFFECTED GENDER, AGE, SEASON FOR BELFAST LGD**

| Gender | Before weighting (N) | Before weighting % | After weighting % |
|---|---|---|---|
| Male | 372 | 40.5 | 46.9 |
| Female | 546 | 59.5 | 53.1 |
| **Age group** | | | |
| 16-29 | 190 | 20.7 | 30.4 |
| 30-49 | 314 | 34.2 | 31.9 |
| 50+ | 410 | 44.7 | 37.3 |
| **Season** | | | |
| Spring | 312 | 34.0 | 25.0 |
| Summer | 272 | 29.6 | 25.0 |
| Autumn | 167 | 18.2 | 25.0 |
| Winter | 167 | 18.2 | 25.0 |

**TABLE 4.12: SUMMARY OF HOW THE WEIGHTING AFFECTED GENDER, AGE, SEASON FOR DERRY LGD**

| Gender | Before weighting (N) | Before weighting % | After weighting |
|---|---|---|---|
| Male | 441 | 42.5 | 48.3 |
| Female | 596 | 57.5 | 51.7 |
| **Age group** | | | |
| 16-29 | 250 | 24.1 | 27.5 |
| 30-49 | 354 | 34.1 | 36.8 |
| 50+ | 427 | 41.2 | 35.3 |
| **Season** | | | |
| Spring | 390 | 37.6 | 25.0 |
| Summer | 307 | 29.6 | 25.0 |
| Autumn | 178 | 17.2 | 25.0 |
| Winter | 162 | 15.6 | 25.0 |

## 4.9 ETHICAL APPROVAL

Ipsos MORI operations are governed by the Market Research Society's Code of Conduct. As members of the Market Research Society, Ipsos MORI adhere to a strict code of conduct that encompasses not only quality standards but also ethical and legislative principles.

## 4.10 DATA ANALYSIS PROCEDURES

Using SPSS for Windows (version 17.0) responses were analysed to provide frequency distributions and these are described in Chapter 5. Following preliminary examination of simple frequencies, cross tabulations were carried out in line with the objectives of this study, and the most commonly studied variables in previous studies of this type. Due to the large amount of data captured, it would have been difficult to investigate the associations between all the variables identified using the new survey instrument. Given the sampling procedures employed and the use of weighting to re-balance the sample which was subsequently considered to be parametric (representative of the population). Consequently a range of parametric statistical tests was conducted including t-tests and ANOVA to explore the association of the variables age, gender, disability, marital status, educational attainment, location (urban/rural and areas of social need), employment status, income and (a) levels of total physical activity and (b) a range of health and wellness variables, including smoking behaviour, alcohol consumption, fruit & vegetable consumption, perceived health and happiness and self-reported BMI. The significance level was set at $p < 0.05$.

**Binary Logistic Regression**

Binary logistic regression was then used to explore the influence of socio-demographic and health and wellness variables and being a *model citizen*[31] with regard to a healthy lifestyle. In addition, analysis was conducted to determine whether or not physical activity contributed significantly to perceived health and happiness.

Binary logistic regression can be described as a type of regression analysis which is used for predicting the outcome of a binary variable based on a set of predictor variables. It allows a researcher to identify which factors impact significantly on the categorical variable as well as quantifying their influence. The most common application of this type of analysis is predicting if individuals belong to a specific group (e.g. buyers of a product) and which variables influence the probability of being a member of the group. In the context of this study, the results can, for example, help to inform policy makers which factors to focus on in order to increase the proportion of adults who are sufficiently active (i.e. belonging to the group of people being sufficiently active).

The basic idea behind logistic regression is that, instead of using the group membership itself as a dependent variable, a new target variable is created based on the probability of belonging to group 1.

[31] For the purpose of this study a *model citizen* is defined as a person that achieved the CMO's physical activity recommendations [sufficiently active], did not smoke, stayed within recommended limits for alcohol consumption, ate the recommended portions of fruit and vegetables per day and had a healthy BMI.

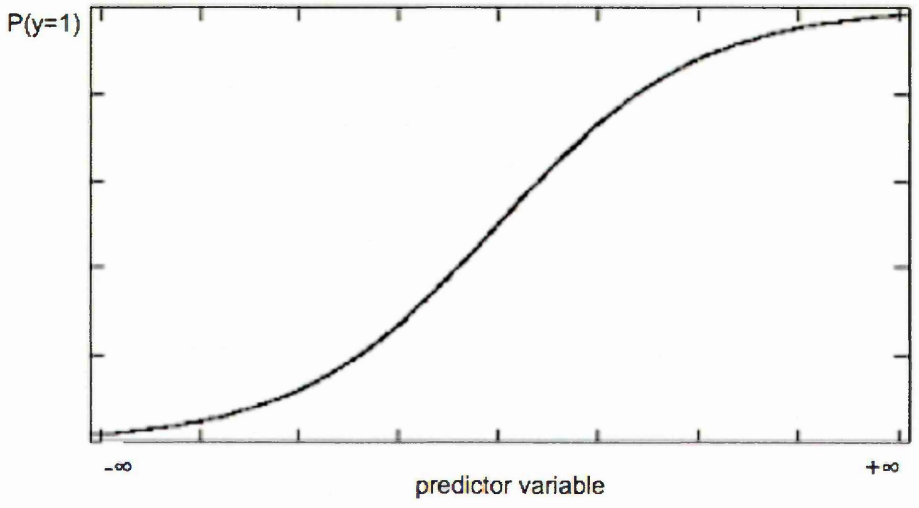
This target variable, called 'logit', is defined as:

$$\ln\left(\frac{p(y=1)}{1-p(y=1)}\right)$$

The probability of belonging to group 1 $p(y=1)$ is divided by the counter probability. The result $p(y=1)/(1-p(y=1))$, is called the odds ratio. The logarithm of the odds ratio is taken to provide a range from -∞ to +∞.

Contrary to linear regression, logistic regression assumes a non-linear relationship between the probability of belonging to the group and the predictors, using a logistic function.

**FIGURE 4.1: LOGISTIC FUNCTION USED FOR LOGISTIC REGRESSION**



The logistic function is often superior to the linear function used in linear regression models because it does not assume that a change of the predictor always causes a proportionate change of the target variable. The probability increases slowly with an increase of the predictor variable; then the increase accelerates, finally stabilises, but does not increase beyond 1. For example, it is reasonable to assume that variables such as income have an impact on sport participation but that there is no proportionate increase - the impact is likely to differ depending on the level of income earned.

The equation of the model can be described as:

$$\ln\left(\frac{p(y=1)}{(1-p(y=1))}\right) = b_0 + b_1x_1 + b_2x_2 + ... + b_jx_i$$

*with*

$b_o$*: constant*

$b_j$*: coefficients / parameters to be estimated*

$x_i$*: predictor variables*

Binary logistic regression models estimate the parameters $b_j$ so that the resulting equation best predicts the group membership found in the data, using maximum-likelihood methodology.

The coefficient parameters $b_j$ are not as easy to interpret as in linear regression models. Positive/negative values of $b_j$ indicate the direction of the impact the predictor has on the probability of belonging to group 1, but the absolute value cannot be interpreted in a straight forward way because the dependent variable of the model is defined as a 'logit' term.

Therefore, so-called logit-coefficients are used to quantify the impact: These coefficients describe by which factor the odds-ratio (i.e. the probability of y=1 divided by the counter-probability) changes if the predictor value increases by 1 unit.

$\text{Exp}(b_j) < 1$ : The probability of y=1 decreases

$\text{Exp}(b_j) > 1$ : The probability of y=1 increases

$\text{Exp}(b_j) = 1$ : The probability of y=1 is not influenced

**Test Statistics**

A range of test statistics is available for testing logistic regression models and the parameters used. In the following, a brief description of the most popular statistics is given.

**1.** Deviance

The deviance is a measure based on the likelihood (i.e. the probability of producing the empirical values with the estimated model). It is calculated by multiplying the natural logarithm of the likelihood by -2 and has a distribution which approximates to a chi-squared distribution, which like the Logistic Regression distribution, shown in Figure 4.1, is curvilinear rather than linear. This measure is comparable to the sum of squares calculations in linear regression and can be used to test the hypothesis:

$H_0$: Perfect fit of the model

$H_1$: No perfect fit

If the deviance is low, $H_0$ cannot be declined, implying that the model has a good fit. However, the deviance is not an ideal criterion for measuring the model fit as its value is not only influenced by the impact the predictors have on group membership but also by the distribution of the group membership itself. The steps taken are therefore a pragmatic but imperfect approach to conducting analysis of this type.

**2.** Likelihood-ratio test

This test compares the deviance of the estimated model (model deviance) with the deviance of a model with only the intercept and no predictors (null model deviance). The idea is that a small difference between the model deviance and the null model deviance means that the predictors have only little impact on group membership.

The hypotheses is formulated as:

$H_0$: All coefficients are null ($b_1=b_2= \ldots b_j =0$)

$H_1$: None of the coefficients is null ($b_1, b_2, \ldots b_j \neq 0$)

**3.** Cox & Snell $R^2$

The calculation and interpretation of $R^2$ in linear regression is reasonably straightforward, although its use is not without criticism[32]. Various $R^2$-type statistics have been proposed for logistic regression, the most popular being Cox & Snell $R^2$ and Nagelkerke- $R^2$.

[32] For example, Cox and Wermuth (1992) criticise that, if responses are binary, often values close to zero are obtained even when the model fits the data very well.

The Cox and Snell statistic, also called Pseudo-$R^2$, is defined as:

$$R^2 = 1 - \left(\frac{L_0}{L_{Sat}}\right)^{\frac{2}{n}}$$

*with*

$L_o$: *likelihood of null model (constant only)*

$L_{Sat}$: *likelihood of saturated model*

*n: sample size*

The Cox & Snell $R^2$ has the disadvantage that it only produces values smaller than 1, which makes the data difficult to interpret particularly for lay users. As an extension of the Cox & Snell $R^2$ test there are alternative tests which can provide the answer 1 ('perfect fit') as discussed below.

**4**. Nagelkerke- $R^2$

This measure can produce the value 1 ('perfect fit') and is therefore easier to interpret than the Cox & Snell $R^2$. It is defined as:

$$\text{Nagelkerke- } R^2 = \frac{R^2}{R^2_{\max}}$$

*with*

$$R^2_{\max} = 1 - (L_0)^{\frac{2}{n}}$$

$L_0$: *Likelihood of null model (only constant)*

**5.** Classification results

Another way of evaluating the model fit is to analyse the classification results by comparing the empirical distribution with the forecasts generated. Usually, a classification table is used to show the number of cases being correctly classified overall, being correctly classified to group 1 (y=1) and to group 2 (y=2). In order to evaluate the quality of the classification results it is useful to compare this classification with a random draw, using the proportion in the sample belonging to each of the groups as an estimator. For example, if the two groups are of equal size in the sample a random draw classification would produce a result with a hit rate of 50%. If the classification generated by binary regression produces a higher hit rate it can be concluded that the model has a positive impact on the classification results. However, it needs to be considered that an overestimation of the hit rate occurs if the classification and the estimation of the logistic function are generated with the same data set. The reason for this is that the function parameters are optimised for the 'best fit' with the data and therefore the hit rate is higher than it would be if different data sets were used for estimating the data and forecasting group memberships. However, this effect is only marginal if the data set is very large.[33]

[33] Morrison, D.F., 1969, p. 158; a solution for small datasets is to split the data randomly and use a holdout-sample for the classification only.

**Statistics for Evaluating the Impact of the Predictors**

1. Likelihood-ratio test

The likelihood-ratio test, which has been described above for testing the overall fit of the model, can also be used for evaluating the significance of each parameter $b_j$ included in the model. For this purpose, the saturated model (including all parameters) is compared to a reduced model in which one of the regression coefficients is set to zero. The test compares the deviances (-2 log likelihoods) of these two models with the hypothesis:

$H_0$: The coefficient bj is null ($b_j = 0$)

$H_1$: The coefficient bj is not null ($b_j \neq 0$)

The test statistic $LL_{reduced} - LL_{saturated}$ follows a chi-square distribution[34].

**2.** Wald statistic

The Wald statistic is similar to the t-test used in linear regression. The null hypothesis is that a coefficient is null, implying that the respective regressor variable has no influence on group membership.

[34] The degrees of freedom equal the difference of the number of parameters of each model.

The formula of the Wald statistic is:

$$W = \left( \frac{b_j}{s_{bj}} \right)$$

*with:*

$b_j$*: coefficient of regressor variable* $x_j$

$s_{bj}$*: standard error of* $b_j$ *(j=0,1,2, ..., J)*

W follows a chi-squared distribution with one degree of freedom.

**Advantages of Logistic Regression Compared to Other Techniques**

There are three reasons linear regression is not suitable for predicting group memberships and quantifying the impact of dependent variables: Firstly, linear regression cannot be applied if the dependent variable is dichotomous as the classical regression model assumes a range from -∞ to +∞. Secondly, linear regression assumes that the residuals are normally distributed. This assumption is undermined because the values of the dependent variable can only be 1 (belonging to the group) or 0 (not belonging to the group). Thirdly, assuming that the dependent variable would be defined as the probability of belonging to group 1, linear regression would produce values greater than 1 and smaller than 0, which severely compromises the definition of probabilities with a range from 0 to 1.

Discriminant analysis is another technique that could have, within limits, been used for this study. Discriminant analysis is also suitable for forecasting group memberships

and quantifying the impact of influencing factors. However, logistic regression is technically superior because it does not require restrictive assumptions as normally distributed predictors in both groups, homoscedasticity[35] of co-variances and at least interval-scaled predictors.

## 4.11 METHODOLOGY: CONCLUDING REMARKS

This chapter has outlined the theoretical basis for the study and the methodology used to design and administer the new survey instrument, SAPAS (Appendix 4). Chapter 5 will present descriptive analysis of frequencies and results of cross-tabulations; Chapter 6 will describe the results of exploratory analysis; and Chapter 7 will discuss the main issues identified by the current study in the context of the stated aims and objectives. This chapter has explicitly focussed on the theoretical, operational and statistical aspects of the research in the planning and delivery phases. It is inevitable, in all research, that when a post research evaluation is conducted it is possible to identify potential improvements to the research design and implementation. This research is no different and a full post research evaluation is presented in Chapter 7 reflecting the notion that a PhD is equally about the process as it is the product.

[35]Homoscedasticity is the assumption that variance in the criterion is constant at all levels of the predictor(s).

# CHAPTER 5: RESULTS: EXPLORATORY DATA ANALYSIS I

## Road map of the thesis

| Introduction | Review of Literature | Methodology | Results | Discussion | Conclusions |
|---|---|---|---|---|---|
| | Ch2 A Systematic Review of the Literature on Population Based Approaches to Measuring Physical Activity & Health | | Ch5 Exploratory Data Analysis I | | |
| Ch1 ► | Ch3 A Review of the Narrative Literature on Population Based Approaches to Measuring Physical Activity & Health | ► Ch4 ► | Ch6 Exploratory Data Analysis II | ► Ch7 ► | ► Ch8 |

## 5.1 INTRODUCTION

As detailed in Chapter 3 (Section 3.7), two of the objectives of this study were to (1) quantify the physical activity levels amongst the adult population in Northern Ireland in the four domains of home, transportation, work, and sport/leisure, relative to the UK Chief Medical Officer's recommendations; and (2) identify the characteristics associated with physical activity levels and their relationship with physiological measures such as self-reported height and weight (in order to compute BMI); lifestyle factors such as smoking, alcohol consumption and healthy eating habits; and perceived health and happiness measures. This chapter begins by profiling the sample by various biographical variables before going on to explore the differences and relationships between a number of variables, and including physical activity levels (across four life domains); health and wellness characteristics (smoking, alcohol consumption, healthy eating habits, perceived health and happiness and healthy BMI) and a number of key demographic variables.

All of the survey responses (n=4653) were automatically entered into the Statistical Package for Social Science (SPSS: Version 17) and frequency tests, t-tests and one-way analysis of variance (ANOVA) were used to describe the data and investigate significant differences and relationships between the variables (In keeping with standard statistical protocols, the significance level was set at $p < 0.05$). The results of these preliminary analyses and breakdowns are described in this chapter.

## 5.2 BASIC CHARACTERISTICS OF RESPONDENTS

The sample universe of this study comprised all individuals aged 16 plus living in Northern Ireland. In total, 4,653 interviews were conducted during the course of one year. The descriptive characteristics of respondents, which are based on the 'weighted' dataset[36], as discussed previously in Chapter 4: Section 4.8 and as summarised in Table 5.1 and Sections 5.2.1 to 5.2.6.

As highlighted in Section 4.8, weightings were used to rebalance the sample to represent more accurately the population from which it has been drawn. The consequence of using weighting was to reduce the effective sample size which in turn reduced the inferential power of the statistics. To illustrate this basic point, if the full sample of 4,653 was truly parametric, then it would be subject to a maximum sampling error of +/- 1.4. That is to say, if the proportion of males and females in the sample was 50%, then we could be 95% confident that the 'true' ratio of males and females in the population would be 50% +/- 1.4 or somewhere between 48.6% and 51.4%. By contrast, because the use of weights reduced the absolute sample size of 4,653 to an effective sample size 2,283, the revised sampling error is now 2.1. Consequently, if the effective sample contained 50% males and 50% females then we could be 95% confident that the 'true' ratio of males and females in the population would be 50% +/- 2.1 or somewhere between 47.9% and 52.1%. The overall effect of employing weights to rebalance the sample is to increase the maximum sampling error to +/- 0.7, which is sufficiently accurate for research of this type.

### 5.2.1 GENDER & AGE

Of the 4,653 people that responded to the survey, 2,227 (48.5%) were men and 2,396 (51.5%) were women. Respondents were divided into six age bands, including: 16-24 years (16.5%); 25-34 years (17%); 35-44 years (18.1%); 45-54 years (16.8%); 55-64 years (13.5%) and 65 years plus (18.1%).

### 5.2.2 MARITAL STATUS

A majority of respondents were married (56.7%) and 30.3% described themselves as single. The remaining 13% were either 'divorced', 'widowed' or 'separated'.

### 5.2.3 DISABILITY STATUS

Just over three quarters (76.6%) of respondents did not have a disability, while 23.4% did have a disability.

### 5.2.4 EDUCATIONAL QUALIFICATIONS

The level of educational attainment was what would be expected for the general population: 47.1% of respondents attained GCSE or equivalent qualifications, with 19.5% holding a university degree. Over a quarter of (24.5%) claimed to have no formal qualifications.

### 5.2.5 LOCATION (URBAN V RURAL & DEPRIVATION)

A large proportion (81.5%) of respondents lived in urban areas and 31.6% lived in areas which were classified as being among the most deprived areas (bottom third) in Northern Ireland.[37]

### 5.2.6 EMPLOYMENT STATUS & INCOME

Over half of all respondents (54.5%) were working part or full time and 20% had a personal net income of £20,000 or more

### 5.2.7 HEALTH AND WELLNESS CHARACTERISTICS

41.5% of respondents had a healthy BMI[38], nearly three quarters of respondents (72%) were non-smokers, a very high proportion (94%) consumed alcohol within the recommended limits[39] and 44% had healthy eating habits consuming at least 5 portions of fruit and vegetable per day[40].

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[37] Northern Ireland Statistics and Research Agency, http://www.nisra.gov.uk/deprivation/archive/Updateof2005Measures/NIMDM_2010_Report.pdf, 2010

[38] A diagnostic tool to identify weight problems. The BMI is calculated as weight(kg)/(height(m))$^2$; Classifications are: underweight: < 18.5 / healthy: 18.5 - 25 / overweight: 25 - 30 / obese: > 30

[39] Men: No more than 21 units of alcohol over the course of the week; women: No more than 14 units of alcohol over the course of the week. (Public Health Agency Northern Ireland)

[40] See, for example, http://www.nhs.uk/Livewell/5ADAY/Pages/Whatcounts.aspx

**TABLE 5.1: BASIC CHARACTERISTICS OF RESPONDENTS (BASED ON THE WEIGHTED SAMPLE)**

| VARIABLE | | N | % |
|---|---|---|---|
| **Gender** | Male | 2,257 | 48.5 |
| | Female | 2,396 | 51.5 |
| | | **4,653** | **100.0** |
| **Age** | 16-24 | 770 | 16.5 |
| | 25-34 | 792 | 17.0 |
| | 35-44 | 843 | 18.1 |
| | 45-54 | 781 | 16.8 |
| | 55-64 | 626 | 13.5 |
| | 65+ | 841 | 18.1 |
| | | **4,653** | **100.0** |
| **Location** | Urban | 3,794 | 81.5 |
| | Rural | 859 | 18.5 |
| | | **4,653** | **100.0** |
| **BMI** | Underweight | 111 | 2.4 |
| | Healthy | 1,929 | 41.5 |
| | Overweight | 1,537 | 33.0 |
| | Obese | 818 | 17.6 |
| | Missing | 258 | 5.5 |
| | | **4,653** | **100.0** |
| **Marital Status** | Single | 1,409 | 30.3 |
| | Married/ Living as married / Civil partnership | 2,639 | 56.7 |
| | Widowed | 291 | 6.3 |
| | Divorced/ Separated | 314 | 6.7 |
| | | **4,653** | **100.0** |
| **Deprivation** | Bottom third (Most deprived) | 1,468 | 31.6 |
| | Middle third | 1,368 | 29.4 |
| | Top third (Least deprived) | 1,817 | 39.0 |
| | | **4,653** | **100.0** |
| **Social Class** | ABC1 | 2,119 | 45.6 |
| | C2DE | 2,477 | 53.2 |
| | Missing | 57 | 1.2 |
| | | **4,653** | **100.0** |
| **Employment Status** | Working (Full or part time) | 2,538 | 54.5 |
| | Retired | 917 | 19.7 |
| | Student | 313 | 6.7 |
| | Unemployed | 394 | 8.5 |
| | Other | 491 | 10.6 |
| | | **4,653** | **100.0** |

| VARIABLE | | N | % |
|---|---|---|---|
| **Qualifications** | No formal qualifications | 1,143 | 24.5 |
| | GCSE or equivalent | 2,192 | 47.1 |
| | University Degree | 906 | 19.5 |
| | Other | 412 | 8.9 |
| | | **4,653** | **100.0** |
| **Disability** | Has a disability | 1,091 | 23.4 |
| | No disability | 3,562 | 76.6 |
| | | **4,653** | **100.0** |
| **Smoking** | Smoker | 1,281 | 27.5 |
| | Non smoker | 3,364 | 72.3 |
| | Missing | 8 | 0.2 |
| | | **4,653** | **100.0** |
| **Alcohol Consumption** | Within recommended | 4,396 | 94.5 |
| | Above recommended | 257 | 5.5 |
| | | **4,653** | **100.0** |
| **Fruit and Veg** | Less than 5 portions | 2,599 | 55.9 |
| | Eats 5 or more portions | 2,054 | 44.1 |
| | | **4,653** | **100.0** |
| **Happiness** | Unhappy (1-5) | 444 | 9.5 |
| | Happy (6-7) | 1,161 | 25.0 |
| | Very happy (8-10) | 3,042 | 65.4 |
| | Don't know | 6 | 0.1 |
| | | **4,653** | **100.0** |
| **Personal Income** | Under £10,000 | 1,376 | 29.6 |
| | £10,000 to £19,999 | 1,224 | 26.3 |
| | £20,000-£34,999 | 632 | 13.6 |
| | Over £35,000 | 294 | 6.3 |
| | Not provided | 1,127 | 24.2 |
| | | **4,653** | **100.0** |
| **Health** | Very good | 1,418 | 30.5 |
| | Good | 1,631 | 35.1 |
| | Average | 1,065 | 22.9 |
| | Poor | 416 | 8.9 |
| | Very Poor | 123 | 2.6 |
| | | **4,653** | **100.0** |

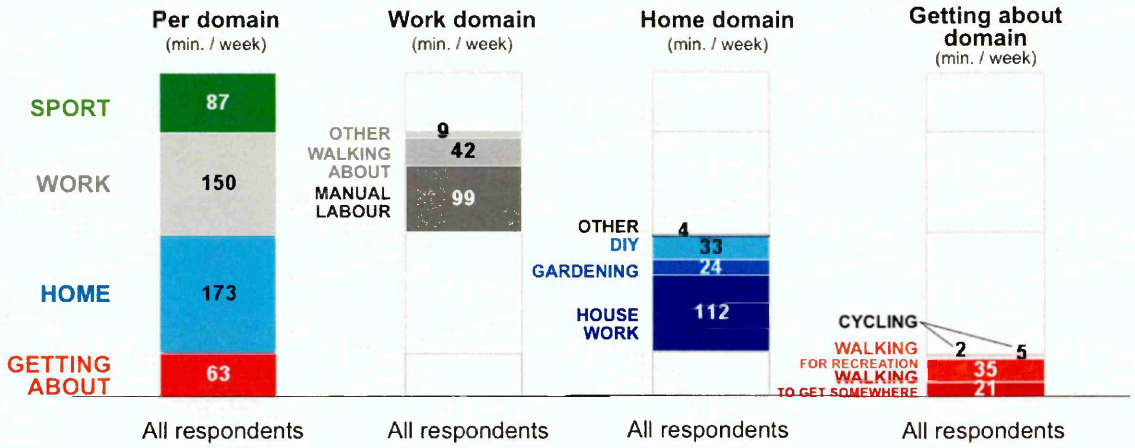
## 5.3 OVERALL PHYSICAL ACTIVITY LEVELS

The results of the survey showed that 35% of Northern Ireland's adult population achieved the levels of physical activity recommended by the Chief Medical Officer of participating in at least moderate intensity activities for at least 30 minutes on at least five days per week. The average amount of time spent on at least moderate intensity physical activities per week was 473 minutes with 60% of the population participating 150 minutes or more.

## 5.4 MAIN SOURCES OF PHYSICAL ACTIVITY (FIGURE 5.1)

The most relevant domain was the home domain. On average, 173 minutes of at least moderate intensity activities were spent at home with housework being the most important contributor (112 min.). The work domain came second with 150 minutes, with manual labour (99 min.) and walking about (42 min.) reported as being the most important activities while at work. Sport came third with 87 minutes, followed by 'getting about' activities (63 min.).

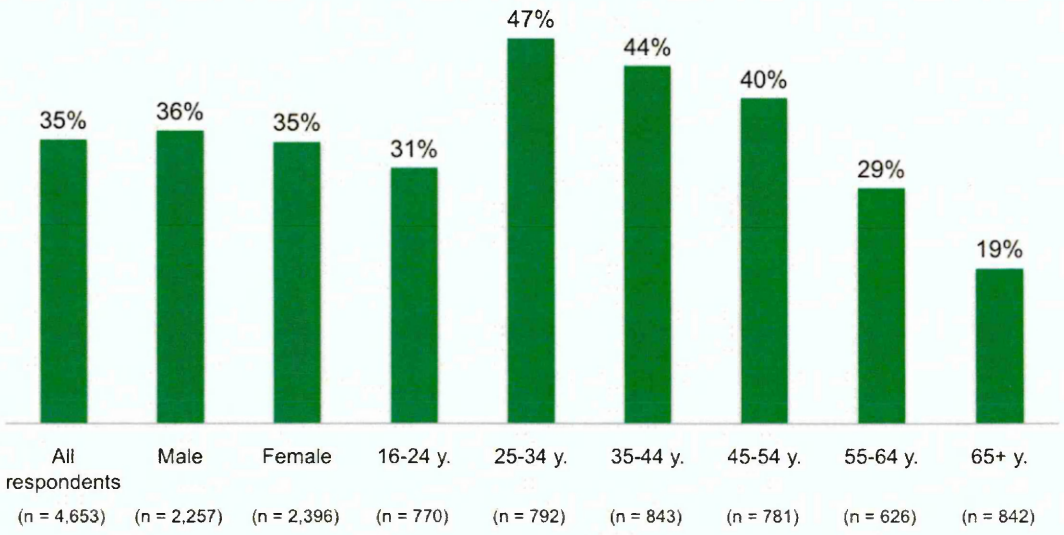
**FIGURE 5.1: TIME SPENT ON AT LEAST MODERATE INTENSITY ACTIVITIES PER WEEK**



## 5.5 GENDER & AGE

There was no significant difference between men and women with regard to the proportions who met the Chief Medical Officer's recommendation (men: 36%, women: 35%).

**FIGURE 5.2: PROPORTIONS MEETING THE CHIEF MEDICAL OFFICER'S RECOMMENDATION BY GENDER & AGE**

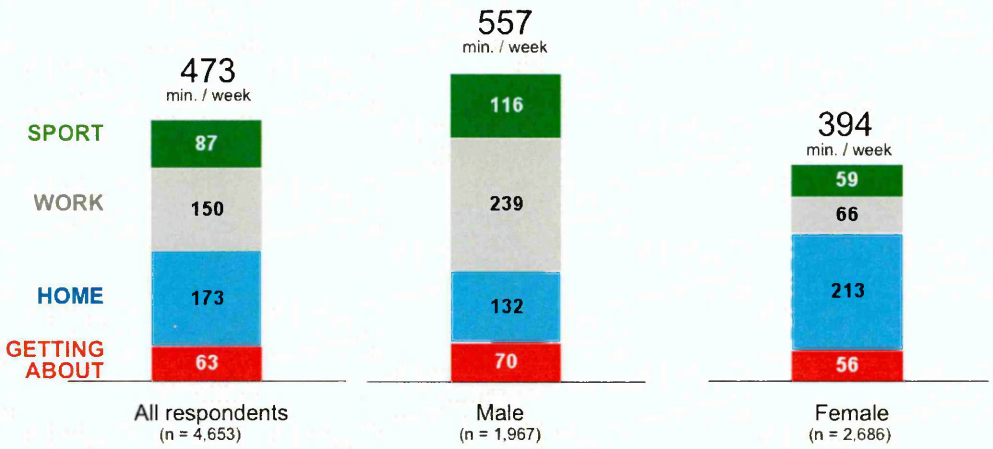



However, when comparing the total time men and women spent on physical activities of at least moderate intensity, a gender gap becomes evident (men: 557 min., women: 394 min.).

In addition, the sources of relevant physical activity differ significantly between men and women: Men spent more time on work activities (men: 239 min., women: 66 min.), sport (116 min, 59 min.) and getting about activities (70 min., 56 min.).

Contrarily, activities in the house contribute more to women's overall physical activity levels (men: 132 min., women: 213 min.).

**FIGURE 5.3: TIME SPENT ON AT LEAST MODERATE INTENSITY ACTIVITIES PER WEEK BY GENDER**



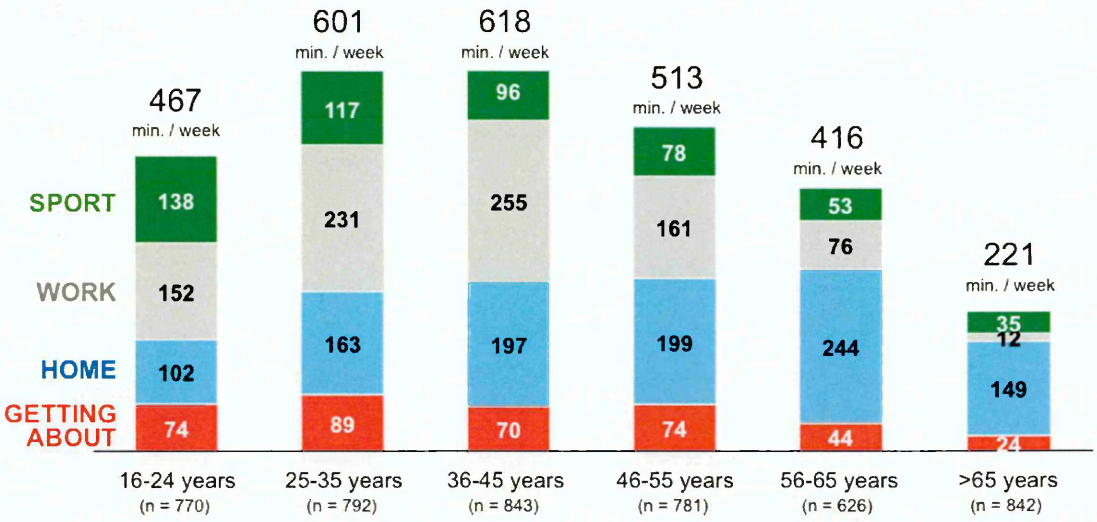

When analysing the data by gender it was found that women's levels of physical activity rise with increasing demands of the household. For example, the proportion who met the Chief Medical Officer's recommendation was significantly higher among women who have at least one child aged under 16 in the household (44% compared to 29% among women without children under 16 in the household).

With regard to age groups, the proportion of adults who met the Chief Medical Officer's recommendation peaked in the age group 25-34 (47%). As people get older, significantly less time was spent on physical activity (35-44 y.: 44%, 45-54 y.: 40%, 55-64 y.: 29%, 65+ y.: 19%). As expected, the importance of the four domains also varies substantially between age groups. The time spent on sport activities significantly decreased with age (16-24 y.: 138 min., 25-34 y.: 117 min., 35-44 y. : 96 min., 45-54 y.: 78 min., 55-64 y.: 53 min., 65+ y.: 35 min.). Time spent on work activities peaked

in the age groups 25-34 (231 min.) and 34-44 (255 min.). Moderate intensity activities in the house increased until people reach the age group 55-64 (244 min.).

While the time spent on activities in the house decreased in the oldest age group 65+ (149 min.) it is important to note that the relative contribution of house activities was significantly higher among 65 year olds than in any other age group (67% of the total relevant time is spent on home based physical activity).

**FIGURE 5.4: TIME SPENT ON AT LEAST MODERATE INTENSITY ACTIVITIES PER WEEK BY AGE**

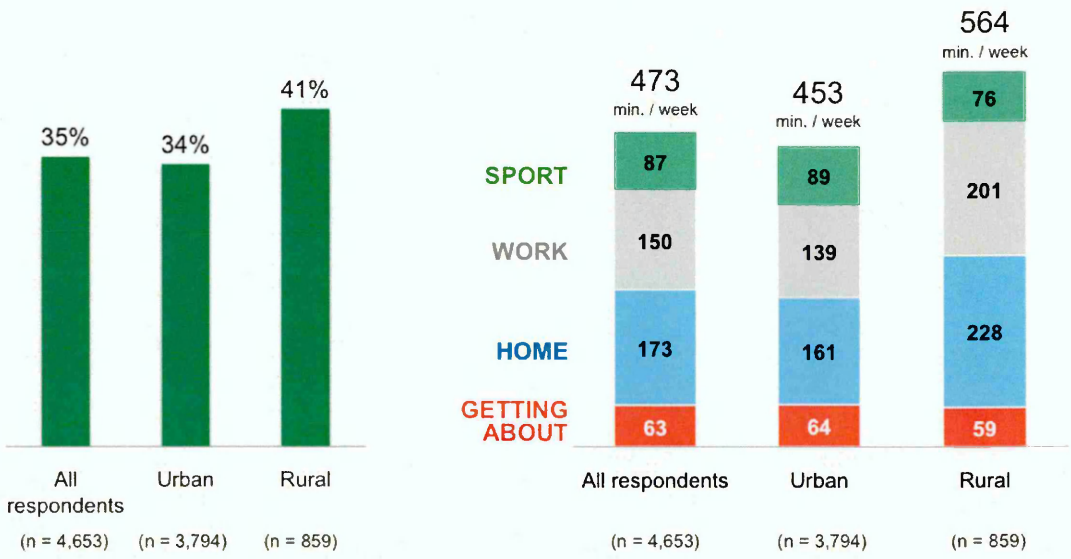



There were significant differences when analysing age groups by gender separately. The most significant gender gap occurs in young age groups with only 29% of young women aged 16-24 meeting the Chief Medical Officer's recommendation compared to 34% of young men. The total average time spent on at least moderate intensity activities among young women is also significantly lower (men aged 16-24: 576 min., women aged 16-24: 352 min.).

## 5.6 LOCATION (Urban v Rural and Deprivation)

Adults in rural areas were statistically significantly more active than in urban areas (41% in rural areas achieve the recommended level of physical activity compared to 34%). This corresponds to a significant gap with regard to the total time spent on relevant activities (rural: 564 min., urban: 453 min.). The main differences stem from the home domain (rural: 228 min., urban: 161) and in the work domain (rural: 201 min., urban: 139 min.). It is also interesting to note that major differences occur especially when comparing older age groups. For example, the total time spent on at least moderate intensity activities in the house was 390 min. among 55-64 year-olds living in rural areas compared with 202 min. among adults in the same age group living in urban areas. Contrarily, the time spent on sport activities was lower in rural areas (rural: 76 min., urban: 89 min.).

**FIGURE 5.5: PROPORTIONS MEETING THE CHIEF MEDICAL OFFICER'S RECOMMENDATION & TIME SPENT ON AT LEAST MODERATE INTENSITY ACTIVITIES PER WEEK BY URBAN/RURAL LOCATION**

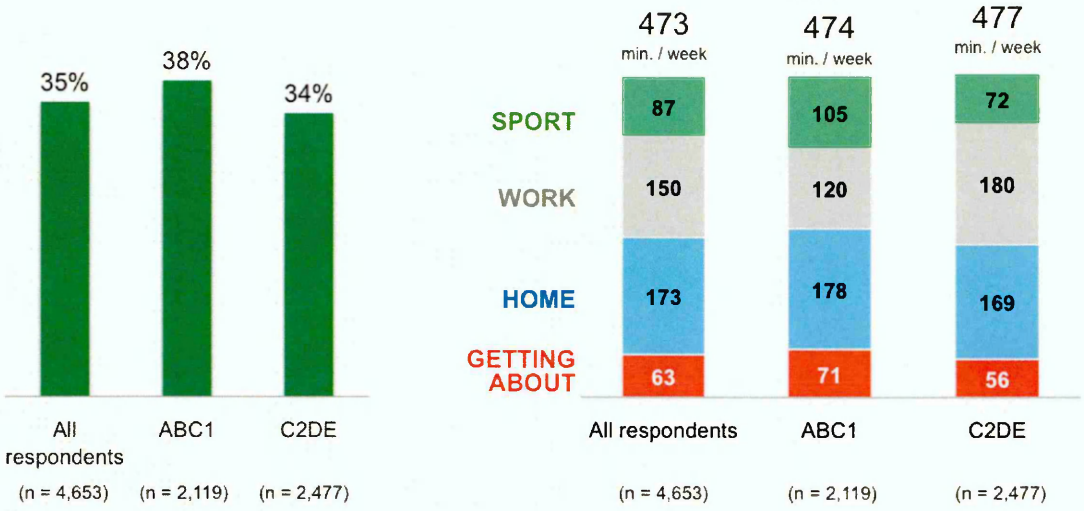


The relationship between the deprivation of an area and the levels of physical activity is complex. There was no significant difference between the proportions of adults who achieved the Chief Medical Officer's recommendation when comparing the most deprived areas (bottom third: 36%) with the least deprived (top third: 37%). The primary reason for this result is that while sport participation is higher in less deprived areas (least deprived: 91 min., most deprived: 85 min.) the relevance of physical activity at work is higher in deprived areas (least deprived: 130 min., most deprived: 174 min.). However, there was a significant difference between both the top and the bottom third and the middle third of deprived areas (33% achieved the recommended levels) as adults who live in these areas don't engage in sport as much as those in less deprived areas and, on the other hand, spend significantly less time on physical activity at work than people in more deprived areas.

## 5.7 SOCIAL CLASS, PERSONAL INCOME, QUALIFICATIONS AND EMPLOYMENT STATUS

The proportion of adults from higher social classes who met the Chief Medical Officer's recommendation was significantly larger among higher social classes (ABC1: 38%; C2DE: 34%). When analysing the sources of physical activity it becomes evident that sport contributed more to the total amount of time spent on relevant physical activities in higher social classes (ABC1: 105 min., C2DE: 72 min.) whereas work activities were a much stronger contributor in lower social classes (ABC1: 120 min., C2DE: 180 min.).

**FIGURE 5.6: PROPORTIONS MEETING THE CHIEF MEDICAL OFFICER'S RECOMMENDATION AND TIME SPENT ON AT LEAST MODERATE INTENSITY ACTIVITIES PER WEEK BY SOCIAL CLASS**




There was a significant relationship between the personal income of an adult and achieving the threshold (under £10,000: 32%, £10,000 to £19,999: 38%, £20,000-£34,999: 42%, over £35,000: 38%).

On a domain level, the higher the personal income, the more time was spent on sport activities (e.g.: under £10,000: 67 min. compared with over £35,000: 134 min.) and on getting about activities (under £10,000: 60 min. compared to over £35,000: 88 min.)

People without formal qualifications were significantly less active than others (no formal qualifications: 29%, GCSE or equivalent: 38%, university degree: 38%). However, this result needs to be interpreted in light of the fact that the average age of adults without formal qualifications is substantially higher than the overall average age of the adult population (58 yrs. compared to 45 yrs.), and there was a strong relationship between age and participation as discussed above.

There was a significant relationship between employment status and meeting the recommended levels of physical activity. While the proportion among working adults (full or part-time) was 42%, only 28% of unemployed people, 26% of students and 21% of retired people met the threshold.

When analysing age groups separately it became evident that there was no significant difference between employed and unemployed adults in young age groups (16-29 year-old employed adults: 39%, 16-29 year-old unemployed adults: 39%). However, there was a wide gap in both middle and older age groups (30-49 year-old employed adults: 47%, 30-49 year-old unemployed adults: 28%; 50+ year-old employed adults: 34%, 50+ year-old unemployed adults: 14%).

The data suggest that a lack of activities in the workplace was not the only reason for low physical activity levels among unemployed adults. Unemployed people also spent significantly less time on sport, getting about and house activities (sport: 70 min. compared to 110 min. among employed adults, getting about: 63 compared to 72 min., house: 121 compared to 165 min.).

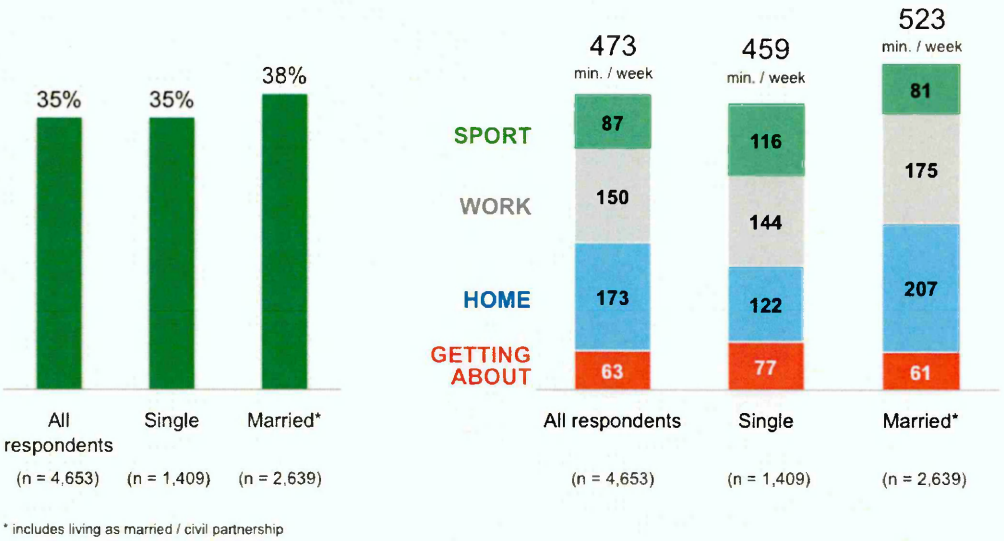
## 5.8 MARITAL STATUS

Married adults[41] were more likely to achieve the recommended levels of physical activity (38%) than singles (35%), divorced or separated adults (32%) and widowed adults (16%). Differences between married adults and singles were also evident when analysing age groups separately (e.g. age group 30-49: 47% among married., 43% among singles). When analysing the sources of physical activity there was a wide gap between married people and singles with regard to the time spent on at least moderate

[41] Including living as married and living in a civil partnership

intensity activities in the house (married: 207 min., single: 122 min.) and work activities (married: 175 min., single: 143 min.). Contrarily, singles spent more time on sport (married: 81 min., single: 116 min.) and getting about activities (married: 61 min., single: 77 min.).

**FIGURE 5.7: PROPORTIONS MEETING THE CHIEF MEDICAL OFFICER'S RECOMMENDATION AND TIME SPENT ON AT LEAST MODERATE INTENSITY ACTIVITIES PER WEEK BY MARTIAL STATUS**

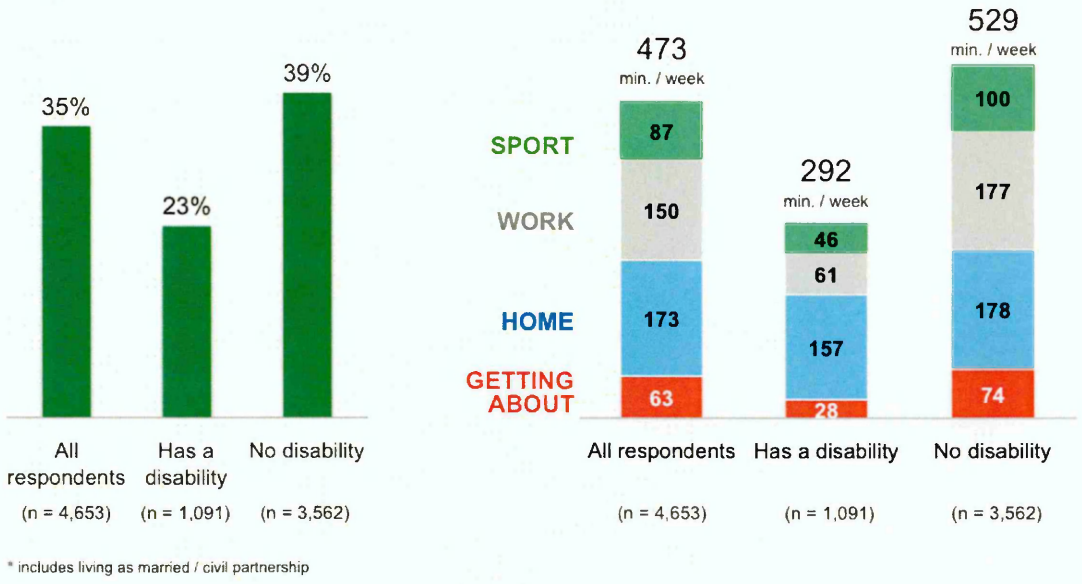



## 5.9 DISABILITY STATUS

Adults in Northern Ireland who have a disability were significantly less active than others (22% achieve the recommended levels compared to 39% among adults without a disability). There were significant relationships between having a disability and the average times adults spent on at least moderate intensity activities in the sport domain (disability: 46 min., no disability: 100 min.), getting about (28 min., 74 min.) and work domain (61 min., 177 min). There was no significant relationship with regard to the home domain (disability: 157 min., no disability: 178 min.) and activities in the home

were by far the most important contributor to the overall levels of physical activity among people who have a disability.

**FIGURE 5.8: PROPORTIONS MEETING THE CHIEF MEDICAL OFFICER'S RECOMMENDATION AND TIME SPENT ON AT LEAST MODERATE INTENSITY ACTIVITIES PER WEEK BY DISABILITY STATUS**

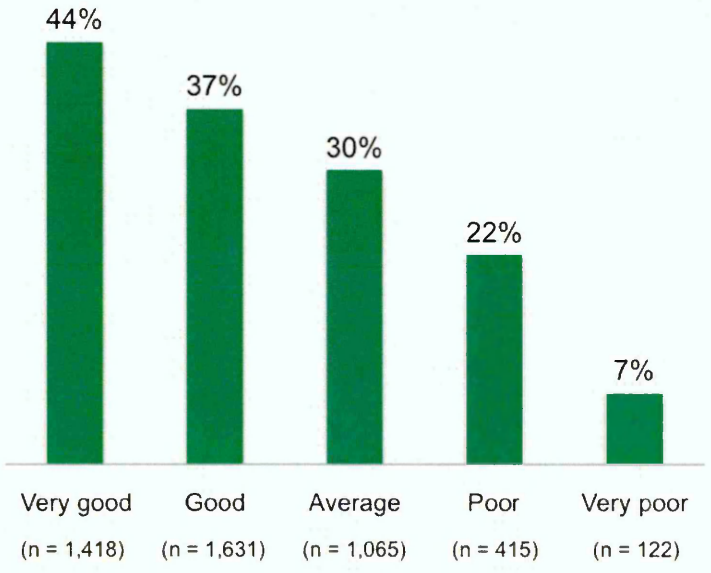



However, a significant gap between people who have a disability and others only occurred within older age groups as among 16-24 and 25-34 year olds no significant relationship between having a disability and the total amount of time spent on relevant activities was found. There was also no significant relationship with regard to the proportions who met the Chief Medical Officer's recommendation. From the age of 35 both the total time spent and the proportions who met the threshold differ significantly between adults with a disability and others in all middle and older age groups.

## 5.10 SELF-REPORTED HEALTH

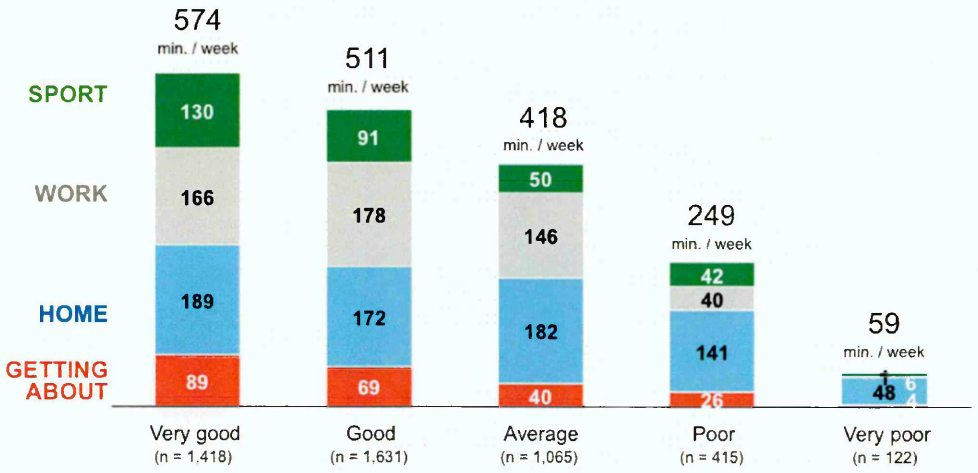
The relationship between relevant physical activity and self-reported health was highly significant. The proportions of adults who met the level recommended by the Chief Medical Officer decreased almost linearly with the respondents' self-assessment of their health (self-reported health very good: 44%, good: 37%, average: 30%, poor: 22%, very poor: 7%). While health was strongly correlated with many demographic variables which potentially impact on the health status of an adult (e.g. age), the relationship between physical activity and health was evident in all demographic subgroups. For example, 35% of young adults aged 16-24 who rated their health as very good achieve the recommended level compared with only 24% who rated their health as average.

**FIGURE 5.9: PROPORTIONS MEETING THE CHIEF MEDICAL OFFICER'S RECOMMENDATION AND TIME SPENT ON AT LEAST MODERATE INTENSITY ACTIVITIES PER WEEK BY SELF-REPORTED HEALTH**



Those who reported very good health were significantly more active than those with an average health in the sport domain (130 min. compared to average health: 50 min.) and the getting about domain (89 min. compared to 39 min.). The relationships between self-reported health and time spent in the work and house domains were only significant when comparing adults with very good health with those assessing their health as poor.

**FIGURE 5.10: TIME SPENT ON AT LEAST MODERATE INTENSITY ACTIVITIES PER WEEK BY SELF-REPORTED HEALTH STATUS**




## 5.11 SMOKING & ALCOHOL CONSUMPTION

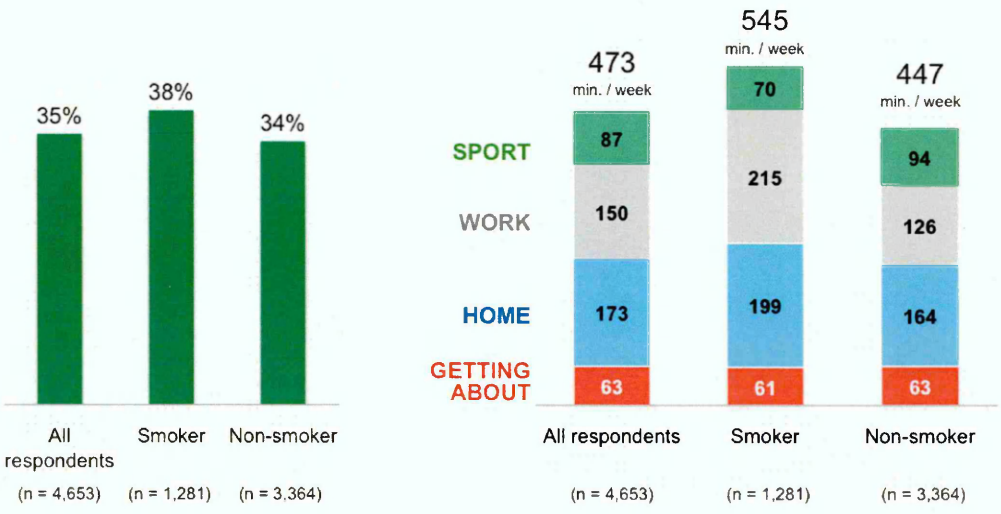
Adults, who smoked and/or consumed more alcohol than recommended by the Public Health Agency[42], were, on average, more active than others. However, this finding must be interpreted carefully as both physical activity and smoking / drinking habits were significantly different in demographic subgroups.

[42] Men: No more than 21 units; Women: No more than 14 units of alcohol over the course of the week. (Public Health Agency Northern Ireland)

Overall, there was a significant relationship between smoking habits and the proportions who met the Chief Medical Officer's advice of participating in at least moderate intensity activities for at least 30 minutes on at least five days per week. Overall, 38% of smokers met this threshold compared to 34% of non-smokers. The overall time spent on relevant physical activities was also significantly higher among smokers (545 min., non-smokers: 446 min.).

Smokers spent significantly more time on physical activities at work (215 min., non-smokers: 126 min.) and in the house (199 min., non-smokers: 164). In contrast, time spent on sport activities was significantly lower (70 min., non-smokers: 94 min.). There was no significant relationship between getting about activities and smoking.

**FIGURE 5.11: PROPORTIONS MEETING THE CHIEF MEDICAL OFFICER'S RECOMMENDATION AND TIME SPENT ON AT LEAST MODERATE INTENSITY ACTIVITIES PER WEEK BY SMOKING STATUS**




Analysing the data by age groups revealed that the positive relationship between smoking and meeting the recommended levels of physical activity was only significant

in the youngest age group (16-24 year-old smokers: 40%; 16-24 year-old non-smokers: 27%). By contrast, the proportion of adults aged 55-64 who achieved the recommended level was significantly higher among non-smokers (smokers: 21%, non-smokers: 32%). For all other age groups no significant relationship was found.

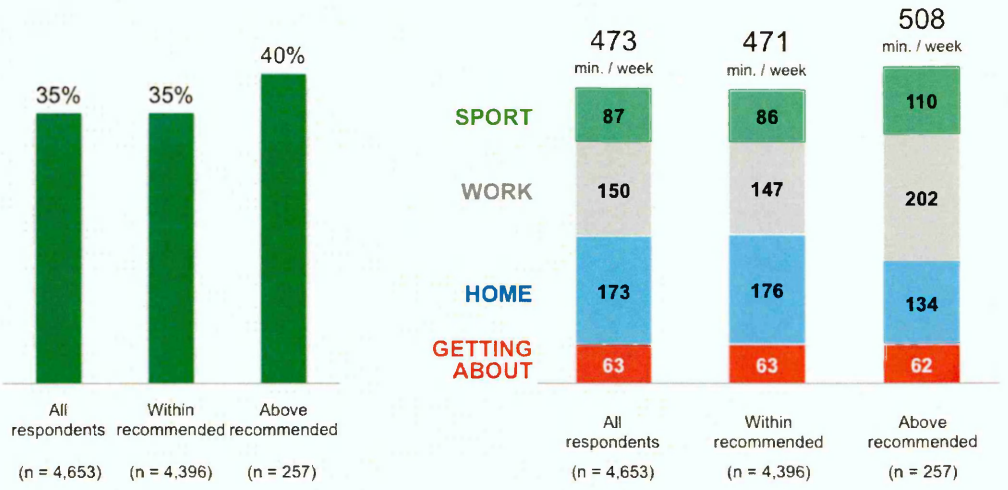
Other subgroups have been identified where a significant positive relationship between smoking and physical activity exists. However, almost all of these positive relationships were linked to the age of an adult as an important background variable. For example, single people who smoke were more active than non-smoking single people (42%, non-smokers: 32%) but this relationship was only significant in the youngest age group (16-24 year-old smokers: 49%, non-smokers: 26%).

In general, smokers in young and middle age groups appear to benefit from physical activity at work, however as the amount of time spent on these activities (especially the amount time spent on physical labour) gradually decreased, so did the time spent on relevant physical activities overall.

Similar to smoking, there was a positive relationship between alcohol consumption and physical activity. Overall, 40% of those who consumed alcohol more than the recommended limits were sufficiently active compared with 35% among those who drank within the recommended levels[43] or did not drink alcohol at all.

[43] 6.3% were classified as drinking above the recommended limits based on self-stated consumption of units of alcohol per week. Men: No more than 21 units; Women: No more than 14 units of alcohol over the course of the week. (Public Health Agency Northern Ireland), see also description of sample in the appendices.

**FIGURE 5.12: PROPORTIONS MEETING THE CHIEF MEDICAL OFFICER'S RECOMMENDATION AND TIME SPENT ON AT LEAST MODERATE INTENSITY ACTIVITIES PER WEEK BY ALCOHOL CONSUMPTION**




Adults who consumed more than recommended spent significantly more time on relevant sport activities (110 min., within recommended levels of alcohol consumption: 86 min.) and work activities (203 min., 147 min.). They spend less time on activities in the house (134 min., 176 min.) and there was no significant relationship with regard to getting about activities.

Due to small sample sizes for adults who consumed alcohol above the recommended limits, no significant relationships between alcohol consumption and achieving the threshold could be found within different age groups. However, as the average age among those who consume more alcohol than recommended was significantly lower than amongst other people (39 compared to 45 years) it seems reasonable to assume that, similar to smoking habits, the relationship between drinking habits and physical activity was linked to age as a background variable.

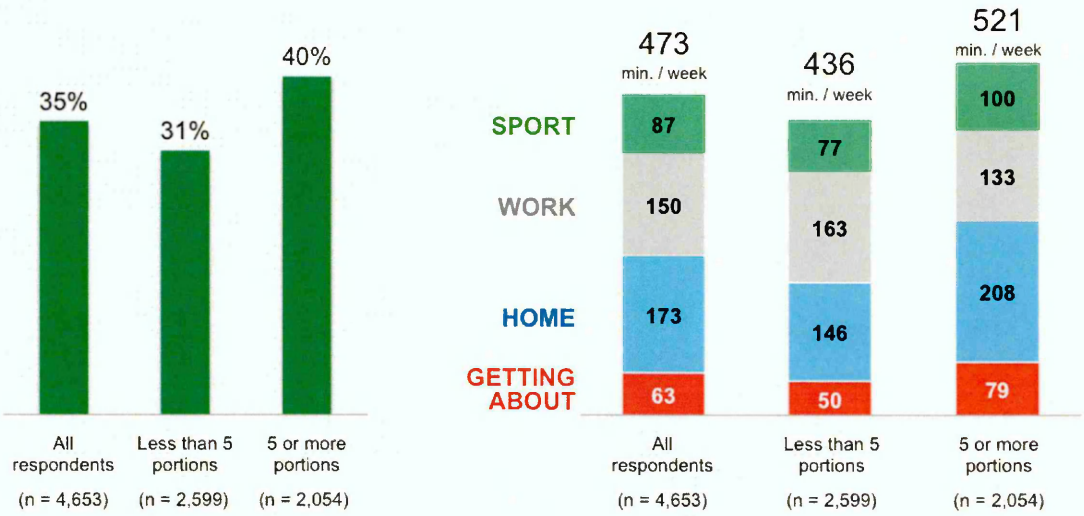
With regard to gender, the relationship between alcohol consumption and achieving the threshold was only significant for men.

It is also interesting to note that there was a significant relationship between sport club membership and alcohol consumption (sport club membership among those who consume more alcohol than recommended: 31%; others: 22%).

## 5.12 HEALTHY EATING

There was a significant positive relationship between healthy eating and achieving the recommended levels of physical activity. 40% of adults who eat five or more portions of fruit and vegetable per day met the threshold compared to 31% among those who eat less healthily. Healthy eating people were significantly more active in the sport domain (100 min. compared to 76 min.), the getting about domain (79 min., 50 min.) and the house domain (208 min., 146 min.). However, they were significantly less active in the work domain (133 min., 163 min.).

**FIGURE 5.13: PROPORTIONS MEETING THE CHIEF MEDICAL OFFICER'S RECOMMENDATION AND TIME SPENT ON AT LEAST MODERATE INTENSITY ACTIVITIES PER WEEK BY HEALTHY EATING HABITS**



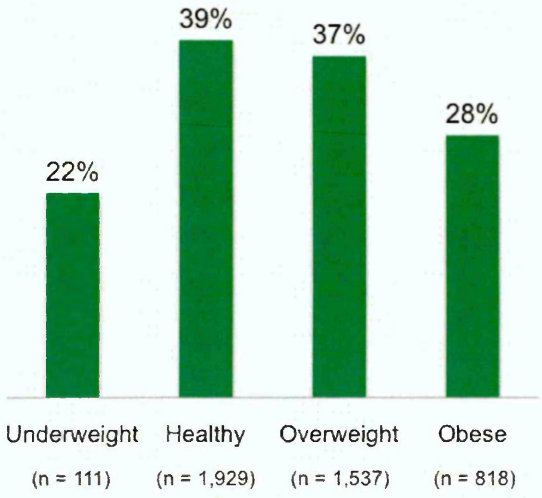

The finding that people who eat healthily were also more likely to meet the Chief Medical Officer's recommendations can be shown for almost all demographic subgroups, for example age groups, marital status and gender.

While there is evidence that people who eat healthily tend to be more active, it also needs to be considered that healthy eating is correlated with the socio-economic status of an adult. For example, the proportion of adults who eat five or more portions of fruit and vegetable a day is significantly higher among social classes ABC1 compared to C2DEs (ABC1: 50%, C2DE: 39%) suggesting that socio-economic circumstances are an important factor behind both physical activity and healthy eating.

## 5.13 BODY MASS INDEX (BMI)

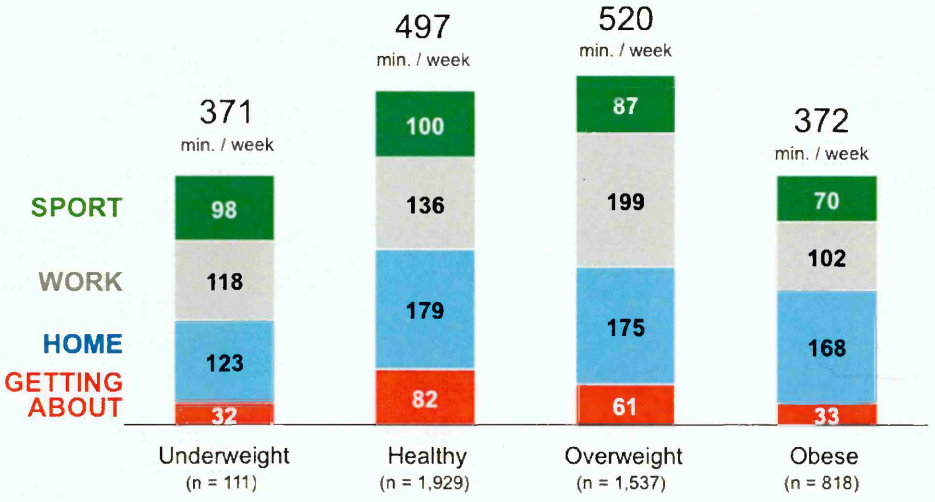
Adults with a healthy or overweight Body Mass Index show significantly higher proportions of those who met the Chief Medical Officer's activity recommendation compared to obese and underweight adults (healthy: 39%, overweight: 37%, obese: 28%, underweight: 22%).

**FIGURE 5.14: PROPORTIONS MEETING THE CHIEF MEDICAL OFFICER'S RECOMMENDATION AND TIME SPENT ON AT LEAST MODERATE INTENSITY ACTIVITIES PER WEEK BY BODY MASS INDEX**




Analysing the sources of physical activity, obese adults were significantly less active than those with a healthy BMI in the sport and getting about domains (sport: 70 min., 100 min.; getting about: 61 min., 77 min.). No significant differences were found in the home and work domain.

**FIGURE 5.15: TIME SPENT ON AT LEAST MODERATE ACTIVITIES PER WEEK BY BODY MASS INDEX**[44]



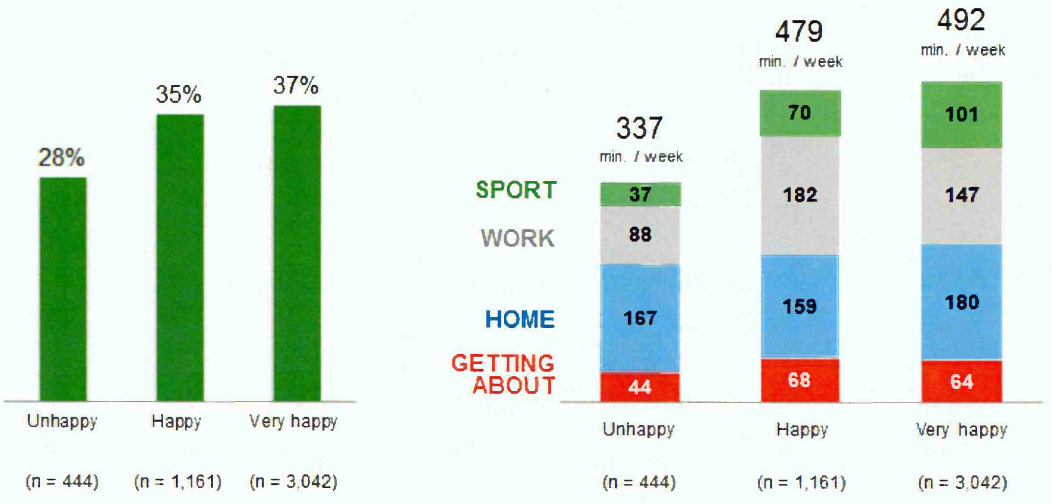

Comparing adults with a healthy BMI and those classified as overweight, there was no significant difference with regard to the proportions who met the Chief Medical Officer's recommendation. However, there were significant differences when analysing the domains. While adults classified as having a healthy BMI spent significantly more time on sport activities (healthy: 100 min., overweight: 87 min.) and getting about activities (healthy: 82 min., overweight: 61 min.), overweight adults spent more time on activities at work (healthy: 136 min., overweight: 199 min.). There was no significant difference with regard to activities spent in the home.

[44] The clinical limitations of BMI should be considered for this study. BMI is a surrogate measure of body fatness because it is a measure of excess weight rather than excess body fat. Factors such as age, sex, ethnicity, and muscle mass can influence the relationship between BMI and body fat. Also, BMI does not distinguish between excess fat, muscle, or bone mass, nor does it provide any indication of the distribution of fat among individuals. For example, muscular individuals, or highly-trained athletes, may have a high BMI because of increased muscle mass.

## 5.14 PERCEIVED HAPPINESS

There was a significant relationship between happiness and physical activity. The proportions of adults who met the recommended levels of physical activity were significantly higher among those who classified themselves as being very happy or happy[45] (very happy: 37%, happy: 35%, unhappy: 28%). Significant positive correlations[46] occurred between self-reported happiness and the total time spent on relevant activities, the time spent on sport activities and getting about activities.

**FIGURE 5.16: PROPORTIONS MEETING THE CHIEF MEDICAL OFFICER'S RECOMMENDATION AND TIME SPENT ON AT LEAST MODERATE INTENSITY ACTIVITIES PER WEEK BY SELF-REPORTED HAPPINESS**




The strongest link between self-reported happiness and physical activities was evident in the sport domain. Adults who classified themselves as very happy spent, on average, 101 minutes per week on sport activities. This compared to 70 minutes among happy and 37 minutes among unhappy people.

[45] Question: *In general, how happy would you say you are? Very happy classified as 8-10, happy as 6-7, unhappy as 1-5 on a 10 point scale.*
[46] Spearman correlations

The relationship between sport and happiness was also apparent when defining subgroups by the total time spent on sport activities. The proportion of adults who classified themselves as very happy increased gradually with the time spent on sport activities per week (no sport or less than 30 minutes: 61%; 30-119 minutes: 66%, 120-239 minutes: 73%, 240 minutes or more: 79%). Beyond 240 minutes, no further significant increase of self-stated happiness was found.

Without exception, the relationship between sport and happiness is significant in all demographic subgroups analysed in this research. For example, the proportion of retired people who classify themselves as very happy is much larger if at least 120 minutes was spent on sport activities (96% compared to 63%); the proportion among lower social classes (73% compared to 60%); among people in deprived areas (78% compared to 60%) and among people who have a disability (66% compared to 60%).

## 5.15 EXPLORATORY DATA ANALYSIS I : CONCLUDING REMARKS

The preliminary scrutiny of the survey revealed that just over a third (35%) of Northern Ireland's adult population achieved the levels of physical activity recommended by the Chief Medical Officer of participating in at least moderate intensity activities[47] for at least 30 minutes on at least five days per week. Unfortunately, this finding could also be described another way, 65% of the Northern Ireland's adult population did not achieve the levels of physical activity recommended by the Chief Medical Officer and as such did not accrue any of the health enhancing benefits that are a by-product of active lifestyles (e.g. improved vitality, improved fitness levels, optimal weight).

[47] Activities that at least raise the breathing rate for at least ten minutes (moderate intensity).

Other key findings of note from the survey that related levels and sources of physical activity their relationship with demography and health and wellness characteristics are as follows:

1. Most of the reported physical activity occurred at home, followed by activities at work. Sport activities came third and activities related to 'getting about' fourth. The most important physical activities in the work domain were manual labour and walking about while at work.

2. The work domain, as a source of physical activity, was especially relevant for men and people from lower social classes. The main physical activities in the home related to housework, DIY and gardening. The contribution of the home domain to overall levels of physical activity was especially relevant for women and older people.

3. The most important physical activities related to 'getting about' are walking to go somewhere and walking for recreation. The relevance of cycling for getting somewhere and for recreation was much lower, especially among women.

4. There were no major differences regarding overall physical activity levels between social classes or by deprivation of area. However, the sources of physical activity were different in that sport participation was more important as a contributor to overall activity levels for higher social classes and work activities for lower social classes.

5. There was a significant relationship between smoking habits and the proportions who met the Chief Medical Officer's recommendations of participating in at least moderate intensity activities for at least 30 minutes on at least five days per week.

6. Physical activity was related to alcohol consumption. In particular, there was a significant relationship between sport club membership and alcohol consumption.

7. Physical activity was related to a healthy body mass index and healthy eating behaviour.

8. Participation in sport was related to people's wellbeing and happiness.

In this chapter, the results of the t-test and ANOVA were described so as to highlight significant differences and relationships between a number of variables, and including physical activity levels (across four life domains); health and wellness characteristic's (smoking, alcohol consumption, healthy eating habits, perceived health and happiness and healthy BMI) and a number of demographic variables.

It is apparent from the results of the preliminary analysis that a wide range of factors have a bearing on adults health related behaviour (physical activity, smoking, alcohol consumption, healthy eating) and their perceived health and happiness in Northern Ireland. In order to explore these in greater detail, further and more advanced statistical analyses (Binary Regression Analysis), as set out in the methodology (Chapter 4), were conducted to understand the relationships of adult participation in physical activity and

other health-related behaviours. Results of the advanced data analysis are described in Chapter 6 with a full discussion of results and implications for government policies presented in Chapter 7.

# CHAPTER 6: RESULTS: EXPLORATORY DATA ANALYSIS II

## Road map of the thesis

| Introduction | Review of Literature | Methodology | Results | Discussion | Conclusions |
|---|---|---|---|---|---|
| | Ch2 A Systematic Review of the Literature on Population Based Approaches to Measuring Physical Activity & Health | | Ch5 Exploratory Data Analysis I | | |
| Ch1 ► | Ch3 A Review of the Narrative Literature on Population Based Approaches to Measuring Physical Activity & Health | ► Ch4 ► | Ch6 Exploratory Data Analysis II | ► Ch7 ► | ► Ch8 |

## 6.1 INTRODUCTION

The previous chapter presented preliminary data explorations, principally by way of univariate analyses of key variables. However, in order to examine the complexity of relationships in greater detail, binary logistic regression[48], as described in Chapter 4: Section 4.11, was next used to explore the influence of:

1. Socio-demographic and health and wellness variables on physical activity level (*Physical Activity Analysis*);
2. Physical activity, socio-demographic factors and health and wellness variables on self-perceived health (*Health Analysis*); and
3. Physical activity, socio-demographic factors and health and wellness variables on self-perceived happiness (*Happiness Analysis*).

The use of multivariate statistical techniques to explore complex relationships has grown over recent years, as computing procedures have become ever more accessible. Given the large number of variables captured by SAPAS, it would not be feasible within the scope of this thesis to examine all possible relationships but instead it was decided to focus attention on three outcomes areas of particular interest, i.e. physical activity, health and happiness. The issue of causality is always problematic with such techniques but at least the procedures are able to show which variables have the strongest relationships, and in turn, by inference, which may have the most significant bearing on a particular outcome. This type of finding is likely to be important for policy makers in designing interventions with the greatest chance of making an impact.

[48] developed by Cox, 1958, and Walker and Duncan, 1967

## 6.2 GROUP DEFINITIONS AND PREDICTOR VARIABLES

Table 6.1 below provides an overview of the variables that have been used to define group membership for the purposes of analysis:

### TABLE 6.1: VARIABLES FOR GROUP DEFINITIONS

| Analysis | Variable | Definition | Proportion in weighted sample | N |
|---|---|---|---|---|
| | | **PHYSICAL ACTIVITY** | | |
| **ANALYSIS 1** | **ACTIVE 1** | Participating in at least moderate intensity activities for at least 30 minutes on at least five days per week / achieving the CMO's recommendation through any of the four domains | 35.4% | N=1,576 |
| **ANALYSIS 2** | **ACTIVE 2** | Achieving the CMO's PA recommendation and participating in at least moderate intensity sport for at least 30 minutes on at least three days per week (150+ minutes PA per week of which 3 x 30 minutes is in sport which takes place on 3 different days) | 9.8% | N=448 |
| **ANALYSIS 3** | **ACTIVE 3** | Participating in at least moderate intensity sport activities for at least 30 minutes on at least three days per week | 13.8% | N=631 |
| **ANALYSIS 4** | **ACTIVE 4** | Participating in at least moderate intensity sport activities for at least 30 minutes on at least five days per week / achieving the CMO's recommendation through sport alone (*sport enthusiasts*) | 4.5% | N=206 |
| | | **HEALTH** | | |
| **ANALYSIS 5** | **MODEL CITIZEN** | Meeting the CMO's PA recommendations (ACTIVE 1); non-smoker; alcohol consumption within recommended limits; healthy Body Mass Index, consumption of 5 or more portions of fruit and vegetables per day | 5.9% | N= 270 |
| **ANALYSIS 6** | **VERY GOOD HEALTH** | Meeting the CMO's PA recommendations (ACTIVE 1) and self-reported health rated 'very good' on a five point scale | 30.5% | N=1,394 |
| **ANALYSIS 7** | **HEALTH & SPORT** | Participating in at least moderate intensity sport activities for at least 30 minutes on at least three days per week (ACTIVE 3) and self-reported health rated as 'very good' on a five point scale | 11.9% | N=544 |
| | | **HAPPINESS** | | |
| **ANALYSIS 8** | **HAPPINESS** | Being 'very happy' as opposed to 'happy' or 'unhappy' (rating 8-10 on a 10 point scale) | 65.5% | N=2,986 |

Nine socio-demographic, three health and wellness, and two physical activity variables were included as predictors in the analysis (as shown in Table 6.2). For the purpose of conducting the logistic regression analyses, categorical variables with more than two categories were transformed into suitable binary variables. For example, in the case of age where there were originally four categories, people aged 65+ were categorised as the base case against which the remaining three categories were then compared.

Table 6.2 provides an overview of all predictor variables and shows how the original variables have been transformed into binary predictors, on each occasion defining one category as the base variable.

**TABLE 6.2: BINARY REGRESSION ANALYSIS PREDICTOR VARIABLES**

| Original variable | Variable attributes | Predictor variables | Proportion in weighted sample |
|---|---|---|---|
| | ***SOCIO-DEMOGRAPHIC VARIABLES*** | | |
| Gender | Male | LRgender | 48.5% |
| | Female | (base) | 51.5% |
| Age | 16-24 | LRage16to24 | 16.5% |
| | 25-34 | LRage25-34 | 17.0% |
| | 35-64 | LRage35-64 | 48.3% |
| | 65+ | (base) | 18.1% |
| Location | Urban | LRurbanrural | 81.5% |
| | Rural | (base) | 18.5% |
| Qualifications | University degree or higher | LRquals | 19.5% |
| | No degree | (base) | 80.5% |
| Disability | Has a disability | LRdisability | 23.4% |
| | No disability | (base) | 76.6% |
| Marital status | married or living as married | LRmarried | 56.7% |
| | all others | (base) | 43.3% |
| Social class | A | LRsocA | 2.5% |
| | B | LRsocB | 17.6% |
| | C1 | LRsocC1 | 26.0% |
| | C2 | LRsocC2 | 20.4% |
| | D | LRsocD | 12.3% |
| | E | (base) | 21.2% |
| Employment status | Working full time | (base) | 41.9% |
| | Working part time | LRworkingpart | 12.8% |
| | Retired | LRretired | 19.8% |
| | Student | LRstudent | 6.7% |
| | Housewife | LRhousewife | 10.2% |
| | Unemployed | LRunemployed | 8.5% |

| | | | |
|---|---|---|---|
| Religion | Catholic | LRreligionC | 41.1% |
| | Protestant | (base) | 50.6% |
| | **HEALTH AND WELLNESS VARIABLES** | | |
| Alcohol consumption | Above recommended | LRalco | 5.5% |
| | Within recommended | (base) | 94.5% |
| Smoking | Smoker | LRsmoking | 27.5% |
| | Non smoker | (base) | 72.3% |
| Healthy eating | 5 or more portions | LRfiveaday | 44.1% |
| | Less than 5 portions | (base) | 55.9% |
| | **PHYSICAL ACTIVITY VARIABLES** | | |
| Overall PA levels | Achieving the CMO's recommendation | LRactive1 | 35.4% |
| | Not achieving the CMO's recommendation | (base) | 64.6% |
| Sport participation | 3 or more days per week | LRsport3days | 13.8% |
| | Less than 3 days per week | (base) | 86.2% |

A correlation analysis was conducted in order to identify instances of unacceptable multicollinearity (i.e. where two or more variables appeared to covary in a way that suggested the constructs should be regarded as synonymous). None of the variables strongly correlated to the point that additional interaction variables needed to be included in the analysis. A table with the full results of the correlation analysis can be found in Appendix 5.

## 6.3 BINARY REGRESSION ANALYSIS: PHYSICAL ACTIVITY ANALYSIS

**ACTIVE 1** **Participating in at least moderate intensity activities for at least 30 minutes on at least five days per week / achieving the CMO's physical activity recommendation through any of the four domains (35.4%)**

The first analysis aimed to identify factors which related to achieving a defined level of overall physical activity within any of the four domains (sport, getting about, activities at work and activities at home). ACTIVE 1 (Group 1) was defined as those achieving the levels of physical activity as recommended by the Chief Medical Officer[49] in the UK (Department of Health, 2004).

4,569 cases (98.2%) were included in the analysis, with 84 cases set as missing values. The cut-off point was set at 0.354 which equals the proportion of respondents achieving the CMO's physical activity recommendations in the sample[50]. The significance level for testing the logit-coefficients was set at 0.05.

Overall, 59.4% of all cases could be classified as consistently falling within the same group across the four life domains. 65.5% were correctly classified as belonging to Group 1 (achieving CMO's physical activity recommendations), 56.1% were correctly classified as belonging to Group 0 (not achieving the CMO's physical activity recommendations).

[49] At least 30 minutes of moderate intensity physical activity on five or more days of the week.
[50] For all groups, taking the proportion in the sample (which is an unbiased estimator of the proportion in the population) as cut-off value produced better classification results than the standard 0.5 value.

**TABLE 6.3: CLASSIFICATION TABLE[51] FOR ACTIVE 1**

| | | | Predicted | | |
|---|---|---|---|---|---|
| | | | Regression Variable: Achieving the CMO's PA recommendations through all domains | | |
| Observed | | | Not | Yes | % Correct |
| Step 1 | Regression Variable: Achieving the CMO's PA recommendations through all domains | Not | 1,656 | 1,295 | 56.1 |
| | | Yes | 562 | 1,065 | 65.5 |
| | **Overall %** | | | | **59.4** |

Table 6.4 (overleaf) shows the impact of the predictor variables on the determination of group membership. Significant positive effects are marked green, significant negative effects are marked red.

[51] The cut-off value is .354

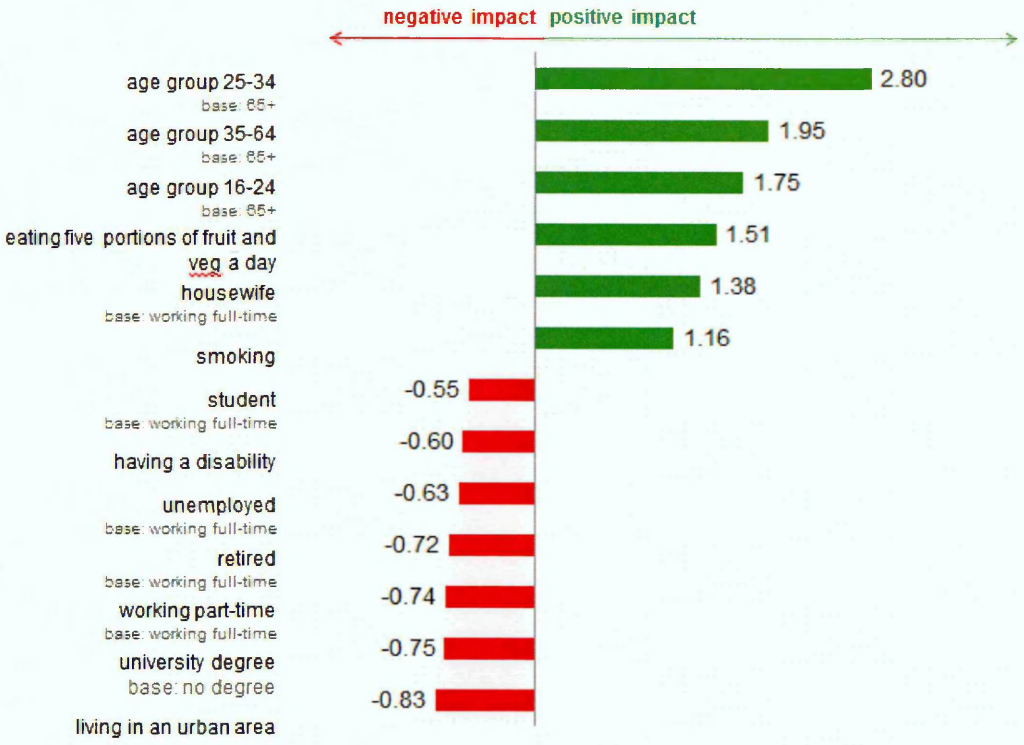
## TABLE 6.4: ACTIVE 1 RESULTS: IMPACT OF SOCIO-DEMOGRAPHIC AND HEALTH & WELLNESS PREDICTOR VARIABLES

| | Base | B | S.E | Wald | df | Sig. | Exp(B) | 95% C.I.for EXP(B) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lower | Upper |
| LRgender | female | 0.090 | 0.072 | 1.591 | 1.000 | 0.207 | 1.094 | 0.951 | 1.259 |
| LRage16to24 | 65+ | 0.557 | 0.175 | 10.158 | 1.000 | 0.001 | 1.745 | 1.239 | 2.458 |
| LRage25to34 | 65+ | 1.031 | 0.159 | 41.850 | 1.000 | 0.000 | 2.804 | 2.052 | 3.832 |
| LRage35to64 | 65+ | 0.669 | 0.136 | 24.065 | 1.000 | 0.000 | 1.952 | 1.494 | 2.550 |
| LRurbanrural | rural | -0.190 | 0.082 | 5.381 | 1.000 | 0.020 | 0.827 | 0.704 | 0.971 |
| LRquals | no degree | -0.288 | 0.097 | 8.777 | 1.000 | 0.003 | 0.750 | 0.620 | 0.907 |
| LRdisability | no disability | -0.513 | 0.089 | 33.284 | 1.000 | 0.000 | 0.599 | 0.503 | 0.713 |
| LRalco | Within recommended | 0.169 | 0.138 | 1.503 | 1.000 | 0.220 | 1.185 | 0.904 | 1.553 |
| LRsmoking | non-smoker | 0.150 | 0.075 | 3.980 | 1.000 | 0.046 | 1.162 | 1.003 | 1.346 |
| LRfiveaday | less than 5 portions | 0.413 | 0.066 | 39.074 | 1.000 | 0.000 | 1.512 | 1.328 | 1.721 |
| LRmarried | not married or living as married | 0.068 | 0.078 | 0.751 | 1.000 | 0.386 | 1.070 | 0.918 | 1.247 |
| LRworkingpart | working full time | -0.295 | 0.104 | 8.038 | 1.000 | 0.005 | 0.744 | 0.607 | 0.913 |
| LRretired | working full time | -0.333 | 0.140 | 5.668 | 1.000 | 0.017 | 0.717 | 0.545 | 0.943 |
| LRstudent | working full time | -0.594 | 0.164 | 13.075 | 1.000 | 0.000 | 0.552 | 0.400 | 0.762 |
| LRhousewife | working full time | 0.322 | 0.131 | 6.078 | 1.000 | 0.014 | 1.381 | 1.068 | 1.784 |
| LRunemployed | working full time | -0.459 | 0.151 | 9.217 | 1.000 | 0.002 | 0.632 | 0.470 | 0.850 |
| LRsocA | social class E | 0.530 | 0.229 | 5.384 | 1.000 | 0.020 | 1.700 | 1.086 | 2.660 |
| LRsocB | social class E | 0.203 | 0.137 | 2.200 | 1.000 | 0.138 | 1.225 | 0.937 | 1.603 |
| LRsocC1 | social class E | 0.109 | 0.121 | 0.814 | 1.000 | 0.367 | 1.116 | 0.880 | 1.415 |
| LRsocC2 | social class E | 0.181 | 0.123 | 2.157 | 1.000 | 0.142 | 1.199 | 0.941 | 1.526 |
| LRsocD | social class E | 0.156 | 0.137 | 1.303 | 1.000 | 0.254 | 1.169 | 0.894 | 1.529 |
| LRreligionC | Protestant | 0.035 | 0.066 | 0.280 | 1.000 | 0.597 | 1.036 | 0.910 | 1.179 |
| Constant | | -1.229 | 0.200 | 37.854 | 1.000 | 0.000 | 0.293 | | |

For an easier interpretation of the findings in Table 6.4, all significant predictors have been ranked by their exp (B) value (showing the strength of the impact) and B value (showing the direction of the impact). The results of the analyses are shown in Figure 6.1. Green bars indicate a significant positive impact and red bars a significant negative impact[52].

[52] If B is negative, Exp(B) has been multiplied by -1 to indicate a negative impact.

**FIGURE 6.1: ACTIVE 1 RESULTS: EXP (B) VALUES FOR SIGNIFICANT PREDICTOR VARIABLES**




## ACTIVE 1

In summary, the analysis revealed that age was the most important factor linked to physical activity, a finding that has significant policy implications that will be discussed further in Chapter 7. More specifically, the most positive link with physical activity was found within the 25-34 years age bracket, followed by the age groups 35-64 and 16-24. Belonging to the age group 65+ implied a higher probability of not achieving the CMO's physical activity recommendations than belonging to any other age group. Being a housewife contributed to being physically active more than any other employment status, including working full-time; whilst being a student correlated negatively, presumably because those who work in this field are more sedentary and

people who leave higher education with a degree tend to go into sedentary jobs rather than employment with a higher manual labour component. As regards location, living in an urban area had a relatively strong negative impact on the probability of achieving the CMO's physical activity recommendations. Once more, from a policy perspective this finding is highly significant as it may show that the targeting of campaigns towards urban communities may be important.

With regard to lifestyle factors, results are mixed. On the one hand, a significant positive relationship between healthy eating (five or more portions of fruit and vegetables per day) and physical activity was found, suggesting that a healthy lifestyle may encompass many related domains. On the other hand, there was a positive relationship between smoking and achieving the recommended levels of physical activity, suggesting that certain unhealthy behaviours may still be attached to aspects of physical activity. Once more the policy implications are significant and especially in relation to the targeting of campaigns. Alcohol consumption did not impact significantly on physical activity and there was also no significant impact from the other predictor variables - socio-economic class, marital status and religion.

Binary Logistic Regression analysis was undertaken to explore the influence of socio-demographic and health and wellness variables on the remaining physical activity based variables (ACTIVE 2, 3 and 4). The key findings from this analysis are presented in Table 6.5.

**TABLE 6.5: BINARY REGRESSION ANALYSES: SUMMARY OF KEY FINDINGS FOR THE REMAINING PHYSICAL ACTIVITY VARIABLES (ACTIVE 2, 3 and 4)**

| Variable | Base | Active 1 | Active 2 | Active 3 | Active 4 |
|---|---|---|---|---|---|
| | | sig. | sig. | sig. | sig. |
| LRgender | female | 0.207 | 0.000 | 0.000 | 0.000 |
| LRage16to24 | 65+ | 0.001 | 0.010 | 0.004 | 0.388 |
| LRage25to34 | 65+ | 0.000 | 0.007 | 0.012 | 0.947 |
| LRage35to64 | 65+ | 0.000 | 0.346 | 0.357 | 0.770 |
| LRurbanrural | rural | 0.020 | 0.851 | 0.060 | 0.849 |
| LRquals | no degree | 0.003 | 0.048 | 0.028 | 0.001 |
| LRdisability | no disability | 0.000 | 0.770 | 0.111 | 0.096 |
| LRalco | Within recommended | 0.220 | 0.831 | 0.474 | 0.125 |
| LRsmoking | non-smoker | 0.046 | 0.000 | 0.000 | 0.004 |
| LRfiveaday | less than 5 portions | 0.000 | 0.000 | 0.000 | 0.000 |
| LRmarried | not married or living as married | 0.386 | 0.197 | 0.228 | 0.043 |
| LRworkingpart | working full time | 0.005 | 0.258 | 0.100 | 0.714 |
| LRretired | working full time | 0.017 | 0.000 | 0.000 | 0.015 |
| LRstudent | working full time | 0.000 | 0.192 | 0.563 | 0.744 |
| LRhousewife | working full time | 0.014 | 0.560 | 0.221 | 0.599 |
| LRunemployed | working full time | 0.002 | 0.336 | 0.388 | 0.324 |
| LRsocA | social class E | 0.020 | 0.003 | 0.000 | 0.921 |
| LRsocB | social class E | 0.138 | 0.000 | 0.000 | 0.043 |
| LRsocC1 | social class E | 0.367 | 0.001 | 0.000 | 0.082 |
| LRsocC2 | social class E | 0.142 | 0.000 | 0.000 | 0.158 |
| LRsocD | social class E | 0.254 | 0.250 | 0.032 | 0.575 |
| LRreligionC | Protestant | 0.597 | 0.425 | 0.599 | 0.580 |
| Constant | | 0.000 | 0.000 | 0.000 | 0.000 |

**ACTIVE 2** **Achieving the CMO's physical activity recommendation and participating in at least moderate intensity sport for at least 30 minutes on at least three days per week (9.8%)**

Following from the earlier findings and potential policy implications, it is noteworthy that the decision to include sport participation in the group definition changed the results fundamentally. In this analysis, being a member of higher social classes is the most important factor determining activity. Members of social class A were more likely to be sufficiently active (achieving the CMO's physical activity recommendations) and engage in sports activities, followed by social class B, C2 and C1.

Adding sport participation also changed the age profile where it was now found that adults aged 16-24 were more likely to achieve the CMO's physical activity recommendations and participate in sport at the same time. In contrast to ACTIVE 1, having a university degree now contributed positively and this corresponds to the descriptive finding in Chapter 5 (Section 5.7) that sport participation increases with educational attainment. In this analysis, a gender gap became evident where men were more likely to belong to this group of active people than women, once more highlighting potentially important policy considerations that will be explored in greater depth in Chapter 7. Again, this is in line with what has been found by comparing sport participation by gender (Chapter 5: Section 5.5). Another interesting difference, as compared to ACTIVE 1, is that smoking, which was positively related to Group 1 membership (achieving the CMO's physical activity recommendations through any of the four domains), now had a negative impact on ACTIVE 2. Therefore, it can be concluded that smokers, in general, were more likely to be physically active, but this did not primarily stem from sport participation but from other domains, and most notably

physical activity in the workplace. Healthy eating was associated with belonging to the ACTIVE 2 group and with regard to employment status, the only significant effect occurred among retired people. Being retired was associated negatively with being sufficiently active and participating in sport.

**ACTIVE 3** **Participating in at least moderate intensity sport activities for at least 30 minutes on at least three days per week (13.8%)**

When reflecting on those who have a significant involvement with sport at least three times a week, seven key findings are noteworthy, and each have important policy implications to be explored in Chapter 7. First, is the finding that only 13.8% (N=631) adults that responded to the survey met the above criteria suggesting that 'sport' is not a popular as many people believe. Second, there was a strong relationship between social status and sport participation and in particular being a member of social class A was most closely aligned with sport participation, followed by social classes B, C1 and C2. As with the ACTIVE 2 group, and very much in line with other research findings, men were significantly more likely to participate three days per week than women. A higher education qualification and eating five portions of fruit or vegetables per day were also related positively with sport participation. Not surprisingly, and in line with earlier analyses, being retired and smoking related negatively with participating in sport at least three times per week and once more, there were no significant associations with regard to alcohol consumption, having a disability, marital status or religion.

**ACTIVE 4** **Achieving the Chief Medical Officer's physical activity recommendations through sport participation only - *Sport Enthusiasts* (4.5%)**

Six key findings emerged from the analysis focusing on *sports enthusiasts* or those who achieve recommended activity through sport alone. Firstly, only 1 in 20 adults (N=206) that responded to the survey achieved the Chief Medical Officer's physical activity recommendation through sport alone. Again, social class is revealed as a significant predictor of activity, with those in social class B being more likely to belong to this group. Higher education was also positively linked with participating five or more times per week through sport participation only, and once more, men were more likely to be represented among sport *enthusiasts* than women. Interestingly, age *per se* did not play a significant role; although retired adults were less likely to be categorised as *sport enthusiasts*. With regard to marital status, being single did have a strong and positive association while smoking had a significant negative association with the probability of being a *sport enthusiast*. The profiling of those who engage with sport frequently is revealing, and while this profile will be considered in a policy context in greater detail in Chapter 7, an emerging picture suggests that healthy living, activity and engagement in sport continues to be the preserve of a minority rather than the majority of the population in Northern Ireland.

As highlighted previously in Section 6.2, binary logistic regression analysis was also undertaken to explore the influence of physical activity, socio-demographic factors and health and wellness variables on self-perceived health (Health Analysis) and self-perceived happiness (Happiness Analysis). The key findings from this analysis are summarised in Sections 6.4 and 6.5 with the results of the analyses shown in Table 6.6

and 6.7. Rows within each table which are shaded 'green' indicate a significant positive link, 'red' a significant negative relationship impact, 'white' no significant effect and 'black' non relevance to the regression. A full output from the binary logistic regression analyses is included in Appendix 2.

## 6.4 BINARY REGRESSION ANALYSIS: HEALTH ANALYSIS

**TABLE 6.6: BINARY REGRESSION ANALYSES: SUMMARY OF KEY FINDINGS FOR THE HEALTH RELATED VARIABLES (MODEL CITIZENS, VERY GOOD HEALTH, AND HEALTH & SPORT)**

| Variable | Base | Model Citizens | Very Good Health | Health & Sport |
|---|---|---|---|---|
| | | sig. | sig. | sig. |
| LRgender | female | 0.383 | 0.811 | 0.621 |
| LRage16to24 | 65+ | 0.257 | 0.001 | 0.002 |
| LRage25to34 | 65+ | 0.045 | 0.117 | 0.098 |
| LRage35to64 | 65+ | 0.041 | 0.199 | 0.144 |
| LRurbanrural | rural | 0.015 | 0.042 | 0.014 |
| LRquals | no degree | 0.065 | 0.306 | 0.607 |
| LRdisability | no disability | 0.000 | 0.000 | 0.000 |
| LRalco | Within recommended | | 0.344 | 0.367 |
| LRsmoking | non-smoker | | 0.000 | 0.000 |
| LRfiveaday | less than 5 portions | | 0.000 | 0.000 |
| LRmarried | :d or living as married | 0.000 | 0.408 | 0.264 |
| LRworkingpart | working full time | 0.131 | 0.420 | 0.428 |
| LRretired | working full time | 0.175 | 0.115 | 0.223 |
| LRstudent | working full time | 0.819 | 0.426 | 0.678 |
| LRhousewife | working full time | 0.000 | 0.134 | 0.075 |
| LRunemployed | working full time | 0.402 | 0.908 | 0.880 |
| LRsocA | social class E | 0.000 | 0.206 | 0.316 |
| LRsocB | social class E | 0.003 | 0.000 | 0.000 |
| LRsocC1 | social class E | 0.012 | 0.007 | 0.020 |
| LRsocC2 | social class E | 0.005 | 0.006 | 0.014 |
| LRsocD | social class E | 0.221 | 0.026 | 0.035 |
| LRreligionC | Protestant | 0.074 | 0.083 | 0.101 |
| LRactive1 | | | 0.000 | 0.000 |
| LRsport3days | | | 0.000 | 0.000 |
| Constant | | 0.000 | 0.000 | 0.000 |

| | |
|---|---|
| **MODEL CITIZENS** | **Meeting the CMO's physical activity recommendations (ACTIVE 1); non-smoker; alcohol consumption within recommended limits; healthy BMI, consumption of 5 or more portions of fruit and vegetables per day (5.9%)** |

Overall, it is noteworthy how small this group is; of the entire sample, only 1 in 16 could be classified as meeting all criteria to be defined as *model citizens* from a health perspective. Furthermore, this elite group showed many other characteristics of elitism, for example being more likely to be members of social class A (which in itself only represents 5% of the population), and to be wealthy. Interestingly however, being a housewife (or house-husband) was also associated with the status of *model citizen*, and more so than full-time employees.

Adults within the 25-34 age bracket were the most likely to belong to the *model citizen* group, with those aged 35-64 coming second. Being married also contributed positively to the probability of leading a healthy lifestyle with regard to physical activity, smoking, drinking and eating habits.

In line with other research, adults with a disability were still those least likely to be defined as model citizens from a lifestyle perspective, and opportunities for positive interventions with this group remain under-developed. Furthermore, those living in towns and cities were also less likely to belong to this category and lead a *model citizen* lifestyle.

**VERY GOOD HEALTH** **Meeting the CMO's physical activity recommendations (ACTIVE 1) and self- reported health rated 'very good' on a five point scale (30.5%)**

When looking not at behaviour but adults' self-reported health status in Northern Ireland, a very different profile emerges that has significant policy implications. Specifically, if an individual does not perceive him or herself as being unhealthy then the motivation to engage in a healthy lifestyle is likely to diminish. Maybe not surprisingly, being young (16-24 years) was the most important factor relating positive views on self-reported health.

Interestingly, and in contrast with the previous analysis, being a member of social classes B, C1, C2 or D was associated positively with self-reported good health, whereas no significant relationship was found for social class A. Looking at lifestyle characteristics, those who ate healthily had a more positive view of their own health while smokers had a negative view, and once more, those living in a rural area were more likely to rate their health as 'very good'. These issues will be explored further in Chapter 7 but it is clear from this analysis that the willingness to engage with healthy lifestyle initiatives is likely to vary considerably across the population, and hence different strategies may be needed to overcome inertia where the perception of health problems is not evident.

**Participating in at least moderate intensity sport activities for at least 30 minutes on at least three days per week (ACTIVE 3) and self-reported health rated as 'very good' on a five point scale (11.9%)**

This analysis focused specifically on the association between taking part in sport and self-perception of health status but overall was not especially revealing over and above earlier analyses. For example, as with Analysis 6, being young (16-24 years), being a member of social classes B, C2, D and C1 and eating healthily all related positively with a self-perception of being healthy while being a smoker and living in an urban area had a negative association.

**TABLE 6.7: BINARY REGRESSION ANALYSES: SUMMARY OF KEY FINDINGS FOR THE HEALTH RELATED VARIABLE (HAPPINESS).**

| Variable | Base | Happiness |
|---|---|---|
| | | sig. |
| LRgender | female | 0.750 |
| LRage16to24 | 65+ | 0.000 |
| LRage25to34 | 65+ | 0.206 |
| LRage35to64 | 65+ | 0.802 |
| LRurbanrural | rural | 0.067 |
| LRquals | no degree | 0.083 |
| LRdisability | no disability | 0.000 |
| LRalco | Within recommended | 0.026 |
| LRsmoking | non-smoker | 0.000 |
| LRfiveaday | less than 5 portions | 0.028 |
| LRmarried | not married or living as married | 0.000 |
| LRworkingpart | working full time | 0.389 |
| LRretired | working full time | 0.075 |
| LRstudent | working full time | 0.634 |
| LRhousewife | working full time | 0.745 |
| LRunemployed | working full time | 0.024 |
| LRsocA | social class E | 0.296 |
| LRsocB | social class E | 0.000 |
| LRsocC1 | social class E | 0.314 |
| LRsocC2 | social class E | 0.006 |
| LRsocD | social class E | 0.060 |
| LRreligionC | Protestant | 0.528 |
| LRsport3days | less than 3 sport days per week | 0.000 |
| Constant | | 0.017 |

| | |
|---|---|
| **HAPPINESS** | **Self –reported happiness and sport participation ('very happy' as opposed to 'happy' or 'unhappy') (65.5%)** |

Sport participation had the second strongest relationship with being 'very happy'. Only the factor of belonging to the youngest age group (16-24 years) ranked higher. With regard to lifestyle, healthy eating significantly increased the probability of belonging to the group of 'very happy' adults and smoking and alcohol consumption above the recommended limits had a negative relationship with self-reported happiness.

## 6.6 BINARY REGRESSION ANALYSIS: CONCLUDING REMARKS

Standing back from the data at this point, a number of key findings with associated policy implications have clearly emerged from this analysis. While the primary purpose of this chapter is to lay out a summary of the most significant results (for a consideration of all analyses, go to Appendix 6), a brief overview is presented in Table 6.8; these themes will be explored further in Chapter 7.

## TABLE 6.8: OVERVIEW OF KEY FINDINGS FROM THE PHYSICAL ACTIVITY, HEALTH & HAPPINESS ANALYSES

| Variable | Base | Active 1 | Active 2 | Active 3 | Active 4 | Model Citizens | Very Good Health | Health & Sport | Happiness |
|---|---|---|---|---|---|---|---|---|---|
| | | sig. | sig. | sig. | sig. | sig. | sig. | sig. | sig. |
| LRgender | female | 0.207 | 0.000 | 0.000 | 0.000 | 0.383 | 0.811 | 0.621 | 0.750 |
| LRage16to24 | 65+ | 0.001 | 0.010 | 0.004 | 0.388 | 0.257 | 0.001 | 0.002 | 0.000 |
| LRage25to34 | 65+ | 0.000 | 0.007 | 0.012 | 0.947 | 0.045 | 0.117 | 0.098 | 0.206 |
| LRage35to64 | 65+ | 0.000 | 0.346 | 0.357 | 0.770 | 0.041 | 0.199 | 0.144 | 0.802 |
| LRurbanrural | rural | 0.020 | 0.851 | 0.060 | 0.849 | 0.015 | 0.042 | 0.014 | 0.067 |
| LRquals | no degree | 0.003 | 0.048 | 0.028 | 0.001 | 0.065 | 0.306 | 0.607 | 0.083 |
| LRdisability | no disability | 0.000 | 0.770 | 0.111 | 0.096 | 0.000 | 0.000 | 0.000 | 0.000 |
| LRalco | Within recommended | 0.220 | 0.831 | 0.474 | 0.125 | | 0.344 | 0.367 | 0.026 |
| LRsmoking | non-smoker | 0.046 | 0.000 | 0.000 | 0.004 | | 0.000 | 0.000 | 0.000 |
| LRfiveaday | less than 5 portions | 0.000 | 0.000 | 0.000 | 0.000 | | 0.000 | 0.000 | 0.028 |
| LRmarried | not married or living as married | 0.386 | 0.197 | 0.228 | 0.043 | 0.000 | 0.408 | 0.264 | 0.000 |
| LRworkingpart | working full time | 0.005 | 0.258 | 0.100 | 0.714 | 0.131 | 0.420 | 0.428 | 0.389 |
| LRretired | working full time | 0.017 | 0.000 | 0.000 | 0.015 | 0.175 | 0.115 | 0.223 | 0.075 |
| LRstudent | working full time | 0.000 | 0.192 | 0.563 | 0.744 | 0.819 | 0.426 | 0.678 | 0.634 |
| LRhousewife | working full time | 0.014 | 0.560 | 0.221 | 0.599 | 0.000 | 0.134 | 0.075 | 0.745 |
| LRunemployed | working full time | 0.002 | 0.336 | 0.388 | 0.324 | 0.402 | 0.908 | 0.880 | 0.024 |
| LRsocA | social class E | 0.020 | 0.003 | 0.000 | 0.921 | 0.000 | 0.206 | 0.316 | 0.296 |
| LRsocB | social class E | 0.138 | 0.000 | 0.000 | 0.043 | 0.003 | 0.000 | 0.000 | 0.000 |
| LRsocC1 | social class E | 0.367 | 0.001 | 0.000 | 0.082 | 0.012 | 0.007 | 0.020 | 0.314 |
| LRsocC2 | social class E | 0.142 | 0.000 | 0.000 | 0.158 | 0.005 | 0.006 | 0.014 | 0.006 |
| LRsocD | social class E | 0.254 | 0.250 | 0.032 | 0.575 | 0.221 | 0.026 | 0.035 | 0.060 |
| LRreligionC | Protestant | 0.597 | 0.425 | 0.599 | 0.580 | 0.074 | 0.083 | 0.101 | 0.528 |

Not surprisingly, the most important determinant of physical activity, including sport participation, is age. The most positive impact was found in the 25-34 years age bracket, followed by the age groups 35-64 and 16-24. Belonging to the age group 65+ implies a higher probability of not being sufficiently active (ACTIVE 1) than belonging to any other age group.

Sport continues to be stratified by socio-economic status, with the higher socio-economic classes (social class A, B, C1 and C2) and those with a higher education (University Degree) being more highly represented within the sporting community. Free time may be another important factor to reflect on alongside socio-economic status (SES), as being a housewife (or househusband) appeared to have a positive relationship with being physical activity (ACTIVE 1) and having a healthy lifestyle (MODEL CITIZENS).

In many respects, these results were predictable but with regard to lifestyle factors, a more complex picture starts to emerge. Overall, the analysis did indicate a significant positive relationship between healthy eating (five or more portions of fruit and vegetables per day), physical activity (ACTIVE 1, 2, 3 and 4), health (VERY GOOD HEALTH, HEALTH & SPORT) and happiness, but at the same time a number of other interesting associations were revealed. For example, there was a positive relationship between smoking and achieving the recommended levels of physical activity (ACTIVE 1), confirming the results described earlier (Chapter 5: Section 5.11) where smokers were more likely to be involved in manual labour, thereby gaining activity from the work domain while simultaneously damaging their health by smoking. In terms of

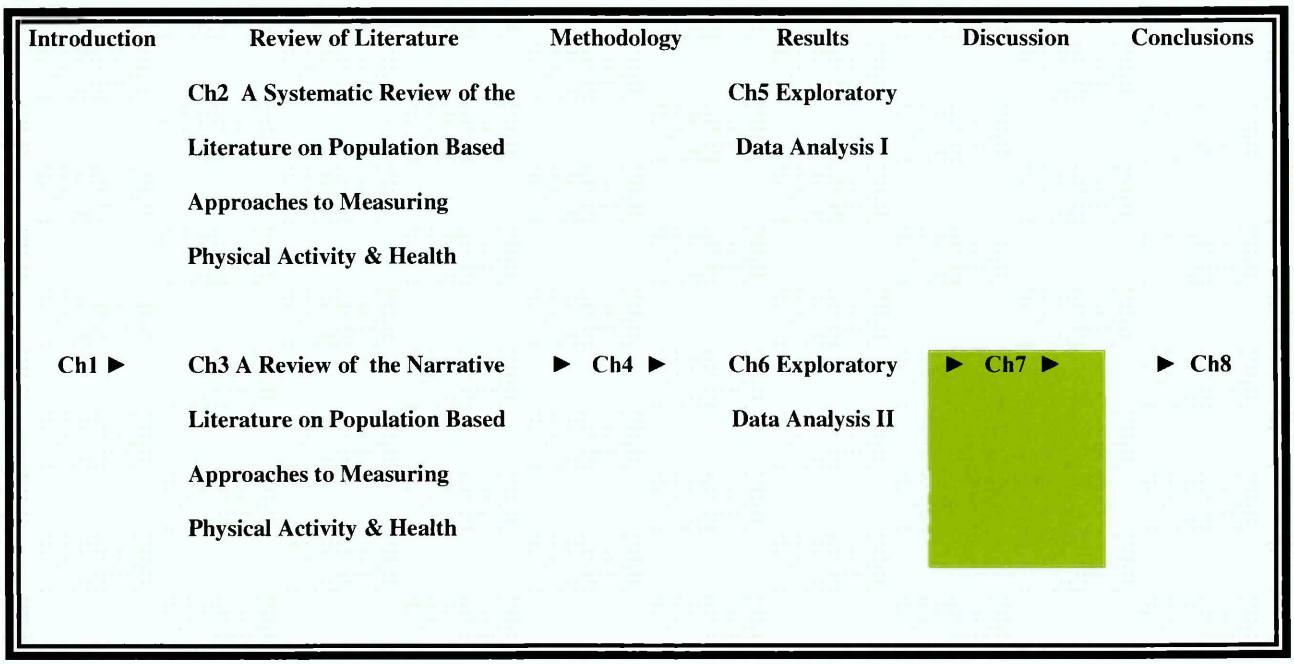
perceived well-being and happiness, those who were often more likely to be at greater risk in terms of lifestyle were not necessarily those who perceived their lifestyle to be problematic. This may mean greater resistance to health promotion campaigns among certain communities who do not recognise a problem, and the design of initiatives should take these perspectives into account.

Other key findings relate to disability status and location; where the effect of having a disability and living in urban areas appears to have a negative impact on physical activity (ACTIVE 1), health (MODEL CITIZENS, VERY GOOD HEALTH and HEALTH & SPORT). In terms of employment status; being retired appears to have a negative impact on being sufficiently active (ACTIVE 1) and sport participation (ACTIVE 2, 3 and 4).

It can be seen from this chapter that future research into physical activity behaviours, and subsequent interventions should be planned in light of demographic variations, rather than develop a 'one size fits all' programme, which may prove ineffective and wasteful in terms of time, effort and resources much of which is scarce at the present time. It should also be noted at this stage that a number of significant relationships have been highlighted and further opportunities for more complex modelling of variables remains an opportunity for the future but was beyond the scope of the thesis. A full discussion of results, including comparisons with other surveys and reflection with the literature reviews, will be presented in Chapter 7

# CHAPTER 7: DISCUSSION

## Road map of the thesis



## 7.1 INTRODUCTION

The primary objective of the current research was to quantify accurately levels of physical activity amongst the adult population (16 years +) in Northern Ireland in order to investigate their relationship with various measures of health and wellness and to explore implications for future initiatives designed to increase physical activity levels and improve health.

This chapter will now reflect on these findings within a broader policy context, as well as exploring limitations of the research and possible opportunities for further research. More than anything else, the project has been an interesting journey, professionally, personally and academically, and along the way has been revealing of many new facets of the measurement of physical activity, and how data can best inform emerging policy in this field. The dataset itself probably represents the single most important output from the project, and while a number of interesting dimensions have already been explored within this dissertation and its related publications (Murphy *et al.*, 2012; Breslin *et al.*, 2013; Neville *et al.*, in press), a number of other lines of enquiry remain to be considered.

In very general terms, previous large scale surveys have yielded valuable information about physical activity and health related behaviours without always nuancing complex relationships between interacting variables. By way of example, they have shown that generally speaking older people, those with low educational attainment and lower social status are among the least likely to participate despite the recognised health benefits of physical activity (Hopkins *et al.* 1991; Martínez-Gonzalez *et al.*, 1999; Turk *et al.*,

2001; Kerner & Kurrant, 2003; Craig *et al.*, 2004; Department of Health., 2004) Haskell *et al.*, 2007; Tzuo *et al.*, 2006; McGrady *et al.*, 2007; Department of Health, 2011).

While these general trends are important to acknowledge, this previous research is not without inherent limitations and especially in terms of methodology. Public health policy in the UK, and including Northern Ireland, recognises the strategic significance of devising strategies for converting awareness of the need for physical activity into actual participation. However, before these intervention strategies can be put in place there was is a need to establish robust and reliable data on current physical activity levels and in the past the reliability and validity of some data was questionable. To remedy this deficit, in recent years, the Sports Councils for England, Scotland and Wales, and their relevant government departments, designed sophisticated research instruments that capture participation data at both a regional and national level (e.g. Active People Survey) but in Northern Ireland the last attempt to capture such information was nearly 20 years ago, in 1994.

The current survey (SAPAS) was designed and conducted in light of this shortcoming and the need for a sophisticated evidence base that would identify baselines and track progress over time. In this chapter, the results of SAPAS will be discussed in the context of data from this and other surveys where applicable, and in accordance with the research objectives of the study. In Chapter 3, five objectives were identified, and these will be used to help provide a coherent structure to the discussion. Relationships between variables will also be reflected upon, and used to suggest how strategic policy initiatives can be devised to have a significant impact on health and wellness across a

diverse population. While these issues will be set primarily in the context of Northern Ireland, implications for other populations will also be explored.

## 7.2 RESEARCH OBJECTIVES: MAIN FINDINGS

**Objective 1** **To derive an appropriate research instrument that will gain acceptance with stakeholders in the form of a national baseline survey of physical activity in Northern Ireland.**

**Designing a New Research Instrument: What Does the Existing Evidence Say?**

As highlighted in Chapter 2: Section 2.7, and at the risk of being repetitive, any systematic review has the potential to overload the researcher by the sheer volume of information that can be generated, with the key messages lost beneath the detail provided. The review related to this study was no exception, with 565 articles deemed eligible for inclusion at the outset.

From the literature review, it was obvious that despite the considerable effort that has been expended in the last decade, particularly in the US and UK, there are limited opportunities for drawing comparisons across physical activity surveys. Most studies included in the reviews measured physical activity by questionnaire but there was little or no consistency in either the instruments used or the methodology employed. For example, questionnaires have been either self-administered or administered by an interviewer and are variable in length and complexity (See Chapter 2: Section 2.5.2 for further details relating to the 24 survey instruments reviewed). This is not necessarily to suggest that any one survey sets the gold standard. Instead, the reality is that

commissioners of each survey had different objectives and resources available to them and did not set out to produce data that could be directly comparable with other data sets.

Of particular concern, the systematic review revealed that many national surveys, categorised across three geographical locations (US, Other Countries and the UK), had not been designed to rigorously measure physical activity levels across all four key life domains (home, work, travel, and sport/leisure) thereby providing an accurate indication of an individual's total physical activity over time. This measurement issue has been recognised in the past but not always remedied (Lawlor *et al.*, 2002; Bouslaugh *et al.*, 2005; Poortinga *et al.*, 2007).

Furthermore, the systematic review revealed little consistency in approach across each of the three identified regions (US, Other Countries and the UK). For example, US studies tended to assess leisure time physical activity (LTPA) only (Anderson *et al.*, 2001; Patterson *et al.*, 2004; Zhu *et al.*, 2004; Reeves and Rafferty, 2005; Berrigan *et al.*, 2006; Swan *et al.*, 2008); while studies in other countries have measured physical activity in quite different ways, such as combining physical activity across all life domains (e.g. Zaletel-Kragelj *et al.*, 2006, Hillsdon *et al.*, 2001; McGrath *et al.*, 2007); or only considering LTPA and activity that is undertaken at work (WRPA) (e.g. Lissner *et al.*, 1996; Guitiérrez-Fisca, 2003). This variability often makes it difficult to establish baseline activity levels, and thereby draw hard and robust conclusions about how physical activity precisely reflects in health and wellness. The issue of variability has already been discussed extensively in Chapter's 2 and 3.

**Measuring Health and Wellness**

Critically, to the present research, the majority of studies included within the systematic review had not investigated physical activity in association with one or more health and wellness variable (e.g. smoking habits, alcohol consumption, fruit and vegetable consumption, self-reported BMI, perceived health and happiness) (See Chapter 2: Table 2.9). Indeed, only eight studies had done so which is understandable given different research agenda's that were prevalent at that time (Fentem & Mocket, 1998; Turk *et al.*, 2001; Guitiérrez-Fisca *et al.*, Zhu *et al.*, Reeves & Rafferty, 2005; Lan *et al.*, 2006; Duvigneaud *et al.*, 2007; Poortinga *et al.*, 2007).

Superficially, while these latter studies do appear to have assessed physical activity along with health and wellness variables (see Chapter 2: Table 2:14), a more in-depth review confirmed that the apparent similarities are outweighed by the methodological differences between each survey, rendering comparisons problematic. For example, Fentem & Mocket (1998) used findings from the ADNFS (1992), including measures of height, body weight, waist and hip girths, to explore differences between reported levels of habitual activity whereas Gutiérrez-Fisac *et al.*, (2002) used data from the Spanish National Health Survey (1993) to explore the association of work-related physical activity (WRPA) and leisure time physical activity (LTPA) with self-reported BMI.

It is perhaps no surprise that the systematic review encountered difficulties when attempting to extract full details relating to each national survey. In fact, it was often necessary to dig beyond the academic paper itself to reveal information contained

within the original survey report. Eventually, it was determined that all of the studies included in the final review (64) were primarily based on self-reported physical activity and secondary analysis of a subset of variables extracted from a larger dataset but often it was not possible to be 100% certain that the articles revealed all variables measured. The systematic review also highlighted just how varied were the survey techniques previously used to measure physical activity over the last 25 years. With reference to the definitions of key terms presented in Chapter 1: Section 1.6, there is precious little evidence to suggest a cumulative effect, with successive surveys systematically building on earlier work and thereby moving towards the application of standard taxonomies of either physical activity (broadly defined) or related health and wellness indices. Instead, the landscape that is portrayed in one that is ever changing, with some surveys characterised by narrow and rigid criteria (e.g. BRFSS, 2001; NHIS; 1997) while others appear more liberal in including many forms of activity (e.g. walking to and from transit) that could be included a physical activity dimension.

As highlighted in Chapter 3, the need for a narrative literature review is not always paramount as searches of academic databases will uncover all relevant material. However, in relation to physical activity it was apparent from an early stage that a considerable number of significant population surveys did not feature in peer reviewed papers and were therefore effectively invisible to the systematic review process. On this basis, the decision was taken to carry out a complementary review of the narrative literature, but on this occasion relying on more traditional literature searching procedures. While this review was necessarily less 'systematic' than that described in Chapter 2, it did usefully supplement the earlier findings and thereby yield a deeper and

more holistic understanding of the full spectrum of physical activity and health research, critically including how this has impacted on actual policy development in Northern Ireland and internationally.

Many of the large scale surveys reviewed (e.g. Canadian Fitness Survey, 1981; Active Australia Survey, 1987; Continuous Household Survey, 1983-2008; Northern Ireland Health & Activity Survey, 1992; BRFSS, 2000, 2001, 2003; Active People Survey 2005), did show signs of becoming more rigorous in their design and execution, and therefore yield some useful data but the persistent issue of consistency between each survey remains unresolved, thus once more limiting opportunities for direct comparison. Despite these research limitations, the UK's home countries have forged ahead in reaching broad agreement as to what levels of physical activity may yield positive health benefits (Department of Health, 2004; Department of Health, 2011). However, from a policy perspective in order to assess whether these performance indicators and targets are met over coming years it is imperative that more sophisticated research instruments are developed, standardised and used internationally, in order to yield comparative data. SAPAS was designed to meet these ambitious goals and in many respects represents this new generation of physical activity surveys that will genuinely marry theory, policy and practice.

**Contribution to Knowledge 1**

The *systematic review* revealed that many national surveys, across three geographical locations (US, Other Countries and the UK), were designed to measure physical activity levels but in different ways. However, none of surveys were designed to robustly measure physical activity levels in all of the four life domains (home, work, travel, and sport/leisure) in order to provide an accurate indication of an individual's total physical activity. It also presented some difficulties when attempting to extract full details relating to each national survey within the articles (64) considered being the most relevant to the study. In fact, it was often necessary to go beyond the academic paper being reviewed and to cross-reference with the information contained within the original survey report.

Many studies included within the systematic review did not investigate levels of physical activity and its association with one or more health and wellness variables (i.e. smoking habits, alcohol consumption, fruit and vegetable consumption, self-reported BMI, and perceived health and happiness).

Based on the evidence, there was no 'gold standard' of best practice for SAPAS to replicate and that the best that was hoped for was an *optimum solution* based on the objectives of the research, the resources available, and the lessons learned for similar previous studies . It was on this basis that SAPAS was designed, developed and used as a *new research framework* for measuring (1) physical activity levels[53] and (2) the health and wellness of the Northern Irish adult population.

[53] Consistent with the Chief Medical Officers Physical Activity Recommendations

**Objective 2** **To quantify the physical activity levels amongst the adult population in Northern Ireland in the four domains of home, transportation, work, and sport/leisure relative, and to assess this activity against the UK Chief Medical Officer's recommendations.**

## Importance of Measuring Total Physical Activity Levels

This research objective was driven by the realisation that none of the surveys reviewed robustly measured physical activity levels across all four life domains, specifically home, transportation, work, and sport/leisure. A policy of excluding one or more life domains from the measurement of adult physical activity levels is likely to lead to an underestimate of adults meeting physical activity guidelines (Bouslaugh et al, 2005; Lan *et al.*, 2005; Ku *et al.*, 2006).

The literature review also revealed that large scale, population surveys remain the most popular research instrument in this field and that, when properly designed and administered, have the potential to measure effectively, among other things, energy expenditure, physiological fitness, quality of life and health maintenance (Paffenburger, 1993, McAuley, 1994; Janz, 2006).

As described in Chapter 3, while many large scale surveys have been carried out not all have successfully captured the complexity of human behaviour and experience. In the case of existing 'sport' data, it often it has been limited simply to describing 'who does

what and where'. While such surveys, including the CHS, can reveal disparities between various groups of people and their likelihood of engaging in sport and physical activity, they fail to go beyond this in exploring complex relationships between personal and demographic variables. That said, the findings from these surveys are broadly consistent and confirm that:

- Men tend to have higher participation rates especially in organised sport but also in general activity than women;
- People with a limiting longstanding illness (proxy for 'disability') have lower participation rates their able bodied counterparts; and
- Older people (50 years +) tend to have lower participation rates than younger people.

What the surveys cannot reveal are the questions beyond the simple 'who, what and where', such as factors that may impact on why people may or may not choose to exercise, and the circumstances that conspire together, structurally and psychologically, to present obstacles to participation. SAPAS was designed to help explore these more complex associations more thoroughly than previous research.

**New Physical Activity Guidelines 2011**

Alongside these methodological considerations, at a strategy or policy level, SAPAS was being developed at a time when the UK physical activity guidelines were about change (July 2011). It was clear that SAPAS had to be designed to capture data as

robustly as possible to ensure that the dataset was sufficiently malleable to capture data relevant to this change, and possible changes in the future. As it happens, this turned out to be the case in 2012, when the SAPAS dataset was re-analysed by a number of researchers, including the author of this thesis, to determine the contribution of walking to total weekly physical activity and to explore the relationship between the volume and intensity of walking and leanness in the Northern Ireland population (Murphy *et al.* 2012). A headline finding from this study was that 42.7% of the population in Northern Ireland achieved the current physical recommendations for physical activity of 150 minutes moderate to vigorous intensity physical activity (MVPA) per week (Department of Health, 2011) as opposed to the 34.5% reported against the previous recommendations[54] (Department of Health, 2004). This point reinforces the strength and capacity of SAPAS to adapt to an every changing policy environment.

In summary, despite evidence to suggest some improvement in activity levels, in common with many other western countries, there remains a strong imperative to increase physical activity levels across the population as a whole. Government in Northern Ireland as elsewhere recognises this priority, and while existing research gives some indication of general trends and increasingly low levels of activity across the board, the instruments that have been used to date have limited power to explore the complexities of this aspect of human behaviour. In other words, the case for developing a new research instrument is compelling.

[54]Adults should achieve a total of at least 30 minutes of moderate intensity physical activity on five or more days of the week.

**The Northern Ireland Sport and Physical Activity Survey 2010 (SAPAS)**

Overall Physical Activity Levels

As detailed in Chapter 5: Section 5.3, the results of this current study showed that 34.5% of Northern Ireland's adult population achieved the levels of physical activity as recommended by the Chief Medical Officer. Unfortunately, this finding could also be described another way, almost two-thirds of the Northern Ireland's adult population did not achieve the recommended levels and as such did not accrue any of the health enhancing benefits that are a by-product of active lifestyles (See Chapter 3). This finding is generally consistent with results from other surveys carried out across the UK over the last five years (Townsend *et al.*, 2012) . (See Table 7.1.). However, a review of more recent available data suggests an equally worrying picture. Hallal *et al.* (2012) reported that 31% of the adults worldwide population (15 years or older) from 122 countries are physically inactive, with proportions ranging from 17% in southeast Asia to about 43% in the Americas and the eastern Mediterranean. Similarly, the Pan-EU survey on Consumer Attitudes to Physical Activity, Body Weight and Health (Pan-EU, 1999) reported that 31% of respondents throughout 15 member states did not participate in any physical activity (range between countries: Finland: 8%., Portugal: 40%). If both of these findings are taken at 'face value', then it would suggest that physical activity levels of the adult population in Northern Ireland are behind the rest of the world.

**TABLE 7.1: SUMMARY OF HEADLINE FINDINGS FROM RECENT SURVEYS IN THE UK DESIGNED TO MEASURE ADULTS PHYSICAL ACTIVITY LEVELS**

| SURVEY INSTRUMENT | COUNTRY | % ACHIEVING PHYSICAL ACTIVITY RECOMMENDATIONS | | |
|---|---|---|---|---|
| | | Overall | Men | Women |
| **Health Survey for England 2008** | England | 34% | 39% | 29% |
| **The Scottish Health Survey 2010** | Scotland | 39% | 45% | 33% |
| **Welsh Health Survey 2010** | Wales | 30% | 37% | 24% |
| **SAPAS 2010** | Northern Ireland | 34.5% | 36% | 35% |

### Main Sources of Physical Activity

The most relevant domain which contributed to total physical activity levels was the 'home' (See Chapter 5: Section 5.4). On average, 173 minutes of at least moderate intensity activities were spent at home with housework being the most important contributor. (112 min.). The 'work' domain came second with 150 minutes, with manual labour (99 min.) and walking (42 min.) reported as being the most important activities while at work. Interestingly, 'sport' came third with 87 minutes, followed by 'getting about' activities. In support of these findings, Lawlor *et al.* (2002) highlighted the importance of 'everyday' activities such as commuter walking and cycling as well as heavy housework in helping people to achieve physical activity recommendations. In their study, they found that when domestic activities were included in the assessment of

physical activity levels over two thirds of elderly British women were reaching recommended levels of physical activity and that this was mainly achieved through participation in 'heavy housework'. Similarly, Bouslaugh *et al.* (2005) reported that the then existing policy of excluding workplace activity in the definition of physical activity led to an underestimation of adults meeting CDC guidelines, especially among men. In this study, a fairly conservative rule for translating workplace activity into units of moderate physical activity resulted in an absolute increase of 5.5% and a percentage increase of 25.5% in participants meeting the CDC standard for moderate physical activity, confirming Bouslaugh *et al.*'s estimation. Finally, it has not been surprising to find that 'getting about' made the least significant contribution to overall physical activity levels in Northern Ireland. At least two researchers have reported that although active transportation can be beneficial for health and the environment, its promotion should not disregard unintended effects such as pedestrian and cyclist safety (Manson *et al.*, 1999; Anderson *et al.*, 2000). This point is particularly relevant for those charged with developing and implementing transportation policies and interventions in Northern Ireland where there is specific need to ensure that there is an appropriate infrastructure is in place that can enable safe travel routes to and from schools, home and the workplace, and that there are effective communication strategies that encourage more active and healthier modes of travel, such as cycling and walking.

Interestingly, there was no significant difference with regard to the proportions of each *gender* that met the physical activity recommendations of the Chief Medical Officer (M:36%, F:35%); however, the 'gender gap' does become very evident when the total time men (557 min) and women (394 min.) spent on physical activities of at least

moderate intensity is compared. This in itself is a very interesting finding given what has been reported in other major surveys over the last 25 years. In 1994, MacAuley carried out a review of adult physical activity participation in national and international contexts and cited that males are generally more active than females with a decrease in physical activity with decreasing age. The review focussed on two thresholds of activity; the proportion in each sample who appear to have no leisure time physical activity, and those who appear to participate in vigorous physical activity at a level considered sufficient to confer cardio-vascular benefit. In this paper, MacAuley (1994) reported key findings from the Allied Dunbar National Fitness Survey (1992) (see Chapter 3: Section 3.7 for further information on this survey) which measured activity and fitness in the adult English population from a representative sample of 6,000. This was a high quality study with a sound methodology that examined physical activity in great detail and included details of leisure, home and work activity. The study concluded that 7 out of 10 men and 8 out of 10 women fell below the age-appropriate activity level necessary to achieve a health benefit. Similar findings were also reported against other large-scale surveys included in the literature review (e.g. Change of Health Baseline Clinical Survey Study 1988, two surveys in 1986-7; the Diet, Lifestyle and Health Study and the Change of Heart Survey; and, the Continuous Household Survey 1983 – present), highlighting that disparities in participation by gender was and to some extend is still a global issue. The finding that that there is no significant difference in the proportion of men and women achieving the CMO's physical activity recommendation would suggest that, when taking into account all four life domains, either women of today may be more physically active or that SAPAS, as a surveillance tool, has been more effective than the aforementioned surveys in attempting to

accurately quantify adults' total physical activity levels. However, it is also worth noting that MacAuley (1994) did indeed flag up the possibility of under-representation on women's participation by highlighting some concerns with the lifestyle surveys included in his review:

> Each of these studies contributes to understanding the overall pattern of physical activity in the British Isles but each uses a different methodology and, in particular, uses a different question in relation to physical activity.....Participation among females may be underestimated and, due to difficulties in comparing results using different methodologies, it is not possible to determine regional variations.
>
> [MacAuley, 1994, page 230]

A more detailed analysis of the data revealed that men spend more time on 'work' activities (M:239 min., F:66 min.), 'sport' (M: 116 min., F:59 min.) and 'getting about' activities (M:70 min., F: 56 min.). In contrast, activities in the home contribute more to women's overall physical levels (M: 132., F: 213 min.). As regards sport participation, the effect of gender is similar here as across a number of studies where it has been reported that men are considerably more likely to participate in sports than women (Alexandris and Carroll, 1997; Berger et al, 2008; Farrell and Shields, 2002; Humphreys and Ruseski, 2007; Robertson and Emerson, 2010; Seabra *et al.*, 2007; Taks and Scheerder, 2006) and similar findings were reported by Turek *et al.* (2000) after they carried out a large cross sectional survey to assess health attitudes, knowledge, behaviour and risks in the post-war Croatian population. In this study, the researchers reported that the pattern of physical activity in the 'home' differed by gender where women were more involved in light and medium activities (6-7 hours per week), while men more likely to perform heavy or very heavy activities (7-9 hours). As regards, leisure-time physical activities, the researchers also reported that men were involved in activities for a longer period of time than women (M:4-5 hours per week., F: 3-4 hours

per week) and in activities which were of a higher intensity (heavy – very heavy activities; M: 4-5 hours per week., F: 2-4 hours per week).

With regard to *age* groups, the proportion of adults in Northern Ireland who met the Chief Medical Officer's physical activity recommendations peaked in the age group 25-34 (47%). As people grow older, so significantly less time was spent on physical activity (35-44 y.: 44%, 45-54 y.:40%, 55-64 y.:29%, 65 + y.: 19%). Similar findings were reported by Haskell *et al.* (2007) that for men and women combined, younger people were likely to be active than older people, with the prevalence of those meeting the CDC physical activity recommendations in the US declining from 59.6% among those 18-24 years of age to 39% among those 65 years and older.

In contrast to these findings, Ku *et al.* (2006), following a nationally representative study of leisure-time physical activity patterns of Taiwanese adults, reported concerns surrounding the low prevalence and recent decline in physical activity in the 20-44 year old age group, but also reported that people aged 45 and older were more likely to be active than younger people. This may be attributable to culture-specific physical activities, such as Tai Chi, which are common among older people in southeast Asia. These types of activities are practised daily, originating in the collectivistic traditions of these cultures. More recently, this finding was reinforced by Hallal *et al.* (2012) who reported that adults aged 60 years or older from southeast Asia are much more active than are individuals of the same age from all the other World Health Organisation's regions, and are actually more active than young adults (aged 15-29 years) from the Americas, the eastern Mediterranean, Europe, and the western Pacific.

As expected, age-related physical activity across the four domains (home, work, sport and getting about) varies substantially between age groups. The time spent on sports activities peaked in the 16-24 years age group (138 mins.) and significantly decreased with age (25-34 y.: 117 mins., 35-44 y.: 96 mins., 45-54 y.: 53 mins., 55-64 y.: 53 mins., 65 + y.: 53 mins.). These findings are consistent with those found in previous studies (Berger *et al.*, 2008; Humphreys and Ruseski, 2009; Van Tuycknom and Scheerder, 2008). However, what was particularly interesting was the finding that physical activities undertaken within the 'home' or at 'work' contributed most to the average time spent on at least moderate intensity activity across all age groups, with the exception of adults who were 65 years and older where activities undertaken within the 'home' was by far the single greatest contributor (149 mins.).

As regards *location*, the systematic and narrative literature reviews did not identify this seperately as a variable against which to measure physical activity levels and therefore it is not possible to reflect the findings of the current study against that of other research. The key finding from this study was that adults who lived in rural areas in Northern Ireland were significantly more active than those who lived in urban areas (Rural: 41%, Urban 34%) and this difference corresponds to a significant gap with regard to the total time spent on relevant activities (Rural: 564 mins, Urban 453 mins.) The main differences stem from the home domain (Rural: 228 mins., Urban 161 mins.) and especially in the work domain (Rural: 201 mins, Urban: 139 mins). One probable explanation for this finding is that adults, particularly men, living in rural areas are more likely to work at jobs requiring strenuous labour ('manual labour) and walking about while at work. When considering the relationship between socio-economic deprivation

of an area and levels of physical activity, the picture becomes much more complex. In this study, no significant difference was found between the proportions of adults achieving the Chief Medical Officer's physical activity guidelines when comparing Northern Ireland's most deprived areas (bottom third: 36%) with the least deprived (top third: 37%). Again, one plausible justification for this finding is that while sport participation is higher in Northern Ireland's least deprived areas (least deprived: 91 mins., most deprived 85 mins.) the relevance of physical activity at work is higher within deprived areas (least deprived: 130 mins., most deprived 174 mins.).

Concerning economic indicators (*social class*, *personal income* and *employment status*), the proportion of adults from higher social classes who met the Chief Medical Officer's physical activity recommendations was significantly larger among higher social classes (ABC1: 38%., C2DE: 34%) and when the sources were considered it was revealed that the 'sport' domain contributed more to the total amount of time spent in physical activities in higher social classes (ABC1: 180 mins., C2DE: 105 mins.) whereas the 'work' domain activities contributed much more significantly in lower social classes (ABC1: 120 mins., C2DE: 180 mins.). These findings are consistent with previous research which has reported that people from lower socio-economic backgrounds are more likely to meet the weekly recommendations of overall physical activity, even if they are less likely to engage in more formal sports and leisure time activities (Macintyre and Mutrie, 2004; Poortinga 2006a, Popham and Mitchell, 2006).

A significant relationship was found between *personal income* and achieving the Chief Medical Officer's physical activity recommendations (e.g. under £10,000: 67 mins.,

over £35,000: 134 mins.). Similarly, a significant relationship was also found between *employment status* and achieving the recommended levels (working full time or part time: 42%., unemployed: 28%., students: 26%., retired: 21% ). Previous research has shown that people who are physically active have higher levels of education, employment and higher incomes than those who are not physically active (Brown *et al.*, 2005; Berger *et al.*, 2008; Humphreys and Ruseski, 2009; Ifedi, 2008; Breuer *et al.*, 2011) which is also borne out by the results of this study.

When *disability status* was considered, adults in Northern Ireland who have a disability were significantly less active that those without a disability (disability: 22%., without a disability: 39%). Furthermore, there were significant relationships between having a disability and the average time adults spent on at least moderate intensity activities in the 'sport' domain (disability: 46 mins., without a disability: 100 mins.), 'getting about' domain (disability: 28 mins., without a disability: 74 mins.), 'work' domain (disability: 61 mins., without a disability: 177 mins.). Interestingly there was no significant relationship with regard to the 'home' domain (disability: 157 mins., without a disability: 178 mins.) where it appears that activities in the 'home' were by far the most important contributor to overall physical activity among people with a disability in Northern Ireland. Similar findings were found by Brown *et al.* (2005). They discovered that 29% of older adults with a disability and 43% without a disability in the US reported that they obtained the recommended amount of physical activity. In a review chapter on physical activity and persons with disabilities, Health and Fenton (1997) pointed out that:

> People with disabilities are less active and have a lower work capacity than persons without a disability and that an inactive lifestyle compounds the effects of the disability.
>
> [Page 195]

Conversely, Rimm *et al.* (1996) estimated that one third of the US population had a disabling condition when disability was broadly defined and suggested that many of the conditions could be improved with increased physical activity.

These findings should have strong implications for public health policy in Northern Ireland where it would appear there is a pressing need to ensure that adults are supported to be active and healthy in all aspects of their life, particularly in their later years. Evidence from this study would suggest that there is an urgent need to develop specific interventions targeted at different settings (homes, workplaces), and populations (e.g. older adults, people with disabilities) aimed at increasing the contribution of all four life domains to time spent in at least moderate intensity physical activity.

In support of this recommendation, Heath *et al.* (2012) carried out a review of physical activity interventions as published between 2000 and 2011, and used this research to identify effective, promising, or emerging interventions from around the world. They recommended a number of specific approaches for encouraging people to be more active, including: (1) informational approaches - community wide and mass media campaigns, and short physical activity messages targeting community sites; (2) behavioural and social approaches - introducing social support for physical activity within communities and workplaces, and school-based strategies which encompass physical education, class room activities, after-school sports, and active transport and lastly (3) environmental and policy approaches - including the creation of access to

places for physical activity with informational outreach activities, active transport policy and practices (e.g. safe routes to school/work). This review suggests that many approaches may lead to acceptable increases in physical activity among people of various ages, and from different social groups, countries and communities. The challenge for policy makers and practitioners in the context of Northern Ireland is whether or not they are willing to commit the time, effort and resources to design and implement 'specific' approaches that are aimed at increasing levels of physical activity and improving health and wellness within targeted communities. A 'one-size-fits-all' approach is clearly inappropriate and will not address the complex needs of a diverse population who already accumulate exercise in different contexts and who should be encouraged to tailor lifestyles to incorporate more physical activity within these existing lifestyle parameters.

**Contribution to Knowledge 2**

SAPAS, as a monitoring tool, has been designed to adapt to an every *changing policy environment* in terms of measuring physical activity levels of the Northern Irish population. For example, Murphy *et al.* (2012) conducted secondary analysis on the SAPAS data to identify the proportion of the adult Northern Irish population achieving the new physical activity guidelines. As far as the author is aware no other population based survey exists with this capability.

In terms of *socio-economic status*, the proportion of adults who met the Chief Medical Officer's physical activity recommendations was significantly larger among higher social classes. When the sources of physical activity were considered this study revealed that the 'sport' domain contributed more to the total amount of time spent in physical activities in higher social classes, whereas the 'work' domain activities contributed much more strongly in lower social classes.

When *disability status* was considered, adults in Northern Ireland who have a disability were significantly less active that those without a disability. Interestingly there was no significant relationship with regard to the 'home' domain where it appears that activities in the 'home' were by far the most important contributor to overall physical activity among people with a disability.

As regards *location*, the study revealed that physical activity levels are influenced by urban and rural location and that the mix of physical activity varies significantly by the domain in which physical activity is undertaken.

The findings from this study also confirms that LTPA on its own underestimates total physical activity levels and that, for the most part, is a minority contributor to total physical activity levels of the adult population in Northern Ireland.

**Objective 3** **To identify the characteristics associated with physical activity levels and their relationship with physiological measures such as self-reported height and weight (in order to compute BMI); lifestyle factors such as smoking, alcohol consumption and healthy eating habits; and perceived health and happiness measures.**

The previous section described significant differences and relationships between physical activity levels (across four life domains) and a selection of demographic variables.

This research objective was driven by the evidence base which suggests that four of the main preventable causes of morbidity and mortality (smoking, excessive alcohol abuse, an unhealthy diet, and insufficient physical activity) are not randomly distributed across the population, but occur in combination with one another (Chiolero *et al.*, 2006; Poortinga, 2006b). Most associations between lifestyle risk factors are positive, however, recent research suggests that physical activity can be negatively associated with smoking and heavy drinking (Poortinga, 2006b). Therefore, in light of this evidence the current research provided an opportunity to explore the range of possible associations of physical activity (across four life domains) with smoking, alcohol consumption and other health and wellness characteristics.

As highlighted previously, this study found that just over a third (34.5%) of Northern Ireland's adult population achieved the levels of physical activity recommended by the Chief Medical Officer of participating in at least moderate intensity activities for at least

30 minutes on at least five days per week. However, further analyses revealed interesting associations when physical activity (across four life domains) and six health and wellness variables (self-reported health and happiness, smoking, alcohol consumption, healthy eating, self-reported BMI) were explored.

**Self-Reported Health and Physical Activity**

As regards *self-reported health*, the systematic and narrative literature reviews did not identify this separately as a variable against which to measure physical activity levels and therefore it is not possible to reflect the findings of the current study against that of other research. The findings for the current study revealed that the relationship between physical activity and self-reported heath status was highly significant, with the proportion of adults in Northern Ireland who met the Chief Medical Officer's physical activity recommendations decreasing almost linearly with the respondent's self-assessment of their health (very good: 44%, good: 37%, average: 30%, poor: 22%, very poor 7%). Health was also found to be strongly correlated with many demographic variables which potentially impact on the health status of an individual (e.g. age). Respondents who reported their health as 'very good' were significantly more active than those with an 'average' self-reported health status in the 'sport' domain (very good health: 130 mins., average health 50 mins.) and the 'getting about' domain (very good health: 89 mins., average health 39 mins.) However, beyond these initial findings, further scrutiny revealed more complex relationships. For example, the relationships between self-reported health and time spent being active in the 'work' and 'home' domains were only significant when adults who reported 'very good' health were

compared with those who described their health as 'poor'. This would suggest either that differences are confined to those who have more extreme opinions on their health status, or it may reflect the questionable reliability of self-report measures of health status, but without further research it is not possible to determine which explanation is most valid. With this in mind, it is worth noting that the comparability of self-reported measures across groups of individuals has been questioned in a number of previous studies (Groot, 2000; Sen, 2002; Lindeboom and Van Doorslaer, 2004).

**Smoking, Alcohol Consumption and Physical Activity**

As regards *smoking* and *alcohol consumption*, respondents who smoked (smokers: 38%, non-smokers: 34%) and/or consumed more alcohol (more than recommended limits: 40%, within recommended limits: 35%) than recommended by the Public Health Agency, were, on average, more active than others. However, this finding must be treated with caution as both physical activity and smoking and drinking habits were significantly different in demographic subgroups. For example, in relation to smoking, when analysing the data by age groups, the positive relationship between smoking and meeting recommended levels of physical activity was only significant in the youngest subgroup (16-24 y. smokers: 40%; 16-24 y. non-smokers: 27%). Interestingly adults who consumed alcohol more than the recommended limits spent significantly more time on relevant 'sport' activities (more than recommended limits: 110 mins., within recommended limits: 86 mins.) and 'work' activities (more than recommended limits: 203 mins., within recommended limits: 147 mins.) and when gender differences was considered the only significant relationship between alcohol consumption and achieving

the physical activity recommendations was for men. The results of the current study also show a significant relationship between sports club membership and alcohol consumption (more than recommended limits: 31%., within recommended limits: 22%). This may be predictable in some respects, given the social side of sports clubs, but the finding does contrast with previous research which generally notes a positive association between lifestyle risk factors, in particular between smoking and drinking (Castro *et al.*, 1989; Bien and Burge, 1990; Revicki *et al.*, 1991; Jenson *et al.*, 2003; Chiolero *et al.*, 2006), but are in common with more recent research findings which suggests that physical inactivity is negatively associated with smoking and heavy drinking. Poortinga (2006) found that people meeting the recommended levels of physical activity were more likely to smoke and drink heavily. At the moment it is not absolutely clear why the association between physical activity and smoking and alcohol consumption are positive but one probable reason is related to the social dimension of sport, for example, including people drinking and smoking together after organised sport (Schuit *et al.*, 2002).

An alternative explanation is that the clustering of physical activity with smoking and alcohol consumption reflects the concentration of these risk factors in specific occupational groups (Poortinga, 2006). It may be that people with manual occupations are more likely to smoke and drink heavily, in addition to being more physically active due to nature of their work. Some evidence has been found for the latter explanation, in that smoking is more prevalent among manual than non-manual occupational groups (Graham, 1994; Duncan *et al.*, 1999). However, at the same time, Poortinga (2006) reported that people from lower socio-economic backgrounds are more likely to meet

the weekly recommendations of overall physical activity, even if they are less likely to engage in more formal sports and leisure time activities (Macintyre and Mutrie, 2004; Poortinga 2006a, Popham and Mitchell, 2006). Whether occupation also applies to alcohol consumption is much less clear. While some studies found that heavy drinking is more common with blue-collar workers than among white collar workers (Lynch *et al.*, 1997), others found no clear socio-economic pattern with heavy alcohol consumption (Marmot, 1997; Poortinga, 2006a). Much less support can be found for the 'sport' explanation. Poortinga, (2006a) found that people who regularly join in activities in a range of clubs and organisations are more likely to drink moderate levels of alcohol than people who do not, but are less likely to smoke. This suggests that the 'sport' explanation may help to understand the clustering of physical activity with alcohol consumption, but not with smoking. In 2007, Poortinga, using data from the Health Survey for England HSE, carried out a study to further explore the associations of physical activity with smoking and alcohol consumption. In this study, two types of physical activity were distinguished (i.e. sports activity and occupational activity) and limited support was found for both. The results suggested that the 'sport' explanation may partly help to understand the relationship between alcohol consumption as sports activity and heavy drinking were both common among sports club members (which is consistent with findings from the current study), however smoking was found to be less common among sports club members (which is inconsistent with findings from the current study) and more common among manual occupation groups.

The results of the current study should be of interest to policy makers in the field of public health in Northern Ireland. It has shown that there is a significant relationship

between physical activity, smoking and alcohol consumption and that being sufficiently active alone (i.e. meeting the Chief Medical Officer's physical activity recommendations) will not guarantee that all of the potential health benefits, discussed in Chapter 3, will be realised by adults in the medium to longer term. In particular, a specific intervention may be required to address the issue of 'smoking'[55] and 'excessive drinking' by adults in Northern Ireland who are actively involved in sport and, in particular, are members of one or more sports clubs. The key point emerging from this study is that increased sport participation is not all 'net gain' and that there may be one or more undesirable behaviours (e.g. smoking, drinking) that accompany increases in sport participation.

**Healthy Eating Habits and Physical Activity**

For *diet*, there was a significant relationship between health eating and the proportions of adults in Northern Ireland achieving the Chief Medical Officer's physical activity recommendations (5 or more portions: 40%; less than 5 portions: 31%) and this finding was consistent among almost all demographic subgroups (e.g. age groups, marital status and gender). This finding is consistent with the findings from a previous study by Johnson *et al.* (1998) which suggested that adherence to recommendations concerning diet and exercise are linked. Berrigan *et al.* (2003) investigated the patterns of health behaviours in US adults using data from the Third National Health and Nutrition Examination Survey (NHANES III). In this study, they observed a greater than

[55] Since Monday 30 April 2007 it is against the law to smoke in enclosed and substantially enclosed workplaces and public places, and in certain vehicles. The introduction of this law, which has received overwhelming support across Northern Ireland, protects workers and the public from the serious health effects of second-hand smoke.

expected proportion of people who adhered to recommendations concerning exercise and diet and found a strong association between diet and exercise and compliance with tobacco and alcohol recommendations. This finding is inconsistent with the findings of the current study and what is particularly interesting from a policy development perspective, is the fact that tobacco and alcohol are addictive substances with many social taboos and laws influencing their use, whereas everyone must make behavioural choices concerning diet and physical activity on a daily basis. Therefore, the critical environmental and psychosocial factors influencing adherence to recommendations concerning these two classes of health behaviour are rather different. Furthermore, with reference to the current study, while there is evidence that people who eat healthily tend to be more active, it also needs to be considered that previous research has shown that healthy eating often correlates positively with socio-economic status, and the present research would confirm this trend. For example, the proportion of adults that eat healthily is significantly higher among social classes ABC1 compared to C2DEs, suggesting that socio-economic circumstances may be the key predictive determinant. Adults who ate healthily were also found to be significantly more active in the 'sport' domain (5 or more portions: 100 mins., less than 5 portions: 76 mins.), the 'getting about' domain (5 or more portions: 40%, less than 5 portions: 31%) and the 'home' domain (5 or more portions: 208 mins, less than 5 portions: 146 mins.), although, they were significantly less active in the 'work' domain (5 or more portions: 133 mins., less than 5 portions: 163 mins.). Therefore, the more affluent and educated would appear to be making active choices to take exercise, in contrast to those who have fewer choices but accumulate exercise 'naturally' through their work or because they have access to fewer labour saving devices in the home or have to rely on public transport more often.

**Self-Reported Happiness & Physical Activity**

There was a significant relationship between *self-reported happiness* and physical activity. The proportion of respondents who met the recommended levels of physical activity were significant higher among those who classified themselves as being 'very happy' or 'happy' (very happy: 37%, happy: 35%, unhappy: 28%). The strongest relationship between self-reported happiness and physical activity was found in the 'sport' domain (very happy: 101 mins., happy: 70 mins, unhappy: 37 mins.). This positive relationship was also visible when subgroups were defined by the total time spent in sport activities. For example, the proportion of adults who classified themselves as being 'very happy' increased gradually with the time spent on sport activities per week (no sport or less than 30 mins.: 61%, 30-119 mins.: 66%, 120-239 mins.: 73%, 240 mins or more: 79%). These findings are highly consistent with those found in previous cross sectional studies (Biddle, 2000; Biddle & Mutrie, 2008, Breslin et al, 2012), with those who are physical active being more likely to be 'happy' compared to those less active (Rasciute and Downward, 2010; Pawlowski, Downward and Rasciute, 2011). Despite the links between physical activity and happiness it is unclear whether adults meeting the current physical activity guidelines of 150 minutes of moderate intensity activity per week are more likely to be 'happy' (Department of Health, 2011), with the result perhaps reflecting more on lifestyle choices that include sport and recreation.

The systematic and narrative literature reviews revealed that there have been no national population based studies that have explored the relationship between happiness and

those achieving physical activity recommendations for health. The complexity of the relationships between all the potentially contributing factors to happiness poses a challenge to those responsible for public health policy and allocating resources to support wellness and happiness of the population. At the same time, as a critical index of wellness and positive effect, self-reported happiness should not be ignored and therefore warrants further investigation. To begin this exploration, Breslin *et al.* (2013, unpublished), in conjunction with the present author, carried out secondary analyses of the SAPAS data to determine the factors associated with happiness in Northern Irish adults. They reported a strong association between adults achieving the new physical activity guidelines (150 minutes of moderate intensity physical activity per week) and happiness.

**Self-Reported Body Mass Index and Physical Activity**

It has long been recognised that overweight and obesity is, in large part, a consequence of dietary and physical activity behaviours (Department of Health, 2011). It is for this reason that the current study decided to assess levels of overweight and obesity of adults in Northern Ireland. The results revealed that adults with a healthy or overweight Body Mass Index (BMI) were significantly overrepresented among those who met the Chief Medical Officer's physical activity recommendations compared to obese or underweight adults (healthy BMI: 39%, overweight: 37%, obese, 28%, underweight: 22%). When sources of physical activity were analysed more finely, obese adults were found to be significantly less active than those with a healthy BMI in the 'sport' and 'getting about' domains. The systematic and narrative literature reviews did not reveal previous lifestyle studies which assessed and reported on body mass index (BMI) and its

relationship with physical activity levels or other health related variables. One explanation for this finding may be that BMI has been seen as an outcome of behaviour (e.g. physical inactivity, poor diet) rather than a health behaviour *per se* (Berrigan *et al.*, 2003; Reeves and Rafferty., 2005).

**Contribution to Knowledge 3**

There is a significant relationship between physical activity, smoking and alcohol consumption and that being sufficiently active alone (i.e. meeting the Chief Medical Officer's physical activity recommendations) will not guarantee that all of the potential health benefits will be realised by adults in the medium to longer term in this sample. In particular, the issue of 'smoking' and 'excessive drinking' by adults in Northern Ireland who are actively involved in sport and, in particular, are members of one or more sports clubs reveals that participation in sport in not all net gain.

There was a significant relationship between healthy eating and the proportions of adults in Northern Ireland achieving the Chief Medical Officer's physical activity recommendations (5 or more portions: 40%; less than 5 portions: 31%) and this finding was consistent among almost all demographic subgroups (e.g. age groups, marital status and gender).

The systematic and narrative literature reviews revealed that there have been no national population based studies that have explored the relationship between happiness and those achieving physical activity recommendations for health, with the present research finding that there was a significant relationship between self-reported happiness and physical activity, particularly in the 'sport' domain.

When sources of physical activity were analysed more finely, obese adults were found to be significantly less active than those with a healthy BMI in the 'sport' and 'getting about' domains.

| Objective 4 | To examine the correlates of participation with physical activity. |
|---|---|

Chapter 5 presented preliminary data explorations by way of univariate analyses of key variables. However, in order to examine the complexity of relationships between variables in greater detail multivariate analyses (using binary regression analysis) was undertaken to explore the influence of three outcome areas. It is beyond the scope of this Chapter to discuss all results arising from this analysis; instead the following three sections will focus on significant findings associated with the outcome areas identified in Chapter 6, namely, (1) Health, (2) Happiness and (3) Physical Activity.

## 1. HEALTH OUTCOME

As mentioned previously, health-related behaviours such as physical activity, tobacco and alcohol use, and diet are among the major factors influencing risks of morbidity and mortality in the US and other developed countries (Doll *et al.*, 1981; McGinnis and Foege, 1993; Peto, 2001). Substantial effort has been dedicated to exploring the demographic correlates of health related behaviours and associations between pairs of behaviours. For example, many studies have examined the relationship between tobacco use and various other behaviours (Revicki *et al.*, 1991; Prattala et la., 1998). A modest literature also exists on the associations between multiple health-related behaviours. Berrigan *et al.* (2003) postulated that this literature is important for two reasons: (1) successful disease prevention and health promotion efforts depend on understanding both the distribution and frequency of health behaviours and

understanding associations among different behaviours; and (2) combinations of health behaviours may have synergistic effects on the risk of developing cancer and other health outcomes. The present study supports both these assertions by demonstrating the often complex relationships between health behaviours that vary across the lifecycle, and which relate to physical activity in different life domains in ways that are not always easily anticipated. For example, an individual may engage in many behaviours that enhance health and well-being but these benefits may be outweighed by unhealthy behaviours, some of which may have an addictive component (e.g. participation in sport and its links with smoking and drinking behaviours). Addressing these inter-related and often competing issues effectively presents significant challenges to those in the business of health proportion, and clearly underlines the need for targeted and responsive interventions.

**Adherence to Public Health Recommendations: Who are the Model Citizens?**

This study advances the literature on the associations between multiple health-related behaviours in Northern Ireland by exploring patterns of behaviour in relation to five health and wellness characteristics, namely (1) physical activity, (2) smoking, (3) alcohol consumption, (4) dietary habits and (5) self-reported BMI. In this study, the five health-related behaviours were assessed with reference to current public health recommendations. Adults that met all five public health recommendations were described as *model citizens.*

Table 7.2 below details information relating to the existing public health recommendations included those considered in the current study.

**TABLE 7.2: PUBLIC HEALTH RECOMMENDATIONS RELATING TO EACH HEALTH BEHAVIOUR**

| Health Behaviour | Public Health Recommendation |
|---|---|
| 1. **Physical Activity Levels** | Achieving levels of physical activity recommended by the CMO. |
| 2. **Smoking Behaviour** | Nonsmoker. |
| 3. **Alcohol Consumption** | Consumes alcohol within recommended limits. Men: No more than 21 units of alcohol per week. Women: No more than 14 units of alcohol per week. |
| 4. **Dietary Habits** | Consumes at least 5 portions (400g) of a variety of fruit and vegetables each day. |
| 5. **Self-reported BMI** | Has a healthy BMI of: 18.5 – 25. |

The present study advances the literature considerably by providing an opportunity to reflect on all five behaviours simultaneously within a representative sample of an entire population. With few exceptions (Patterson *et al.*, 1994; Pate *et al.*, 1996; Ford *et al.*, 2001; Berrigan *et al.*, 2003; Reeves and Rafferty, 2005), previous research studies have used convenience samples. The simultaneous analysis of these health behaviours can contribute to both the design of public health interventions and to the identification of 'at risk' populations and, and helps provide useful data to underpin a multi-dimensional model of health behaviour in Northern Ireland, along the lines of that proposed by Berrigan *et al.* (2003) for the US population.

The results of this study indicate than only 5.9% (1 in 16) of adults in Northern Ireland were characterised by a combination of all five health related behaviours (nonsmoking, healthy weight, adequate fruit and vegetable consumption and regular physical activity). While the overall prevalence of *model citizens* was extremely low, it is actually very

similar to that reported in previous studies which have examined the coincidence of health related behaviours in the US population (Berrigan *et al.*, 2003; Reeves and Rafferty, 2005). Furthermore, it is also worth highlighting that this elite group showed many other characteristics of elitism, for example being more likely to be members of social class A, which in itself represents 5% of the Northern Ireland population, and to be wealthy. Interesting however, being a housewife (or husband) was also associated with the status of being a *model citizen*, and more so than adults in full-time employment. In summary, the likelihood of being a *model citizen* increased with age, being married, not having a disability, living in an urban location and being of higher socio-economic class. For example, adults within the 25-34 age group were the most likely to the *model citizens* group, with those aged 35-64 coming second and being 'married' also contributed positively to the probability of leading a healthy lifestyle with regard to smoking, drinking and eating habits. These results are partly supported by other studies which have shown that age, education and income in combination increased the likelihood of adhering to health behaviour recommendations (Berrigan *et al.*, 2003; Reeves and Rafferty, 2005).

Reeves *et al.* (2005), using data from the 2000 Behavioural Risk Factor Surveillance System, reported that only 3% of the US population followed a combination of four modifiable lifestyle characteristics (non-smoking, healthy weight, 5 fruit and vegetables per day, and regular physical activity) and that no subgroup engaged in all four healthy lifestyles to any important degree – the highest prevalence being only 5.7% for those respondents within the survey that rated their health as 'excellent'. In this study, the researchers created an index of healthy lifestyles by summing the total number of

healthy lifestyle characteristics (HLCs) for each respondent (range 0-4), and then defined the pattern of following all four HLCs as a single indicator of healthy lifestyle. The prevalence of each individual HLC was then considered by age, sex, race, education, household, income, and self-reported health status. When each individual health behaviour was considered separately the results of the US study also revealed that 76% of adults did not smoke, 40% had a healthy weight (which showed a strong inverse trend with age and positive trends with education and health status), 23% consumed adequate proportions of fruit and vegetables per day and 23% engaged in regular leisure time physical activity (30 minutes or more of at least moderate intensity physical activity 5 or more times per week). These US findings are interesting when compared to the results of the current study. 72% of adults in Northern Ireland did not smoke, 39% had a healthy weight, 44% consumed adequate proportions of fruit and vegetables per day and only 34.5% engaged in regular physical activity (defined as at least 30 minutes of moderate intensity physical activity (across four life domains – home, work, travel and sport). Given some variations already highlighted (see Table 7.3), it is important to point out three particular limitations of this US research in comparison with the current study: (1) the BRFSS only captures information on leisure time physical activity which may have underestimated total physical activity, (2) noncoverage and nonresponse biases, typical of telephone surveys may have affected their estimates and, (3) the researchers did not to include moderate alcohol consumption within their index, which is surprising given its overall benefits in reducing cardiovascular risk (Department of Health, 2011). Similar findings were also reported by Berrigan *et al.* (2003) using data from the Third National Health and Nutrition Examination Survey. The main findings from this US study was that only 6% of the

population adhered to recommendations associated with five behaviours (regular physical activity, tobacco use, alcohol consumption, fruit and vegetable consumption and dietary fat intake), about 5% adhered to none and almost 80% of the US population did not adhere to two or more of the five health behaviour recommendations considered. Interestingly, and in contrast to Reeves and Rafferty (2005), the researchers in the US study decided not to include body BMI as a variable.

**TABLE 7.3: SUMMARY OF KEY FINDINGS RELATING HEALTH BEHAVIOURS OF ADULTS IN NORTHERN IRELAND AND THE UNITED STATES**

| Health Behaviours | 2010 SAPAS<br>Donnelly, PF (2013)<br>Northern Ireland | 2000 BRFSS<br>Reeves and Rafferty (2005)<br>United States |
|---|---|---|
| **Physical Activity Levels** | 34.5% | 23% |
| **Smoking Behaviour** | 72% | 76% |
| **Alcohol Consumption** | 94.5% | Not measured |
| **Dietary Habits** | 44% | 23% |
| **Self-reported BMI** | 39% | 40% |
| **% Achieving All** | 5.9% | 3% |

The results from the current study and past studies (e.g. Berrigan *et al.*, 2003; Reeves and Rafferty, 2005) would suggest that there is a need, certainly in Northern Ireland, to design interventions addressing multiple health behaviours and to consider how best to address very different classes of behaviour most effectively (Emmons *et al.*, 1994). From a policy perspective, adults in Northern Ireland who adhere to multiple health behaviour recommendations should be important targets for public health research in order to better understand which psychosocial and environmental factors may help facilitate such adherence. Many past studies of multiple health behaviours have emphasised clusters or patterns of unhealthy behaviours and failures to participate in prevention or early detection programmes, but fewer studies in the public health literature have focused on people who adhere to multiple health behaviour recommendations, and used these profiles to inform future interventions for those who do not adhere.

## 2. HAPPINESS OUTCOME

As reported in Chapter 6, there was a significant relationship between self-reported happiness and physical activity. The proportions of respondents who met the recommended levels of physical activity were significantly higher among those who classified themselves as being 'very happy' or 'happy' with the strongest relationship between self-reported happiness and physical activities found in the 'sport' domain. This positive relationship was also visible when subgroups were defined by the total time spent in sport activities. With regard to lifestyle behaviours, healthy eating significantly increased the probability of belonging to the group of 'very happy' adults,

while smoking and alcohol consumption above the recommended limits had a negative relationship with self-reported happiness. Perhaps not surprisingly, given the daily challenges that those with a disability must face, having a disability and working full time had a negative relationship with self-reported happiness. The systematic and narrative literature reviews did not reveal any national population based studies that have explored the relationship between happiness and those achieving physical activity recommendations for health or any other health related behaviours (e.g. smoking). The complexity of the relationship between all the potentially contributing factors to happiness poses a challenge to those responsible for public health policy and allocating resources to support wellbeing and happiness of the population (Frey and Stutzer, 2002). On this basis, there is a need for future research aimed at exploring the relationship between self-reported happiness and health related behaviours at a population level.

## 3. PHYSICAL ACTIVITY OUTCOME

Overall, the analysis revealed that age was the most important factor linked to physical activity, with a significant and positive relationship between healthy eating, physical activity (ACTIVE 1, 2, 3 and 4), self-reported health, and happiness. However, at the same time it is important to note that a number of other interesting associations were revealed, such as the positive relationship that exists between smoking and achieving the Chief Medical Officer's physical activity recommendations and the finding that having a disability and living in an urban location appears to have a negative impact of physical activity (Active 1) and health. Also in terms of employment status, being

retired appears to have a negative impact on physical activity (ACTIVE 1) and sport participation (ACTIVE 2, 3 and 4).

Furthermore, the decision to include sport participation in the analysis changed the results considerably. Table 7.4. shows the diminishing contribution of sport participation to overall physical activity levels after different group definitions were applied (ACTIVE 1, 2, 3 and 4). For example, only 4.5% (n=206) of adults in Northern Ireland achieved the Chief Medical Officer's physical activity guidelines through sport alone (ACTIVE 4). This finding is particularly interesting when the results of a similar study in the US were considered. Reeves and Rafferty (2005) reported that 22.2% of adults in the US participated in leisure time physical activity. In this study, physical activity was defined as *30 minutes or more of at least moderate intensity physical activity 5 or more times per week* which is broadly consistent with the definition applied to this group analysis (*Sport Enthusiasts).* At this point, it is difficult to explain how these findings can be so different. One possible explanation may lie with the different methodologies employed (SAPAS: Face to Face Household Survey, BRFSS: Telephone Survey) and the questions used to elicit a response from participants. This finding may be particularly challenging for those responsible for sport and health policy in Northern Ireland where it is the view of many that sport participation makes a significant contribution to total physical activity levels and health. The findings from the current study would suggest otherwise, particularly when sport participation (i.e. sports club membership) was found to be positively related to smoking and alcohol consumption.

**TABLE 7.4: PROPORTION OF ADULTS ACHIEVING THE CMO'S PHYSICAL ACTIVITY RECOMMENDATIONS BY ACTIVE 1, 2, 3 & 4**

| Variable | Definition | Proportion in weighted sample | N |
|---|---|---|---|
| | **PHYSICAL ACTIVITY** | | |
| **ACTIVE 1** | Participating in at least moderate intensity activities for at least 30 minutes on at least five days per week / achieving the CMO's recommendation through any of the four domains | 35.4% | N=1,576 |
| **ACTIVE 2** | Achieving the CMO's PA recommendation and participating in at least moderate intensity sport for at least 30 minutes on at least three days per week (150+ minutes PA per week of which 3 x 30 minutes is in sport which takes place on 3 different days) | 9.8% | N=448 |
| **ACTIVE 3** | Participating in at least moderate intensity sport activities for at least 30 minutes on at least three days per week | 13.8% | N=631 |
| **ACTIVE 4** | Participating in at least moderate intensity sport activities for at least 30 minutes on at least five days per week / achieving the CMO's recommendation through sport alone (*sport enthusiasts*) | 4.5% | N=206 |

As expected, sport participation continues to be stratified by socio-economic status with higher socio-economic classes (social class A, B, C1 and C2) and those with higher education (university degree) being more likely to be represented within the sporting community in Northern Ireland. These results are very much in line with findings from previous studies which have considered determinants of sport participation (e.g. Foster *et al.*, 2005). As with the current study, the effect of age, gender, income, disability tend to be similar across most studies (e.g. Haug *et al.*, 2008; Leslie *et al.*, 2004; Downward and Riordan, 2007; Gratton and Tice, 1991; Berger *et al.*, 2007 cited in Breuer *et al.*, 2011).

With regard to policy implications being influenced by to the present research, it must be acknowledged that some variables are more likely to be affected by policy interventions than others. Taking age and disability, for example, the opportunities for

positive interventions are considerable. The results show that overall, physical activity and sport participation decreases with age and among those with a disability. To affect improved health, a policy shift in Northern Ireland should aspire to increase the number of older and disabled people taking part in a wider range of physical activities. These target groups need to be addressed directly so that their specific needs can be detected and appropriate intervention programmes then devised. For example, programmes could be developed and delivered locally for older/retired or disabled individuals. Furthermore, policies should obviously aim to move beyond those with a high level of education in Northern Ireland, as these people already tend to be more active, and it may be the more hard-to-reach and marginalised groups that should be specifically targeted as being 'at risk', including those in working class, urban communities. Also, regarding sports development, governing bodies of sport in Northern Ireland should be targeted and supported to ensure that local sports clubs are encouraging a more diverse range of people to become involved in their club in all sorts of different ways (i.e. women, people with disabilities, older people) and at the same time implementing policies that will encourage positive health behaviours of all those involved with their club and families (e.g. non-smoking, moderate alcohol consumption).

**Contribution to Knowledge 4**

This study advances the literature on the associations between multiple health-related behaviours in Northern Ireland by simultaneously exploring aspects of physical activity across all life domains in relation to five health and wellness characteristics, namely (1) physical activity, (2) smoking, (3) alcohol consumption, (4) dietary habits and (5) self-reported BMI.

As far as the author is aware SAPAS was the first population based study to have explored the relationship between happiness and those achieving physical activity recommendations for health or and other health related behaviours.

| Objective 5 | To examine the implications for government policies relating to the achievement of positive health outcomes using physical activity as a driver. |
|---|---|

This research objective was driven by the fact that there is still an urgent need to monitor the amount of physical activity that adults are actually undertaking, and whether or not this is sufficient to derive a health benefit. By developing and applying a more sophisticated and robust research instrument (SAPAS) it is anticipated that Northern Ireland and the UK as whole would be in a better position to develop policies, strategies and programmes aimed at addressing physical inactivity and improving public health within specific population groups and communities. The implications for government policies have been discussed throughout this Chapter, however in the interests of being clear and concise several key findings have emerged from the current study. These are set out thematically below together with explicit policy implications relating to each theme.

**Measuring Physical Activity**

Given that none of the surveys reviewed robustly measured physical activity levels across all four life domains (i.e. home, work, transportation and sport/leisure) the findings of this study support the policy position postulated by previous researchers where it was suggested that a policy of excluding one or more life domains from the measurement of adult physical activity levels is likely to lead to an underestimate of

adults meeting physical activity guidelines (Bouslaugh *et al.* 2005; Lan *et al..*, 2005; Ku *et al.*, 2006). Sport is a minority contributor to total physical activity levels in Northern Ireland; however it is positively associated with self-reported happiness, health and a healthy BMI.

Modern government is underpinned by a core principle that all policy must be evidence based. Too often in the past sport and physical activity strategies have been blighted by either an absence of data or the misuse of partial data. It is imperative that the mistakes of the past are not repeated and that within and across nations' future policy in this area rest firmly on reliable, vaild and robust data.

**Promoting Active Lifestyles and Targeted Interventions**

The findings from this research study have strong implications for public health policy in Northern Ireland where it would appear there is a pressing need to ensure that adults are supported to be active and healthy in all aspects of their life, particularly in their later years. Evidence from this study would suggest that there is an urgent need to develop specific interventions targeted at several different settings (homes, workplaces), populations (e.g. older adults, people with disabilities) aimed at increasing the contribution of all four life domains to time spent in at least moderate intensity physical activity. As highlighted earlier, Heath *et al..* (2012) proposed a number of approaches to addressing this policy issue all of which could be used in a Northern Ireland context (e.g. informational approaches - community wide and mass media campaigns, and short physical activity messages targeting community sites). The challenge for policy makers

and practitioners in Northern Ireland is whether or not they are willing to commit the time, effort and resources to design and implement 'specific' approaches that are aimed at increasing levels of physical activity and improving health and wellbeing within targeted communities. From a sport policy perspective, there may also be a need to consider specific approaches that are not only designed to highlight and promote the benefits of sport participation, but also the overall benefits of being physically active in other life domains such as the home, at work or getting about.

**Understanding Multiple Health Behaviours**

The current research provided an opportunity to explore and model the range of possible associations of physical activity (across four life domains) with smoking, alcohol consumption and other health and wellness characteristics. The results have shown that there is a significant relationship between physical activity, smoking and alcohol consumption and that being sufficiently active alone (i.e. meeting the Chief Medical Officer's physical activity recommendations) will not guarantee that all of the potential health benefits will be realised by adults in the medium to longer term. A specific policy response/intervention is needed to address the issue of 'smoking' and 'excessive drinking' by adults in Northern Ireland who are sufficiently active, particularly people who are involved in sport and are members of one or more sports club.

The results from the current study and past studies indicate that there is a need, certainly in Northern Ireland, to design interventions addressing multiple health behaviours and to consider how best to address very different classes of behaviour most effectively.

From a policy perspective, adults in Northern Ireland who adhere to multiple health behaviour recommendations should be important targets for public health research in order to better understand which psychosocial and environmental factors may help facilitate such adherence. Many past studies of multiple health behaviours have emphasised clusters or pattern of unhealthy behaviours and failures to participate in prevention or early detection programmes, but fewer studies in the public health literature have focused on people who adhere to multiple health behaviour recommendations, and used these profiles to inform future interventions for those who do not adhere.

**Contribution of Sport to Total Physical Activity Levels**

The current research highlights the minority contribution made by sport participation to overall physical activity levels after different group definitions were applied (ACTIVE 1, 2, 3 and 4). For example, only 4.5% (n=206) of adults in Northern Ireland achieved the Chief Medical Officer's physical activity guidelines through sport alone. This finding may be particularly challenging for those responsible for sport and health policy in Northern Ireland where it is the view of many that sport participation makes a significant contribution to total physical activity levels and health. These findings would suggest otherwise, particularly when sport participation (i.e. sports club membership) was found to be positively related to smoking and alcohol consumption. In terms of a policy response, governing bodies of sport in Northern Ireland should be targeted and supported to ensure that local sports clubs are encouraging a more diverse range of people to become involved in their club in all sorts of different ways (i.e. women, people with disabilities, older people) and at the same time implementing policies that will encourage positive health behaviours of all those involved with their club and families (e.g. non-smoking, moderate alcohol consumption).

Sport participation continues to be stratified by socio-economic status with higher socio-economic classes and those with higher education being more likely to be represented within the sporting community in Northern Ireland. Age, gender, income, disability, like many previous studies, were also found to have a significant effect on sport participation in Northern Ireland. With regard to policy implications it must be acknowledged that some variables are more likely to be affected by policy interventions than others. Taking age and disability, for example, the opportunities for positive interventions are considerable. The results show that overall, physical activity and sport participation decreases with age and among those with a disability. To affect improved health, a policy shift in Northern Ireland should aspire to increase the number of older and disabled people being taking part in a wider range of physical activities. These target groups need to be addressed directly so that their specific needs can be detected and appropriate intervention programmes then devised. For example, programmes could be developed and delivered locally for older/retired or disabled individuals. Furthermore, policies should obviously aim to reach people with a high level of education in Northern Ireland as these people already tend to be more active and it may be the more hard-to-reach and marginalised groups that should be specifically targeted as being 'at risk', including those in working class, urban communities.

For ease of reference, the Table 7.5 sets outs major themes and policy implications arising from the research.

**TABLE 7.5 : SUMMARY OF THEMES AND POLICY IMPLICATIONS**

| THEMATIC AREAS | IMPLICATIONS |
|---|---|
| **Measuring physical activity** | **1.** Excluding one or more life domains from the measurement of adult physical activity levels is likely to lead to an underestimate of adults meeting physical activity guidelines. |
| **Promoting active lifestyles across all physical activity domains and targeted interventions** | **2.** Adults must be supported to be active and healthy in all aspects of their life, particularly in their later years.<br>**3.** There is a need to develop specific interventions targeted at several different settings (homes, workplaces), populations (e.g. older adults, people with disabilities) aimed at increasing the contribution of all four life domains to time spent in at least moderate intensity physical activity.<br>**4.** There is a positive relationship between physical activity, smoking and alcohol consumption. Being sufficiently active alone will not guarantee that all of the potential health benefits will be realised by adults in the medium to longer term.<br>**5.** Specific interventions may be required to address the issue of 'smoking' and 'excessive drinking' by adults in Northern Ireland who are sufficiently active, particularly people who are involved in sport and are members of one or more sports clubs. |
| **Understanding multiple health behaviours** | **6.** There is a need to design interventions aimed at addressing multiple health behaviours and to consider how best to address very different classes of behaviour most effectively. Adults in Northern Ireland who adhere to multiple health behaviour recommendations should be important targets for public health research in order to better understand which psychosocial and environmental factors may help facilitate such adherence. |
| **Contribution of sport to total physical activity levels** | **7.** Sport participation is a minority contributor to overall physical activity levels after different group definitions were applied (ACTIVE 1, 2, 3 and 4).<br>**8.** Sport participation continues to be stratified by socio-economic status with higher socio-economic classes and those with higher education being more likely to be represented within the sporting community in Northern Ireland.<br>**9.** Age, gender, income, disability were found to have a significant effect on sport participation in Northern Ireland. |

To conclude the thesis, Chapter 8 provides a summary overview of the thesis as a whole, and including summative conclusions along with a reflective commentary of limitations, consideration of causality v association and suggestions for future research.

# CHAPTER 8: CONCLUSIONS

## Road map of the thesis

| Introduction | Review of Literature | Methodology | Results | Discussion | Conclusions |
|---|---|---|---|---|---|
| | Ch2 A Systematic Review of the Literature on Population Based Approaches to Measuring Physical Activity & Health | | Ch5 Exploratory Data Analysis I | | |
| Ch1 ► | Ch3 A Review of the Narrative Literature on Population Based Approaches to Measuring Physical Activity & Health | ► Ch4 ► | Ch6 Exploratory Data Analysis II | ► Ch4 ► | ► Ch8 |

## 8.1. INTRODUCTION

At this point in the thesis there is a significant risk of repetition. To avoid this possibility the Chapter is deliberately short and succinct, highlighting key conclusions, contributions to knowledge, limitations, methodological reflections and suggestions for future research.

## 8.2 SUMMATIVE CONCLUSIONS

Looking back over the project, it is to be hoped that SAPAS can be viewed as the first of a new generation of research instruments that can begin to provide robust baseline data on genuine levels of physical activity across communities and individuals. Without this degree of rigour then the capacity of government and agencies to put in place policies and initiatives that get to the heart of the problem will always be constrained. The thesis has begun to explore the complex relationships between activity levels and health and wellness, and has shown that while some groups and communities are beginning to learn the exercise lesson, and are changing their lifestyles accordingly, for others this 'revolution' remains distant. The consequence may well be that the 'affluent and educated' become increasingly healthy through choice, while more marginalised communities may perhaps, by chance, accumulate activity through their daily work and their lives, but more often will fall short of achieving healthy levels of physical activity. Undeniably there has been evidence of success in increasing physical activity levels in the UK over the past decade (Townsend *et al.*, 2012), but if governments in the UK are really serious about increasing levels of physical activity in each home country then it is critically important that guidance becomes more than preaching to the converted and

instead is widely disseminated and, more importantly, understood by all. In Northern Ireland, only 8% of the adult population were aware of current physical activity guidelines (Department of Health, 2004). Knowledge of physical activity guidelines is not enough; specific policies and interventions are required for encouraging and engaging diverse groups of people and often marginalised communities in Northern Ireland to become more physically active. As mentioned in Section 7.2: Objective 2, a number of complementary approaches may be necessary to raise physical activity levels among people of different ages, and social groups, countries and communities in Northern Ireland (i.e. informational approaches, behavioural and social approaches and environmental and policy approaches) (Heath *et al.*, 2012). The challenge for policy makers and practitioners alike will be their willingness both to accept the findings of SAPAS and to then commit the time, effort and resources needed to design and implement these specific interventions.

## 8.3 KEY CONTRIBUTIONS TO KNOWLEDGE

The current study has made several key contributions to theory, policy and practice in the area of physical activity and health.

1. Based on the evidence, there was no 'gold standard' of best practice for SAPAS to replicate and that the best that was hoped for was an *optimum solution* based on the objectives of the research, the resources available, and the lessons learned for similar previous studies . It was on this basis that SAPAS was designed, developed

and used as a *new research framework* for measuring (1) physical activity levels[56] and (2) the health and wellness of the Northern Irish adult population.

2. SAPAS, as a monitoring tool, has been designed to adapt to an every changing policy environment in terms of measuring physical activity levels of the Northern Irish population. For example, Murphy *et al.* (2012) conducted secondary analysis on the SAPAS data to identify the proportion of the adult Northern Irish population achieving the new physical activity guidelines. As far as the author is aware no other population based survey exists with this capability.

3. The findings from this study confirms that Leisure Time Physical Activity on its own underestimates total physical activity levels and that, for the most part, is a minority contributor to total physical activity levels of the adult population in Northern Ireland.

4. There is a significant relationship between physical activity, smoking and alcohol consumption and that being sufficiently active alone (i.e. meeting the Chief Medical Officer's physical activity recommendations) will not guarantee that all of the potential health benefits will be realised by adults in the medium to longer term in this sample. In particular, the issue of 'smoking' and 'excessive drinking' by adults in Northern Ireland who are actively involved in sport and, in particular, are members of one or more sports clubs reveals that participation in sport is not all net gain.

5. There was a significant relationship between healthy eating and the proportions of adults in Northern Ireland achieving the Chief Medical Officer's physical activity

[56] Consistent with the Chief Medical Officers Physical Activity Recommendations

recommendations (5 or more portions: 40%; less than 5 portions: 31%) and this finding was consistent among almost all demographic subgroups (e.g. age groups, marital status and gender).

6. The systematic and narrative literature reviews revealed that there have been no national population based studies that have explored the relationship between happiness and those achieving physical activity recommendations for health, with the present research finding that there was a significant relationship between self-reported happiness and physical activity, particularly in the 'sport' domain.

7. This study advances the literature on the associations between multiple health-related behaviours in Northern Ireland by simultaneously exploring aspects of physical activity across all life domains in relation to five health and wellness characteristics, namely (1) physical activity, (2) smoking, (3) alcohol consumption, (4) dietary habits and (5) self-reported BMI.

8. As far as the author is aware SAPAS was the first population based study to have explored the relationship between happiness and those achieving physical activity recommendations for health or and other health related behaviours.

## 8.4 LIMITATIONS OF THE RESEARCH & LESSONS FOR THE FUTURE

Along with the positive benefits derived from the research, there is a need to reflect on ways in which projects could be enhanced and lessons to be learned for the future. For example, SAPAS represents a very interesting case study for those planning to embark on policy-driven research where competing demands must be accommodated in order

that all stakeholders not only feel they have played an active role in the process but also that they have gained from the experience, both personally and professionally. The author has been congratulated by all stakeholders for managing to balance these often delicate relationships in a way that provided a 'win-win' for all concerned, and maintained the integrity of the research process and data throughout.

While SAPAS has been hailed as a success there is still potential to look at ways in which improvements can be made. These are summarised below:

1. Physical activity prevalence estimates generated by SAPAS 2009/10 were based on self-reported data. Limitations with self-report physical activity questionnaires have been reported previously (Caspersen *et al.*, 1994; Brown *et al.*, 2005), and some misclassification of respondents across physical activity categories may have occurred as result of recall bias or a tendency by some to answer in a socially desirable manner.

2. Based on the definition of disability used for this study, it may also be difficult to assess the extent to which people with disabilities have mental or emotional problems that threaten the validity of their responses. This limitation was also raised by Brown *et al.* (2005) when they concluded that the definition of disability used in their study was based on self-reported activity limitations or use of specific aids which therefore made it difficult to identify specific conditions causing the limitations.

3. Self-report physical activity measures are also problematic if the goal is to determine individual energy expenditures. However, self-report measures can be used to group people into categories of habitual activity, and despite their limitations they remain the most efficient approach to use in large scale epidemiological and surveillance research (Casperson *et al.*, 1994; Moytoye *et al.*, 1996 cited in Brown *et al.*, 2005).

4. Recall bias may have affected the accuracy of reported levels of physical activity; however, there is evidence that people are able to recall habitual activities reasonably well, even over long time periods (Friedenreich., 1998; Falkner., 1999 cited in Lawlor *et al.*, 2002). Thirdly, it is acknowledged that the survey instrument's reliability and validity was not ascertained using a test re-test reliability study. However, as described earlier in this chapter (Section 4.1), the survey was subjected to cognitive testing (n=30) and piloting (n=50).

5. It has been recognised that obesity is, in part, a consequence of dietary and physical activity behaviours. It is for this reason that some health behaviour studies have not included BMI (Berrigan *et al.*, 2003); however, it was included in this study because of its public health importance. This study may be limited by its reliance on self-reported height and weight as well as self-reported physical activity. Self-report data may not provide a true representation of the percentage of adults who are overweight or obese. For example, women are thought to underreport their weight, while men tend to over report their height (Nawaz *et al.*, 2001), thus potentially distorting BMI values.

6. Happiness was only assessed at one point in time, and with one question based on a ten point Likert scale. A validated measure of happiness that assesses the multi-dimensional nature of the concept could be included in subsequent research. Also good health and poor health were dichotomised based on respondent's self-perceptions; there was no objective screening measure of health status adopted.

7. Previous research has often been criticised for confusing association with causality, and this was a temptation in the present research where a strong association between two or more variables could easily be misinterpreted as a cause and effect relationship. The nature of survey work makes the determination of causality especially difficult, but multivariate modelling can go some way towards establishing a hierarchy in terms of influence. Such analyses were beyond the scope of this thesis, but remain unfinished business. In the meanwhile, the author has been careful to avoid implying a causal relationship as this cannot be determined from a cross sectional survey such as SAPAS.

8. Systematic reviews are a relatively new phenomenon within this research field and protocols for undertaking such reviews have yet to be well established. A number of decisions were made as to how the reviews should be conducted (e.g. inclusion criteria, absence of hierarchy and meta-analyses) and these decisions may be returned to in future work, but with hindsight the systematic review would have benefited from broadening the inclusion criteria to include other relevant sources such as formal but not necessarily peer-reviewed reports as these may have provided a more comprehensive portfolio of sources to be included in the systematic review and negated the need to undertake a separate narrative review.

9. The systematic reviews covered the period 1983-2008 in order to help inform the emerging research instrument. Since 2008, clearly the literature has moved forward considerably (e.g. Warren *et al.*, 2010; Kohl *et al.*, 2012). While there has continued to be accumulation of data, unfortunately many of the criticisms which could be levelled on the earlier literature remain current and there is no clear indication of an emerging consensus as to best practice in methodology, or a unifying theory to help interpret data. For example, Warren *et al.* (2010), conducted a review of various methodologies employed to measure physical activity with reference to epidemiological research (e.g. self report – questionnaires; diaries; logs; recalls and objectives measures – motion sensors; accelerometers and pedometers; heart rate monitoring and direct observation). In this review, key definitions and theoretical aspects, which underpin the measurement of physical activity were briefly discussed. Methodologies particularly suited for use in epidemiological research were reviewed, with particular reference to their validity, primary outcome measure and practical considerations when used in the field. In this study, the authors acknowledged that the choice of method may be a compromise between accuracy level and feasibility, but the ultimate choice of tool must suit the stated aim of the research. On the basis of their review, Warren *et al.* made the following conclusions and recommendations for future research:

Conclusions

a. Physical activity is a multi-dimensonal, and complex behaviour to measure; its various domains are often misunderstood.

b. Inappriopriate or crude measures of physical activity have serious implications, and are likely to lead to misleading results and to underestimate effect size.

c. A perfect measurement method for physical activity does not exist and that the selection of a method must be based on careful consideration of its pros and cons, indications for use and the evidence to support it.

Recommendations

d. The selection method to assess physical activity is a crucial decision, yet it is often rushed and inadequately thought out. Careful consideration must be given to the research question, and the dimension or domain of physical activity to be assessed.

e. A thorough understanding of the pros and cons of each method is vital and these should be evaluated in light of the practical aspects of the study (e.g. resources, participants numbers etc.).

f. The choice of method for the population under study must be appropriate to the age, ethnicity and cognitive ability of the population.

g. The advent of technology means that objective measure of physical activity is now affordable and feasible for large-scale studies and this, where possible, should be incorporated in subsamples of national surveys.

As reported earlier, it is to be hoped that SAPAS establishes a trend in developing research instruments that have academic credibility along with practical utility.

Looking towards the future, there are a number of lessons that can be learned from the current study that will help inform the development and implementation of SAPAS II.

1. The advance letter and introduction worked well in 'selling the survey' to all respondents as they did not mention the word 'sport' or 'Sport Northern Ireland' and stated only that the survey was about 'people's leisure and recreational activities'.

2. The interviewer briefings should remain an integral part of the preparation for the survey as they help the interviewers become fully appraised about the study and its aims, thereby assisting in their 'buy in' to the project.

3. Over a long fieldwork period it is good practice to provide periodic feedback to the interviewers about how the survey is progressing to help maintain their motivation.

4. The quality of the data captured from respondents would be improved if the CAPI script was enhanced to flag potential outlier data at the point of interview. For subsequent studies the following internal data checks should be included:

    a. Policy makers and researchers could agree a set of acceptable ranges on each activity within each of the domains (home, getting about, work and sport) in terms of average time spent per day with the interviewer, being prompted if the value goes above the set range, e.g. playing basketball for more than 4 hours in one day.
    b. Once all questions have been asked relating to all four domains, the CAPI script could be written to check across all activities to ensure that the number of hours of activity on a given weekday does not exceed a set figure e.g. 18 hours per day. If the figure has been exceeded then the

interviewer is asked to clarify the information provided by the respondent.

c. The CAPI script asked the respondent for their weight and height. Going forward it would be beneficial for the CAPI script to calculate the Body Mass Index (BMI) and check that the value falls within a pre-agreed range e.g. 15 – 45 and if the value is outside that range the interviewer is asked to recheck the height and weight figures entered.

## 8.5 FUTURE RESEARCH DIRECTIONS

Future research will be able to draw extensively on the current findings and a number of opportunities for further work are immediately apparent. These are summarised below:

1. In order to explore SAPAS data further and inform the development and implementation of SAPAS II (to be repeated in 2014-15), it would be useful to update the systematic review to identify further studies that have been undertaken since to 2008 that relate to population based approaches to the measurement of physical activity levels and health.

2. The systematic and narrative literature reviews revealed that there have been no national population based studies that have explored the relationship between happiness and those achieving physical activity recommendations for health. The complexity of the relationships between all the potentially contributing factors to happiness poses a challenge to those responsible for public health policy and allocating resources to support wellness and happiness of the population. At the

same time, as a critical index of wellness and positive effect, self-reported happiness should not be ignored and therefore warrants further investigation.

3. The results from the current study and past studies (e.g. Berrigan *et al.*, 2003; Reeves and Rafferty, 2005) would suggest that there is a need to design interventions that address multiple health behaviours and to consider how best to address very different classes of behaviour most effectively (Emmons *et al.*, 1994). Adults in Northern Ireland who adhere to multiple health behaviour recommendations should be important targets for future research in order to better understand which psychosocial and environmental factors may help facilitate such adherence. Many past studies of multiple health behaviours have emphasised clusters or patterns of unhealthy behaviours and failures to participate in prevention or early detection programmes, but fewer studies in the public health literature have focused on people who adhere to multiple health behaviour recommendations, and used these profiles to inform future interventions for those who do not adhere.

4. Evidence from this study indicates that there is a significant relationship between physical activity, smoking and alcohol consumption and that being sufficiently active alone (i.e. meeting the Chief Medical Officer's physical activity recommendations) will not guarantee that all the potential health benefits will be realised. It would therefore be useful to carry out further research in the field of health economics to investigate the net health gains that may be accrued by adults across health behaviours and physical activity domains.

Arguably the most important future research direction is for SAPAS to be repeated and not to be confined to being a 'one-off' study. Replication would provide the basis for time series analysis notably the quantification of any changes against initial baselines. Whilst the PhD might be complete, the author's work continues to make SAPAS II and indeed subsequent editions a reality.

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*Denotes research papers (64) that were included in the systematic review for final analysis.

# APPENDICES

# APPENDIX 1

# SYSTEMATIC REVIEW

# FULL OUTPUT

| No. | SYSTEMATIC REVIEW OUTPUT | SCREENING 1 (123) | SCREENING 2 (64) |
|---|---|---|---|
| 1 | ABERNETHY, Bruce and COTE, Jean (2007). Nurturing the development of a comprehensive model of expertise. *International journal of sport psychology,* **38** (1), 68-72. | | |
| 2 | ABRAMSON, Jerome L. and VACCARINO, Viola (2002). Relationship between physical activity and inflammation among apparently healthy middle-aged and older US adults. *Archives of internal medicine,* **162** (11), 1286-1292. | | |
| 3 | ABUBAKARI, A. R., *et al.* (2008). National prevalence of obesity - prevalence and time trends in obesity among adult west african populations: A meta-analysis. *Obesity reviews,* **9** (4), 297-311. | | |
| 4 | ADAMS, R. J., *et al.* (2004). Impact of coping and socioeconomic factors on quality of life in adults with asthma. *Respirology,* **9** (1), 87-95. | | |
| 5 | AFIFI, T. O., *et al.* (2005). Investigating health correlates of adolescent depression in canada. *Canadian journal of public health-revue canadienne de santé publique,* **96** (6), 427-431. | | |
| 6 | AGARWAL, S., *et al.* (2005). Sankara nethralaya-diabetic retinopathy epidemiolopy and molecular genetic study (SN-DREAMS 1): Study design and research methodology. *Ophthalmic epidemiology,* **12** (2), 143-153. | | |
| 7 | AHLBORG JR., G., AXELSSON, G. and BODIN, L. (1996). Shift work, nitrous oxide exposure and subfertility among swedish midwives. *International journal of epidemiology,* **25** (4), 783-790. | | |
| 8 | AHN, J., *et al.* (2007). Adiposity, adult weight change, and postmenopausal breast cancer risk. *Archives of internal medicine,* **167** (19), 2091-2102. | | |
| 9 | ALAVIAN, Seyed-Moayed, *et al.* (2008). Hypertriglyceridemic waist phenotype and associated lifestyle factors in a national population of youths: CASPIAN study. *Journal of tropical pediatrics,* **54** (3), 169-177. | | |
| 10 | ALBANES, D., BLAIR, A. and TAYLOR, P. R. (1989). Physical activity and risk of cancer in the NHANES I population. *American journal of public health,* **79** (6), 744-750. | | |
| 11 | ALBANES, D., *et al.* (1987). Associations between smoking and body weight in the US population: Analysis of NHANES II. *American journal of public health,* **77** (4), 439-444. | | |
| 12 | AL-HADDAD, F. H., LITTLE, B. B. and GHAFOOR, A. G. M. A. (2005). Childhood obesity in united arab emirates schoolchildren: A national study. *Annals of human biology,* **32** (1), 72-79. | | |
| 13 | ALHASSAN, S., *et al.* (2008). Metabolic syndrome: Do clinical criteria identify similar individuals among overweight premenopausal women? *Metabolism-clinical and experimental,* **57** (1), 49-56. | | |
| 14 | AL-MAHROOS, F. and AL-ROOMI, K. (2001). Obesity among adult bahraini population: Impact of physical activity and educational level. *Annals of saudi medicine,* **21** (3-4), 183-187. | 1 | |
| 15 | AL-NOZHA, M. M., *et al.* (2007). Prevalence of physical activity and inactivity among saudis aged 30-70 years: A population-based cross-sectional study. *Saudi medical journal,* **28** (4), 559-568. | | |
| 16 | ALNUAIM, A. A., *et al.* (1997). Overweight and obesity in saudi arabian adult population, role of sociodemographic variables. *Journal of community health,* **22** (3), 211-223. | 1 | 2 |
| 17 | ALSAIF, M. A., *et al.* (2002). Prevalence and risk factors of obesity and overweight in adult saudi population. *Nutrition research,* **22** (11), 1243-1252. | 1 | 2 |
| 18 | ANDERSEN, R. E., *et al.* (2001). Obesity and reports of no leisure time activity among older americans: Results from the third national health and nutrition examination survey. *Educational gerontology,* **27** (3-4), 297-306. | 1 | 2 |
| 19 | ANDERSON, Denise M., WOZENCROFT, Angela and BEDINI, Leandra A. (2008). Adolescent girls' involvement in disability sport: A comparison of social support mechanisms. *Journal of leisure research,* **40** (2), 183-207. | | |
| 20 | Answering deaths's questions. (2001). *The BMJ,* **322** (7282), 0. | | |
| 21 | ARDERN, C. I., *et al.* (2005). Revised adult treatment panel III guidelines and cardiovascular disease mortality in men attending a preventive medical clinic. *Circulation,* **112** (10), 1478-1485. | | |

| No. | SYSTEMATIC REVIEW OUTPUT | SCREENING 1 (123) | SCREENING 2 (64) |
|---|---|---|---|
| 22 | ARIF, A. A. and ROHRER, J. E. (2005). Effect of alcohol consumption on obesity among nonsmokers. *Annals of epidemiology,* **15** (8), 642-643. | | |
| 23 | ATHYROS, V. G., *et al.* (2005). The prevalence of the metabolic syndrome in greece: The MetS-greece multicentre study. *Diabetes obesity & metabolism,* **7** (4), 397-405. | | |
| 24 | ATLANTIS, E., BARNES, E. H. and SINGH, M. A. F. (2006). Efficacy of exercise for treating overweight in children and adolescents: A systematic review. *International journal of obesity,* **30** (7), 1027-1040. | | |
| 25 | Attention to blood sugar today means healthy feet tomorrow. (2006). *O&P business news,* **15** (11), 44-47. | | |
| 26 | AUSTER, Carol J. (2008). The effect of cohort on women's sport participation: An intergenerational study of collegiate women ice hockey players. *Journal of leisure research,* **40** (2), 312-337. | | |
| 27 | AVELLAR, S. A. (2005). *Black-white mental and physical well-being following divorce.* | | |
| 28 | BAILIS, D. S., *et al.* (2001). Perceived control in relation to socioeconomic and behavioral resources for health. *Social science & medicine,* **52** (11), 1661-1676. | | |
| 29 | BALLARDBARBASH, R., *et al.* (1996). Contribution of dieting to the inverse association between energy intake and body mass index. *European journal of clinical nutrition,* **50** (2), 98-106. | | |
| 30 | BALLESTEROS, M. N., *et al.* (2001). Dietary fiber and lifestyle influence serum lipids in free living adult men. *Journal of the american college of nutrition,* **20** (6), 649-655. | | |
| 31 | BALLEW, C., GALUSKA, D. and GILLESPIE, C. (2001). High serum retinyl esters are not associated with reduced bone mineral density in the third national health and nutrition examination survey, 1988-1994. *Journal of bone and mineral research,* **16** (12), 2306-2312. | | |
| 32 | BALOGUN, Joseph A., SLOAN, Patricia E. and GERMAIN, Monique (2007). Core values and evaluation processes associated with academic tenure. *Perceptual & motor skills,* **104** (3), 1107-1115. | | |
| 33 | BAO, Y. H., DUAN, N. H. and FOX, S. A. (2006). Is some provider advice on smoking cessation better than no advice? an instrumental variable analysis of the 2001 national health interview survey. *Health services research,* **41** (6), 2114-2135. | | |
| 34 | BARBER, J. S., AXINN, W. G. and THORNTON, A. (1999). Unwanted childbearing, health, and mother-child relationships. *Journal of health and social behavior,* **40** (3), 231-257. | | |
| 35 | BARKAI, H., *et al.* (2007). Influence of sports participation and menarche on bone mineral density of female high school athletes. *Journal of science & medicine in sport,* **10** (3), 170-179. | | |
| 36 | BASS, M., *et al.* (2006). Variables for the prediction of femoral bone mineral status in american women. *Southern medical journal,* **99** (2), 115-122. | | |
| 37 | BASTERRA-GORTARI, F. J. and SEGUI-GOMEZ, M. (2007). Use of national health interview data to measure the burden of disease and injuries. *Injury prevention,* **13** (4), 254-257. | | |
| 38 | BATES, Janet H., *et al.* (2005). Total and leisure-time walking among U.S. adults: Should every step count? *American journal of preventive medicine,* **29** (1), 46-50. | | |
| 39 | BAUM, Antonia (2006). Eating disorders in the male athlete. *Sports medicine,* **36** (1), 1-6. | | |
| 40 | BEHREN, Timothy K., HAWKINS, Scott B. and DINGER, Mary K. (2005). Relationship between objectively measured steps and time spent in physical activity among free-living college students. *Measurement in physical education & exercise science,* **9** (2), 67-77. | 1 | |
| 41 | BEHRENS, Timothy K., *et al.* (2005). College students' understanding of moderate physical activity: A qualitative study. *American journal of health studies,* **20** (3), 129-134. | 1 | 2 |
| 42 | BEMELMANS, W., *et al.* (2008). The costs, effects and cost-effectiveness of counteracting overweight on a population level. A scientific base for policy targets for the dutch national plan for action. *Preventive medicine,* **46** (2), 127-132. | 1 | |
| 43 | BERGHOFER, A., *et al.* (2008). Obesity prevalence from a european perspective: A systematic review. *Bmc public health,* **8** , 200. | 1 | |

| No. | SYSTEMATIC REVIEW OUTPUT | SCREENING 1 (123) | SCREENING 2 (64) |
|---|---|---|---|
| 44 | BERRIGAN, D., *et al.* (2006). Physical activity and acculturation among adult hispanics in the united states. *Research quarterly for exercise and sport,* **77** (2), 147-157. | 1 | 2 |
| 45 | BERRIGAN, David, *et al.* (2003). Patterns of health behavior in U.S. adults. *Preventive medicine,* **36** (5), 615-623. | 1 | 2 |
| 46 | BESSER, L. M. and DANNENBERG, A. L. (2005). Walking to public transit steps to help meet physical activity recommendations. *American journal of preventive medicine,* **29** (4), 273-280. | 1 | 2 |
| 47 | BIRMANN, B. M., *et al.* (2007). Body mass index, physical activity, and risk of multiple myeloma. *Cancer epidemiology biomarkers & prevention,* **16** (7), 1474-1478. | | |
| 48 | BLACK, Peter N. and SCRAGG, Robert (2005). Relationship between serum 25-hydroxyvitamin D and pulmonary function in the third national health and nutrition examination survey. *Chest,* **128** (6), 3792-3798. | | |
| 49 | BLAIR, S. N. (2003). Physical activity, epidemiology, public health, and the american college of sports medicine. *Medicine and science in sports and exercise (hagerstown, md.),* **35** (9), 1463. | 1 | |
| 50 | BLAUM, C. S., WEST, N. A. and HAAN, M. N. (2007). Is the metabolic syndrome, with or without diabetes, associated with progressive disability in older mexican americans? *Journals of gerontology series A-biological sciences and medical sciences,* **62** (7), 766-773. | | |
| 51 | BODE, C., DE RIDDER, D. T. D. and BENSING, J. M. (2006). Preparing for aging: Development, feasibility and preliminary results of an educational program for midlife and older based on proactive coping theory. *Patient education and counseling,* **61** (2), 272-278. | | 2 |
| 52 | BOONE, J. E., *et al.* (2007). Screen time and physical activity during adolescence: Longitudinal effects on obesity in young adulthood. *International journal of behavioral nutrition and physical activity,* **4** , 26. | 1 | 2 |
| 53 | BOREHAM, Colin (2006). *Physical activity for health.* J.Sports Sci., **24** (9), 917-918 . | | |
| 54 | BOSLAUGH, Sarah E., *et al.* (2005). Misclassification of physical activity level due to exclusion of workplace activity. *Measurement in physical education & exercise science,* **9** (1), 21-33. | 1 | 2 |
| 55 | BOTSFORD, A. L. and KING, A. (2005). End-of-life care policies for people with an intellectual disability: Issues and strategies. *Journal of disability policy studies,* **16** (1), 22-30. | | |
| 56 | BOUTIN-FOSTER, C., *et al.* (2008). Training community health workers to be advocates for health promotion: Efforts taken by a community-based organization to reduce health disparities in cardiovascular disease. *Journal of community health,* **33** (2), 61-68. | | |
| 57 | BOWER, B. L. and MARTIN, M. (1999). African american female basketball players: An examination of alcohol and drug behaviors. *Journal of american college health,* **48** (3), 129-133. | | |
| 58 | BOWLING, A. and GABRIEL, Z. (2007). Lay theories of quality of life in older age. *Ageing and society,* **27** (6), 827-848. | | |
| 59 | BRAY, G. A. and CHAMPAGNE, C. M. (2004). Obesity and the metabolic syndrome: Implications for dietetics practitioners. *Journal of the american dietetic association,* **104** (1), 86-89. | | |
| 60 | BREHAUT, J. C., *et al.* (2004). The health of primary caregivers of children with cerebral palsy: How does it compare with that of other canadian caregivers? *Pediatrics,* **114** (2), 182-191. | | |
| 61 | BRENNER, James and SWANIK, Kathleen (2007). High-risk drinking characteristics in collegiate athletes. *Journal of american college health,* **56** (3), 267-272. | | |
| 62 | BRESLIN, F. C., *et al.* (2007). Time allocation between work and recreation and the associated injury risks among young people. *Journal of safety research,* **38** (3), 373-379. | | |
| 63 | BRESLOW, R. A. and SMOTHERS, B. A. (2005). Drinking patterns and body mass index in never smokers - national health interview survey, 1997-2001. *American journal of epidemiology,* **161** (4), 368-376. | | |

| No. | SYSTEMATIC REVIEW OUTPUT | SCREENING 1 (123) | SCREENING 2 (64) |
|---|---|---|---|
| 64 | BRESLOW, R. A., *et al.* (2001). Long-term recreational physical activity and breast cancer in the national health and nutrition examination survey I epidemiologic follow-up study. *Cancer epidemiology biomarkers & prevention,* **10** (7), 805-808. | | |
| 65 | BRODNEY, SUZANNE, *et al.* (2001). Nutrient intake of physically fit and unfit men and women. *Medicine and science in sports and exercise,* **00033** (00003), 459-468. | | |
| 66 | BROOKS, C. (1988). Adult physical activity behavior: A trend analysis. *Journal of clinical epidemiology,* **41** (4), 385-392. | 1 | 2 |
| 67 | BROWN, David R., *et al.* (2005). Physical activity among adults greater than or equal to 50 yr with and without disabilities, BRFSS 2001. *Medicine & science in sports & exercise,* **37** (4), 620-629. | 1 | 2 |
| 68 | BROWN, H. S., *et al.* (2007). The cost-effectiveness of a school-based overweight program. *International journal of behavioral nutrition and physical activity,* **4** , 47. | | |
| 69 | BROWN, W. J. and BAUMAN, A. E. (2000). Comparison of estimates of population levels of physical activity using two measures. *Australian and new zealand journal of public health,* **24** (5), 520-525. | 1 | 2 |
| 70 | BROWN, Wendy J. and MILLER, Yvette D. (2005). International differences in management of physical activity data: Can they explain some of the difference in prevalence estimates? *Journal of physical activity & health,* **2** (4), 460. | 1 | 2 |
| 71 | BROX, J., *et al.* (2002). Blood lipids, fatty acids, diet and lifestyle parameters in adolescents from a region in northern norway with a high mortality from coronary heart disease. *European journal of clinical nutrition,* **56** (7), 694-700. | | |
| 72 | BRUCKER, D. (2007). Estimating the prevalence of substance use, abuse, and dependence among social security disability benefit recipients. *Journal of disability policy studies,* **18** (3), 148-159. | | |
| 73 | BRUSTER, Stephen, *et al.* (1994). National survey of hospital patients. *The BMJ,* **309** (6968), 1542-1546. | | |
| 74 | BUCHOWSKI, M. S., *et al.* (2004). Patterns of physical activity in free-living adults in the southern united states. *European journal of clinical nutrition,* **58** (5), 828-837. | 1 | |
| 75 | BURGER, M., *et al.* (2003). Characteristics associated with alcohol consumption in germany. *Journal of studies on alcohol,* **64** (2), 262-269. | | |
| 76 | BURGER, M., *et al.* (2004). Alcohol consumption and its relation to cardiovascular risk factors in germany. *European journal of clinical nutrition,* **00058** (00004), 605-615. | | |
| 77 | BURNS, K. J., CAMAIONE, D. N. and CHATTERTON, C. T. (2000). Prescription of physical activity by adult nurse practitioners: A national survey. *Nursing outlook,* **48** (1), 28-33. | 1 | |
| 78 | BYLINA, Maureen M., *et al.* (2006). Comparison of exercise attitudes and behaviors of urban older adults with AARP's national sample results. *Journal of aging & physical activity,* **14** (1), 41. | | |
| 79 | CABALLERO, B. (2007). The global epidemic of obesity: An overview. *Epidemiologic reviews,* **29** , 1-5. | | |
| 80 | CAMARGO, C. A., *et al.* (1999). Prospective study of body mass index, weight change, and risk of adult-onset asthma in women. *Archives of internal medicine,* **159** (21), 2582-2588. | | |
| 81 | CAMPBELL, J. R. and AUINGER, P. (2007). The association between blood lead levels and osteoporosis among adults - results from the third national health and nutrition examination survey (NHANES III). *Environmental health perspectives,* **115** (7), 1018-1022. | | |
| 82 | CARLSON, Susan A., *et al.* (2006). Self-reported injury and physical activity levels: United states 2000 to 2002. *Annals of epidemiology,* **16** (9), 712-719. | 1 | |
| 83 | CARMELLI, D., *et al.* (1999). Midlife cardiovascular risk factors and brain morphology in identical older male twins. *Neurology,* **52** (6), 1119-1124. | | |
| 84 | CARMELLI, D., ROBINETTE, D. and FABSITZ, R. (1994). Concordance, discordance and prevalence of hypertension in world-war-ii male veteran twins. *Journal of hypertension,* **12** (3), 323-328. | | |
| 85 | CARNETHON, M. R., *et al.* (2004). Risk factors for the metabolic syndrome - the coronary artery risk development in young adults (CARDIA) study, 1985-2001. *Diabetes care,* **27** (11), 2707-2715. | | |

| No. | SYSTEMATIC REVIEW OUTPUT | SCREENING 1 (123) | SCREENING 2 (64) |
|---|---|---|---|
| 86 | CARNETHON, M. R., GULATI, M. and GREENLAND, P. (2005). Prevalence and cardiovascular disease correlates of low cardiorespiratory fitness in adolescents and adults. *Jama-journal of the american medical association,* **294** (23), 2981-2988. | | |
| 87 | CARPENTER, S. C. and CLYMAN, R. B. (2004). The long-term emotional and physical wellbeing of women who have lived in kinship care. *Children and youth services review,* **26** (7), 673-686. | | |
| 88 | CASHEL, K. M. (2000). What are australian children eating and how does this compare with public health guidelines? *Medical journal of australia,* **173** (SUPPL.). | | |
| 89 | CASTEEL, C., *et al.* (2008). National study of physical and sexual assault among women with disabilities. *Injury prevention,* **14** (2), 87-90. | | |
| 90 | CERIN, E., *et al.* (2007). Measuring perceived neighbourhood walkability in hong kong. *Cities,* **24** (3), 209-217. | | |
| 91 | CHALOUPKA, F. J. and JOHNSTON, L. D. (2007). Bridging the gap - research informing practice and policy for healthy youth behavior. *American journal of preventive medicine,* **33** (4), S147-S161. | | |
| 92 | CHAMBERS, E. C., *et al.* (2006). Serum iron and body fat distribution in a multiethnic cohort of adults living in new york city. *Journal of the american dietetic association,* **106** (5), 680-684. | | |
| 93 | CHAN, L., *et al.* (2005). Design and validation of a methodology using the international classification of diseases, 9th revision, to identify secondary conditions in people with disabilities. *Archives of physical medicine and rehabilitation,* **86** (5), 1065-1069. | | |
| 94 | CHANG, P. C., *et al.* (2008). Association between television viewing and the risk of metabolic syndrome in a community-based population. *Bmc public health,* **8** , 193. | 1 | 2 |
| 95 | CHARTIER, M. J., WALKER, J. R. and NAIMARK, B. (2007). Childhood abuse, adult health, and health care utilization: Results from a representative community sample. *American journal of epidemiology,* **165** (9), 1031-1038. | | |
| 96 | CHEN, P. -C (2006). *The effects of residential relocation on health among very old community- dwellers.* | | |
| 97 | CHENG, Yiling J., *et al.* (2007). Muscle-strengthening activity and its association with insulin sensitivity. *Diabetes care,* **30** (9), 2264-2270. | | |
| 98 | CHEONG, J., HALL, N. M. and MACKINNON, D. P. (2006). Use of designated boat operators and designated drivers among college students. *Journal of studies on alcohol,* **67** (4), 616-619. | | |
| 99 | CHI, C. H., *et al.* (2006). Definition of metabolic syndrome in preadolescent girls. *Journal of pediatrics,* **148** (6), 788-792. | | |
| 100 | CHIAN, L. K. Zason and WANG, C. K. John (2008). Motivational profiles of junior college athletes: A cluster analysis. *Journal of applied sport psychology,* **20** (2), 137-156. | | |
| 101 | CHIRIBOGA, D. E., *et al.* (2008). Gender differences in predictors of body weight and body weight change in healthy adults. *Obesity,* **16** (1), 137-145. | | |
| 102 | CHO, Sungsoo, *et al.* (2003). The effect of breakfast type on total daily energy intake and body mass index: Results from the third national health and nutrition examination survey (NHANES III). *J. am. coll. nutr.,* **22** (4), 296-302. | | |
| 103 | CHURILLA, James R. and ZOELLER, Robert F.,Jr (2008). Physical activity: Physical activity and the metabolic syndrome: A review of the evidence. *American journal of lifestyle medicine,* **2** (2), 118-125. | 1 | 2 |
| 104 | CLÉROUX, J., FELDMAN, R. D. and PETRELLA, R. J. (1999). Lifestyle modifications to prevent and control hypertension. 4. recommendations on physical exercise training. canadian hypertension society, canadian coalition for high blood pressure prevention and control, laboratory centre for disease control at health canada, heart and stroke foundation of canada. *CMAJ : Canadian medical association journal = journal de l'association medicale canadienne,* **160** (9 Suppl). | 1 | |
| 105 | CLÉROUX, J., FELDMAN, R. D. and PETRELLA, R. J. (1999). Recommendations on physical exercise training. *Canadian medical association journal,* **160** (9 SUPPL.). | | |
| 106 | COAKLEY, E. H., *et al.* (1998). Predictors of weight change in men: Results from the health professionals follow-up study. *International journal of obesity,* **22** (2), 89-96. | | |

| No. | SYSTEMATIC REVIEW OUTPUT | SCREENING 1 (123) | SCREENING 2 (64) |
|---|---|---|---|
| 107 | COLE, D. C., *et al.* (2001). Work correlates of back problems and activity restriction due to musculoskeletal disorders in the canadian national population health survey (NPHS) 1994-5 data. *Occupational and environmental medicine,* **58** (11), 728-734. | | |
| 108 | COLLINS, Mike (2006). Changing times, sport and leisure in europe and the wider world. *European sport management quarterly,* **6** (3), 307-311. | 1 | |
| 109 | CONNELL, C. M., SCOTT ROBERTS, J. and MCLAUGHLIN, S. J. (2007). Public opinion about alzheimer disease among blacks, hispanics, and whites: Results from a national survey. *Alzheimer disease and associated disorders,* **21** (3), 232-240. | | |
| 110 | CONROY, David E. and COATSWORTH, J. Douglas (2006). Coach training as a strategy for promoting youth social development. *Sport psychologist,* **20** (2), 128-144. | | |
| 111 | COOLS, Ann M., *et al.* (2007). Isokinetic scapular muscle performance in young elite gymnasts. *Journal of athletic training,* **42** (4), 458-463. | | |
| 112 | CORBIN, C. B. (2001). The "untracking" of sedentary living: A call for action. *Pediatric exercise science,* **13** (4), 347-356. | | |
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| No. | SYSTEMATIC REVIEW OUTPUT | SCREENING 1 (123) | SCREENING 2 (64) |
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| No. | SYSTEMATIC REVIEW OUTPUT | SCREENING 1 (123) | SCREENING 2 (64) |
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| 495 | TANG, B., *et al.* (2007). ASSESSING THE RELATIONSHIP BETWEEN THE NUMBER OF BIOLOGICAL AGENTS EVER USED AND CLINICAL OUTCOMES & WORK PRODUCTIVITY IN PATIENTS WITH RHEUMATOID ARTHRITIS (RA). *EULAR meeting abstracts,* **66** (Suppl_2), 275-c. | | |
| 496 | TANG, B., *et al.* (2007). FACTORS PREDICTING WORK LOSS AND PRODUCTIVITY IMPAIRMENT USING WORKER PRODUCTIVITY AND IMPAIRMENT QUESTIONNAIRE IN PATIENTS WITH RHEUMATOID ARTHRITIS. *EULAR meeting abstracts,* **66** (Suppl_2), 276. | | |
| 497 | TAVERAS, E. M., *et al.* (2008). Parental perceptions of overweight counseling in primary care: The roles of race. *Obesity,* **16** (8), 1794-1801. | | |
| 498 | TAYLOR, R. J., *et al.* (2000). Mental health services in faith communities: The role of clergy in black churches. *Social work,* **45** (1), 73-87. | | |
| 499 | TEH, Carrie Farmer, *et al.* (2008). Gender differences in health-related quality of life for veterans with serious mental illness. *Psychiatric services,* **59** (6), 663-669. | | |
| 500 | TENENBAUM, A., *et al.* (2004). Macrovascular complications of metabolic syndrome: An early intervention is imperative. *International journal of cardiology,* **97** (2), 167-172. | | |
| 501 | THANAVARO, J. L., *et al.* (2006). Predictors of poor coronary heart disease knowledge level in women without prior coronary heart disease. *Journal of the american academy of nurse practitioners,* **18** (12), 574-581. | | |
| 502 | *The active australia survey: A guide and manual for implementation, analysis and reporting.* (2003). Canberra; Australia, Australian Institute of Health and Welfare. | 1 | |
| 503 | THE SEOSI INVESTIGATORS, (1997). Survey on heart failure in italian hospital cardiology units: Results of the SEOSI study. *European heart journal,* **18** (9), 1457-1464. | | |
| 504 | THEBERGE, Nancy (2008). "Just a normal bad part of what I do": Elite athletes' accounts of the relationship between health and sport. *Sociology of sport journal,* **25** (2), 206-222. | | |
| 505 | THOMSON, C. A., *et al.* (2005). A cross-sectional analysis demonstrated the healthy volunteer effect in smokers. *Journal of clinical epidemiology,* **58** (4), 378-382. | | |
| 506 | TORSTVEIT, M. K. and SUNDGOT-BORGEN, J. (2005). Participation in leanness sports but not training volume is associated with menstrual dysfunction: A national survey of 1276 elite athletes and controls. *British journal of sports medicine,* **39** (3), 141-147. | | |
| 507 | TROIANO, R. P., *et al.* (2008). Physical activity in the united states measured by accelerometer. *Medicine and science in sports and exercise,* **40** (1), 181-188. | 1 | |
| 508 | TROPED, Philip J., *et al.* (2003). Correlates of recreational and transportation physical activity among adults in a new england community. *Preventive medicine,* **37** (4), 304-310. | 1 | 2 |
| 509 | TSORBATZOUDIS, Haralambos, *et al.* (2006). Examining the relationship between recreational sport participation and intrinsic and extrinsic motivation and amotivation. *Perceptual & motor skills,* **103** (2), 363-374. | 1 | 2 |
| 510 | TSUJI, Ichiro, *et al.* (2003). Impact of walking upon medical care expenditure in japan: The ohsaki cohort study. *International journal of epidemiology,* **32** (5), 809-814. | | |

| No. | SYSTEMATIC REVIEW OUTPUT | SCREENING 1 (123) | SCREENING 2 (64) |
|---|---|---|---|
| 511 | TUCKER, L. A. and KANO, M. J. (1992). Dietary-fat and body-fat - a multivariate study of 205 adult females. *American journal of clinical nutrition,* **56** (4), 616-622. | | |
| 512 | Tung-Sung Tseng and Hui-Yi Lin (2008). Gender and age disparity in health-related behaviors and behavioral patterns based on a national survey of taiwan. *International journal of behavioral medicine,* **15** (1), 14-20. | 1 | |
| 513 | TUREK, S., *et al.* (2001). A large cross-sectional study of health attitudes, knowledge, behaviour and risks in the post-war croatian population - (the first croatian health project). *Collegium antropologicum,* **25** (1), 77-96. | 1 | 2 |
| 514 | TURNER, L. W., *et al.* (1998). Osteoporotic fracture among older US women - risk factors quantified. *Journal of aging and health,* **10** (3), 372-391. | | |
| 515 | TURNER, L. W., *et al.* (1998). Physical activity and osteoporotic fracture among older women. *Journal of athletic training,* **33** (3), 207-210. | | |
| 516 | TUTEN, C., *et al.* (1995). Biracial differences in physical-activity and body-composition among women. *Obesity research,* **3** (4), 313-318. | | |
| 517 | UAUY, R., MIZE, C. E. and CASTILLO-DURAN, C. (2000). Fat intake during childhood: Metabolic responses and effects on growth. *American journal of clinical nutrition,* **72** (5), 1354S-1360S. | | |
| 518 | UNGEMACK, J. A. (1994). Patterns of personal health practice: Men and women in the united states. *American journal of preventive medicine,* **10** (1), 38-44. | | |
| 519 | VAEZ, M. and LAFLAMME, L. (2003). Health behaviors, self-rated health, and quality of life: A study among first-year swedish university students. *Journal of american college health,* **51** (4), 156-162. | | |
| 520 | VAIL, Susan E. (2007). Community development and sport participation. *Journal of sport management,* **21** (4), 571-596. | | |
| 521 | VANNONI, F., *et al.* (2005). Workplace injuries and professional mobility correlated with health problems. the potential and limitations of the ISTAT labour force survey - july 1999. *Medicina del lavoro,* **96** (SUPPL. 1), 85-92. | | |
| 522 | VARNEY, S. J. and GUEST, J. F. (2003). The annual cost of blood transfusions in the UK. *Transfusion medicine,* **13** (4), 205-218. | | |
| 523 | VERBRUGGE, L. M. and JUAREZ, L. (2006). Profile of arthritis disability: II. *Arthritis care and research,* **55** (1), 102-113. | | |
| 524 | VINER, R. M. (2007). Do adolescent inpatient wards make a difference? findings from a national young patient survey. *Pediatrics,* **120** (4), 749-755. | | |
| 525 | VINER, R. M. and COLE, T. J. (2005). Television viewing in early childhood predicts adult body mass index. *Journal of pediatrics,* **147** (4), 429-435. | | |
| 526 | VINER, R. M. and COLE, T. J. (2006). Who changes body mass between adolescence and adulthood? factors predicting change in BMI between 16 year and 30 years in the 1970 british birth cohort. *International journal of obesity,* **30** (9), 1368-1374. | | |
| 527 | VON KORFF, Michael, *et al.* Modified WHODAS-II provides valid measure of global disability but filter items increased skewness. *Journal of clinical epidemiology,* **In Press, Corrected Proof**. | | |
| 528 | VORACEK, Martin (2007). National differences in intelligence and population rates of suicidal ideation, suicide plans, and attempted suicide. *Perceptual & motor skills,* **105** (2), 355-361. | | |
| 529 | VOZORIS, Nicholas T. and TARASUK, Valerie S. (2003). Household food insufficiency is associated with poorer health. *The journal of nutrition,* **133** (1), 120-126. | | |
| 530 | WALDRON, Jennifer J. (2007). Looking at the past to understand the present: Women and sport. (editorial). *JOPERD: The journal of physical education, recreation & dance,* **78** (3), 3-4;9. | | |
| 531 | WANG, M. C., *et al.* (2003). Diet in midpuberty and sedentary activity in prepuberty predict peak bone mass. *American journal of clinical nutrition,* **77** (2), 495-503. | | |
| 532 | WANG, Youfa (2002). Is obesity associated with early sexual maturation? A comparison of the association in american boys versus girls. *Pediatrics,* **110** (5), 903-910. | | |
| 533 | WARDLE, J. and STEPTOE, A. (2003). Socioeconomic differences in attitudes and beliefs about healthy lifestyles. *Journal of epidemiology and community health,* **57** (6), 440-443. | | |

| No. | SYSTEMATIC REVIEW OUTPUT | SCREENING 1 (123) | SCREENING 2 (64) |
|---|---|---|---|
| 534 | WATTS, P. B., *et al.* (2003). Anthropometry of young competitive sport rock climbers. *British journal of sports medicine,* **37** (5), 420-424. | | |
| 535 | WEISS, Edward C., *et al.* (2006). Weight-control practices among U.S. adults, 2001–2002. *American journal of preventive medicine,* **31** (1), 18-24. | | |
| 536 | WEISS, Edward C., *et al.* (2007). Weight regain in U.S. adults who experienced substantial weight loss, 1999–2002. *American journal of preventive medicine,* **33** (1), 34-40. | | |
| 537 | WEITZEN, S., *et al.* (2003). Factors associated with site of death a national study of where people die. *Medical care,* **41** (2), 323-335. | | |
| 538 | WELLMAN, N. S. and FRIEDBERG, B. (2002). Causes and consequences of adult obesity: Health, social and economic impacts in the united states. *Asia pacific journal of clinical nutrition,* **11** , S705-S709. | | |
| 539 | WICKEL, E. E. and EISENMANN, J. C. (2006). Within- and between-individual variability in estimated energy expenditure and habitual physical activity among young adults. *European journal of clinical nutrition,* **60** (4), 538-544. | 1 | |
| 540 | WIJNDAELE, Katrien, *et al.* (2007). Association between leisure time physical activity and stress, social support and coping: A cluster-analytical approach. *Psychology of sport & exercise,* **8** (4), 425-440. | 1 | |
| 541 | WILDMAN, Rachel P., *et al.* (2008). The obese without cardiometabolic risk factor clustering and the normal weight with cardiometabolic risk factor clustering: Prevalence and correlates of 2 phenotypes among the US population (NHANES 1999-2004). *Archives of internal medicine,* **168** (15), 1617-1624. | | |
| 542 | WILLIAMS, Melvin H. (1999). FACTS AND FALLACIES OF PURPORTED ERGOGENIC AMINO ACID SUPPLEMENTS. *Clinics in sports medicine,* **18** (3), 633-649. | | |
| 543 | WILLIAMS, P. T. (1997). Relationship of distance run per week to coronary heart disease risk factors in 8283 male runners. the national runners' health study. *Archives of internal medicine,* **157** (2), 191-198. | 1 | |
| 544 | WILLIAMS, Paul T. (1996). High-density lipoprotein cholesterol and other risk factors for coronary heart disease in female runners. *New england journal of medicine,* **334** (20), 1298-1304. | | |
| 545 | WILLIAMS, PT (1997). Evidence for the incompatibility of age-neutral overweight and age- neutral physical activity standards from runners. *American journal of clinical nutrition,* **65** (5), 1391-1396. | | |
| 546 | WILLIAMSON, DF, *et al.* (1991). Smoking cessation and severity of weight gain in a national cohort. *New england journal of medicine,* **324** (11), 739-745. | | |
| 547 | WILSGAARD, T. and JACOBSEN, B. K. (2007). Lifestyle factors and incident metabolic syndrome the tromso study 1979-2001. *Diabetes research and clinical practice,* **78** (2), 217-224. | 1 | |
| 548 | WIMBUSH, E., MACGREGOR, A. and FRASER, E. (1998). Impacts of a national mass media campaign on walking in scotland. *Health promotion international,* **13** (1), 45-53. | 1 | 2 |
| 549 | WONG, J. and WONG, S. (2002). Trends in lifestyle cardiovascular risk factors in women: Analysis from the canadian national population health survey. *International journal of nursing studies,* **39** (2), 229-242. | 1 | |
| 550 | WOOD, F. G. (2002). Ethnic differences in exercise among adults with diabetes. *Western journal of nursing research,* **24** (5), 502-515. | | |
| 551 | WOODWARD, Diana, GREEN, Eileen and HEBRON, Sandra (1989). The sociology of women's leisure and physical recreation: Constraints and opportunities. *International review for the sociology of sport,* **24** (2), 121-135. | | |
| 552 | WOOLF, Steven H., *et al.* (2006). A practice-sponsored web site to help patients pursue healthy behaviors: An ACORN study. *The annals of family medicine,* **4** (2), 148-152. | | |
| 553 | WRIGHT, M. E., *et al.* (2007). Prospective study of adiposity and weight change in relation to prostate cancer incidence and mortality. *Cancer,* **109** (4), 675-684. | | |
| 554 | WU, Tiejian, *et al.* (2002). Associations of serum C-reactive protein with fasting insulin, glucose, and glycosylated hemoglobin : The third national health and nutrition examination survey, 1988-1994. *American journal of epidemiology,* **155** (1), 65-71. | | |

| No. | SYSTEMATIC REVIEW OUTPUT | SCREENING 1 (123) | SCREENING 2 (64) |
|---|---|---|---|
| 555 | XU, K. T. and RAGAIN, R. M. (2005). Effects of weight status on the recommendations of and adherence to lifestyle modifications among hypertensive adults. *Journal of human hypertension,* **19** (5), 365-371. | | |
| 556 | YANG, Eunju (2006). Obesity in korean elderly: Nutritional and health implication. *FASEB journal,* **20** (4), A180-d-181. | | |
| 557 | YANG, X. (1997). *A multidisciplinary analysis of physical activity, sport participation and dropping out among young finns - a 12-year follow-up study.* Jyvaskyla; Finland, LIKES-Research Center for Sport and Health Sciences. | 1 | 2 |
| 558 | YANG, X. L., *et al.* (2008). The longitudinal effects of physical activity history on metabolic syndrome. *Medicine and science in sports and exercise,* **40** (8), 1424-1431. | | |
| 559 | YING WU, , MCCRONE, Susan H. and LAI, Hong J. (2008). Health behaviors and transitions of physical disability among community-dwelling older adults. *Research on aging,* **30** (5), 572-591. | | |
| 560 | YUN, Y. H., *et al.* (2004). Cigarette smoking and cancer incidence risk in adult men: National health insurance corporation study. *Cancer detection and prevention,* **29** (1), 15-24. | | |
| 561 | ZALETEL-KRAGELJ, L., ERZEN, I. and FRAS, Z. (2004). Interregional differences in health in slovenia - II. estimated prevalence of selected behavioral risk factors for cardiovascular and related diseases. *Croatian medical journal,* **45** (5), 644-650. | | |
| 562 | ZALETEL-KRAGELJ, L., FRAS, Z. and ZAKOTNIK, J. M. (2006). Results of CINDI health monitor surveys in slovenia as a tool for development of effective healthy nutrition and physical activity intervention programmes. *Journal of public health,* **14** (2), 110-118. | 1 | 2 |
| 563 | ZHANG, Ding, ZHANG, Shu-Fang and ZHAN, Xuan (2008). The epidemiology of overweight and obesity in henan province, china. *FASEB journal,* **22** (1_MeetingAbstracts), 866.16. | | |
| 564 | ZHU, S. K., *et al.* (2004). Lifestyle behaviors associated with lower risk of having the metabolic syndrome. *Metabolism-clinical and experimental,* **53** (11), 1503-1511. | 1 | 2 |
| 565 | ZONANA-NACACH, A., *et al.* (2008). Prevalence and factors associated with metabolic syndrome in patients with rheumatoid arthritis and systemic lupus erythematosus. *Jcr-journal of clinical rheumatology,* **14** (2), 74-77. | | |

# APPENDIX 2

# SYSTEMATIC REVIEW

# SUMMARY OF KEY VARIABLES CONSIDERED

# WITHIN EACH PUBLICATION

| SUMMARY OF KEY VARIABLES CONSIDERED WITHIN EACH PUBLICATION | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CATEGORY A – HIGHLY RELEVANT PUBLICATIONS (10)** | | | | | | | | | | | | | | | | | | | | | |
| | **METHODOLOGICAL VARIABLES** | | | | | | | | | **PHYSICAL ACTIVITY VARIABLES** | | | | | **HEALTH & WELLNESS VARIABLES** | | | | | |
| **AUTHORS** | **NATIONAL SUVREY** | **SAMPLE SIZE ( n=1000 >)** | **SURVEY MODE** | **REFERENCE PERIOD** | **ACTIVITY TYPE** | **FREQUENCY** | **INTENSITY** | **DURATION** | **QUALIFIYING TIME** | **TOTAL PA** | **LEISURE TIME PA** | **WORK RELATED PA** | **ACTIVE TRAVEL** | **HOME RELATED PA** | **HEALTH & HAPPINESS** | **SMOKING BEHAVIOUR** | **FRUIT & VEG CONSUMPTION** | **ALCOHOL CONSUMPTION** | **SELF-REPORTED BMI** | **TOTALS** |
| Hopkins *et al.* (1991) | | | • | • | • | • | • | • | | • | • | • | • | • | | | | | • | 11 |
| Rzewnicki *et al.* (2002) | | | • | • | | • | • | • | • | • | • | • | • | • | | | | | | 11 |
| Kerner & Kurrant (2003) | | | • | • | • | • | • | • | • | | • | | • | | | | | | | 9 |
| Hillsdon *et al.* (2001) | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | | | | 15 |
| Haskell *et al.* (2007) | Not applicable – article relates to an evaluation | | | | | | | | | | | | | | | | | | | 0 |
| Craig *et al.* (2004) | • | • | • | • | • | • | • | • | | | • | | | | | | | | | 9 |
| Berrigan *et al.* (2006) | • | • | • | • | | • | • | • | • | | • | • | • | | | • | • | • | • | 15 |
| Brown & Bauman (2000) | • | • | • | • | | • | • | • | • | • | • | • | • | • | | | | | | 13 |
| Boslaugh *et al.* (2005) | | • | • | • | | • | • | • | • | | • | • | | | | | | | | 9 |
| Reeves & Rafferty (2005) | • | • | • | • | • | • | • | • | • | | • | | | | • | | • | • | | 13 |
| **TOTALS** | 5 | 6 | 9 | 9 | 5 | 9 | 9 | 9 | 7 | 4 | 9 | 6 | 6 | 4 | 2 | 1 | 2 | 2 | 1 | |

## SUMMARY OF KEY VARIABLES CONSIDERED WITHIN EACH PUBLICATION

## CATEGORY B – RELEVANT PUBLICATIONS (36)

| | METHODOLOGICAL VARIABLES | | | | | | | | | PHYSICAL ACTIVITY VARIABLES | | | | | HEALTH & WELLNESS VARIABLES | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AUTHORS** | NATIONAL SUVREY | SAMPLE SIZE ( n=1000 >) | SURVEY MODE | REFERENCE PERIOD | ACTIVITY TYPE | FREQUENCY | INTENSITY | DURATION | QUALIFIYING TIME | TOTAL PA | LEISURE TIME PA | WORK RELATED PA | ACTIVE TRAVEL | HOME RELATED PA | HEALTH & HAPPINESS | SMOKING BEHAVIOUR | FRUIT & VEG CONSUMPTION | ALCOHOL CONSUMPTION | SELF-REPORTED BMI | **TOTALS** |
| Behrens *et al.* (2005) | Not applicable | | | | | | | | | | | | | | • | Not applicable | | | | **1** |
| Lowther *et al.* (2002) | | | • | • | | | • | • | | | • | • | | | | | | | | **6** |
| Patterson *et al.* (2004) | • | • | • | • | | • | • | • | • | | • | | | | | | | | • | **10** |
| Speck & Looney (2006) | | | • | • | • | • | • | • | • | | • | • | | • | | | | | | **10** |
| Talbot *et al.* (2001) | | • | • | | • | • | • | • | | | • | | | | | | | | | **6** |
| Yang *et al.* (2008) | | • | • | | | • | • | • | | | • | | | | | | | | | **6** |
| Troped *et al.* (2003) | | • | • | • | | • | | • | | | • | | | | | | | | | **6** |
| Zaletel-Kragelj *et al.* (2006) | • | • | • | • | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | **18** |
| Stofan *et al.* (1998) | | • | • | • | • | • | • | • | • | | • | | | | | | | | | **9** |
| Scheerder *et al.* (2005) | • | Not stated | | | | | | | | | • | | | | | | | | | **2** |
| Poortinga *et al.* (2007) | • | • | Not stated | | | • | • | • | • | | • | • | | | | • | • | | | **10** |
| Owen., N. (1996) | Not applicable – article evaluates the impact of strategic initiatives designed to promote participation in physical activity | | | | | | | | | | | | | | | | | | | **0** |
| Nigg., C. (2003) | Not applicable – article discussed the impact of technology on different aspects of physical activity interventions | | | | | | | | | | | | | | | | | | | **0** |

## SUMMARY OF KEY VARIABLES CONSIDERED WITHIN EACH PUBLICATION

### CATEGORY B – RELEVANT PUBLICATIONS (36)

| | METHODOLOGICAL VARIABLES | | | | | | | | | PHYSICAL ACTIVITY VARIABLES | | | | | HEALTH & WELLNESS VARIABLES | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AUTHORS** | NATIONAL SUVREY | SAMPLE SIZE ( n=1000 >) | SURVEY MODE | REFERENCE PERIOD | ACTIVITY TYPE | FREQUENCY | INTENSITY | DURATION | QUALIFIYING TIME | TOTAL PA | LEISURE TIME PA | WORK RELATED PA | ACTIVE TRAVEL | HOME RELATED PA | HEALTH & HAPPINESS | SMOKING BEHAVIOUR | FRUIT & VEG CONSUMPTION | ALCOHOL CONSUMPTION | SELF-REPORTED BMI | **TOTALS** |
| Morrow *et al.* (1997) | Not applicable – article relates to the populations awareness/knowledge of health related messages | | | | | | | | | | | | | | | | | | | **0** |
| Morrow *et al.* (2004) | Not applicable – article relates to adults' knowledge of exercise recommendations | | | | | | | | | | | | | | | | | | | **0** |
| McGrady *et al.* (2007) | • | • | • | • | | • | • | • | • | • | • | • | • | • | | • | • | | | **15** |
| Martínez-González (1999) | • | • | Not stated | | | • | • | • | | | • | Abstract Only – full article not found | | | | | | | | **6** |
| Macera *et al.* (2001) | • | • | • | • | • | • | • | • | • | | • | | | | | | | | | **10** |
| Lawlor *et al.* (2002) | • | • | • | | • | | • | • | | • | • | • | • | • | • | | • | | | **13** |
| Ku *et al.* (2006) | • | • | • | • | • | • | • | • | • | | • | | | | | | | | | **10** |
| Kruger *et al.* (2007) | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | | | | | **14** |
| Brown *et al.* (2005) | • | • | • | • | • | • | • | • | • | | • | | • | • | | | | | | **12** |
| Guitiérrez-Fisac *et al.* (2002) | • | • | • | | | • | | | | | • | • | | | • | • | • | | • | **10** |
| Gordon-Larsen *et al.* (2004) | • | • | • | • | | • | Not stated | | | | • | | | | | | | | | **6** |
| Ferran *et al.* (1999) | • | • | • | Not stated | | • | Not stated | | | | • | | | | • | • | • | | | **8** |

## SUMMARY OF KEY VARIABLES CONSIDERED WITHIN EACH PUBLICATION

### CATEGORY B – RELEVANT PUBLICATIONS (36)

| | METHODOLOGICAL VARIABLES | | | | | | | | | PHYSICAL ACTIVITY VARIABLES | | | | | HEALTH & WELLNESS VARIABLES | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AUTHORS** | NATIONAL SURVEY | SAMPLE SIZE ( n=1000 >) | SURVEY MODE | REFERENCE PERIOD | ACTIVITY TYPE | FREQUENCY | INTENSITY | DURATION | QUALIFIYING TIME | TOTAL PA | LEISURE TIME PA | WORK RELATED PA | ACTIVE TRAVEL | HOME RELATED PA | HEALTH & HAPPINESS | SMOKING BEHAVIOUR | FRUIT & VEG CONSUMPTION | ALCOHOL CONSUMPTION | SELF-REPORTED BMI | **TOTALS** |
| Duvigneaud *et al.* (2007) | • | • | • | • | • | • | • | • | | | • | | | | | • | • | | | **11** |
| Dunn *et al.* (1998) | Not applicable – article reviewed the history of lifestyle physical activity interventions | | | | | | | | | | | | | | | | | | | **0** |
| Craig *et al.* (2007) | • | • | • | • | | • | • | • | • | • | • | • | • | • | | | | | | **13** |
| Churilla & Zoeller (2008) | Not applicable – article discussed the findings of literature review related to physical activity and the metabolic syndrome | | | | | | | | | | | | | | | | | | | **0** |
| Brown and Miller (2005) | • | • | • | • | | • | • | • | • | | • | • | • | • | | | | | | **13** |
| Brooks C. (1988) | • | • | Not stated | | | | | | | | • | | | | | | | | | **3** |
| Berrigan *et al.* (2003) | • | • | • | • | • | • | • | • | • | | • | | | | | • | • | • | | **13** |
| Besser & Dannenberg (2005) | • | • | • | Not stated | | | | | | | | • | | | | | | | | **4** |
| Anderson *et al.* (2001) | • | • | • | • | • | • | • | • | • | | • | | | | | • | • | • | | **13** |
| Talbot A. (2001) | Not applicable – article relates to a book chapter on activity and ageing | | | | | | | | | | | | | | | | | | | **0** |
| Alsaif *et al.* (2002) | • | • | • | Not stated | | • | Not stated | | | | • | | | | | | | | | **5** |
| Glassberg & Balady (1999) | Not applicable – discussion paper related to exercise and heart disease in women | | | | | | | | | | | | | | | | | | | **0** |

## SUMMARY OF KEY VARIABLES CONSIDERED WITHIN EACH PUBLICATION

### CATEGORY B – RELEVANT PUBLICATIONS (36)

| | METHODOLOGICAL VARIABLES | | | | | | | | | PHYSICAL ACTIVITY VARIABLES | | | | | HEALTH & WELLNESS VARIABLES | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AUTHORS** | NATIONAL SUVREY | SAMPLE SIZE ( n=1000 >) | SURVEY MODE | REFERENCE PERIOD | ACTIVITY TYPE | FREQUENCY | INTENSITY | DURATION | QUALIFIYING TIME | TOTAL PA | LEISURE TIME PA | WORK RELATED PA | ACTIVE TRAVEL | HOME RELATED PA | HEALTH & HAPPINESS | SMOKING BEHAVIOUR | FRUIT & VEG CONSUMPTION | ALCOHOL CONSUMPTION | SELF-REPORTED BMI | **TOTALS** |
| MacAuley D. (1994) | Not applicable – discussing paper reviewing how adults physical activity levels are measured nationally and internationally | | | | | | | | | | | | | | | | | | | **0** |
| **TOTALS** | **22** | **25** | **24** | **17** | **11** | **22** | **20** | **21** | **14** | **5** | **26** | **11** | **7** | **8** | **5** | **8** | **9** | **2** | **3** | |

| SUMMARY OF KEY VARIABLES CONSIDERED WITHIN EACH PUBLICATION | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CATEGORY C – SOME RELEVANT PUBLICATIONS (16)** | | | | | | | | | | | | | | | | | | | | | |
| | **METHODOLOGICAL VARIABLES** | | | | | | | | | **PHYSICAL ACTIVITY VARIABLES** | | | | | **HEALTH & WELLNESS VARIABLES** | | | | | |
| AUTHORS | NATIONAL SUVREY | SAMPLE SIZE ( n=1000 >) | SURVEY MODE | REFERENCE PERIOD | ACTIVITY TYPE | FREQUENCY | INTENSITY | DURATION | QUALIFIYING TIME | TOTAL PA | LEISURE TIME PA | WORK RELATED PA | ACTIVE TRAVEL | HOME RELATED PA | HEALTH & HAPPINESS | SMOKING BEHAVIOUR | FRUIT & VEG CONSUMPTION | ALCOHOL CON.SUMPTIO N | SELF-REPORTED PAL | **Totals** |
| Lan *et al.* (2006) | • | • | • | • | | • | • | • | | • | • | | | | • | • | | • | • | **13** |
| Boone *et al.* (2007) | • | • | • | • | | • | • | Not stated | | | • | | | | | | | | | **7** |
| Lissner *et al.* (1996) | • | • | • | • | Not stated | | | | | | • | • | | | | • | | • | | **8** |
| Huberty *et al.* (2008) | | | • | • | | • | • | • | | | • | | | | • | | | | | **7** |
| Jurges H. (2007) | • | • | • | Not stated | | | | | | | | | | | • | | | | • | **5** |
| Tsorbatzoudis *et al.* (2006) | | | • | • | | • | | | | | • | | | | | | | | | **4** |
| Wimbush *et al.* (1998) | Not applicable – article relates to an evaluation of the impact of mass media walking campaign in Scotland | | | | | | | | | | | | | | | | | | | **0** |
| Turk *et al.* (2000) | • | • | • | Not stated | | | • | • | | | • | • | | • | | • | • | • | | **11** |
| Swan *et al.* (2008) | • | • | • | • | | • | • | • | • | | • | | | | | | | | | **9** |
| Janz F. (2006) | Not applicable – article outlining the benefits of the objective measurement of physical activity | | | | | | | | | | | | | | | | | | | **0** |
| Chang *et al.* (2008) | | • | • | • | • | | • | • | | | • | • | | | | • | | • | | **10** |
| Al-Nuaim *et al.* (1997) | • | • | • | Not stated | | | | | | | Not stated | | | | | | | | | **15** |
| Zhu *et al.* (2004) | • | • | • | • | • | • | • | • | • | | • | | | | | • | | | | **11** |
| Samdal *et al.* (2006) | • | • | • | • | • | • | • | • | • | | • | | | | | | | | | **9** |
| Gordon-Larsen *et al.* (2000) | • | • | • | • | | • | Not stated | | • | | • | | | | | | | | | **13** |
| Fentem & Mockett (1998) | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | • | | • | | **16** |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Totals** | 11 | 12 | 14 | 11 | 5 | 9 | 9 | 8 | 5 | 2 | 12 | 4 | 1 | 2 | 3 | 6 | 1 | 5 | 2 |

# APPENDIX 3

# SAPAS

# ADVANCED LETTER

# Ipsos MORI

Date as postmark

THE OCCUPIER
(address)

**Our Ref: 52267- 10197**

Dear Sir/ Madam,

Ipsos MORI is an independent research company which has been commissioned to carry out a survey of people's leisure activities in Northern Ireland.

The research is being conducted on behalf of a government funded body and will be used to improve local services in your area. **The questions in this survey are relevant for everyone whatever leisure activities you might do.**

Your address has been chosen at random from the Royal Mail's Postal Address File (PAF) and within your home we will randomly select one adult (aged 16+) to take part in our survey.

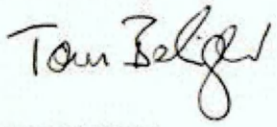
One of our interviewers will call at your home during the next month and, if it is convenient, we hope this adult will be able to spare 20-25 minutes to answer some questions. The interviewer will carry an identification card which should be presented to your household. All information collected will be treated in strict confidence and will be processed solely for the purposes of this research.

Ipsos MORI conforms with the principles of the Data Protection Act (1998). The information you provide will not be disclosed to anyone outside this organisation. The results of the research will be published, however, let me reassure you that the research data will be confidential and it will not be possible to identify you or any other member of your household from the published information.

As it is important to have the views of the widest possible range of people, I hope your household will agree to take part in the survey.

Thank you, in anticipation, for your help.

Yours faithfully



Tom Behringer
Research Director - Ireland
Ipsos MORI

# APPENDIX 4

# SAPAS

# FINAL QUESTIONNAIRE

# Sport and Physical Activity Participation Survey 2009-2010

# Final Questionnaire

**Table of contents**

PROGRAMMING INFORMATION:

ALL ACTIVITIES OF AT LEAST MODERATE INTENSITY DONE IN THE LAST SEVEN DAYS NEED TO BE RECORDED DURING THE INTERVIEW AND DISPLAYED IN QUESTION S1Q100.

THE FOLLOWING ACTIVITIES ARE OF AT LEAST MODERATE INTENSITY:

- Walking at a fairly brisk pace / a fast pace (S1Q6a and S1Q21a)
- All sport activities precoded as 'moderate', 'vigorous' or 'moderate or vigorous' (see column Precoded Intensity Labels in the respective tables)
- Activities in the home section that raised the breathing rate done (S1Q10)
- All other activities that raised the breathing rate ('yes' in S1Q6/ S1Q21/ S1Q28)

**Section 1 Sports Participation / Other Activity**

Good morning/afternoon/evening, my name is ..... from Ipsos MORI, the research organisation, and we are carrying out a survey among local people about your leisure/free time. The research is being conducted on behalf of a government funded body and will be used to improve local services in your area. At the end of the survey we want to ask you some questions about your general health and lifestyle. We are not selling anything; we would just like to ask you some questions.

The interview will take about 30 minutes. I would like to assure you that all the information we collect will be kept in the strictest confidence and used for research purposes only. We guarantee that it will not be possible to identify any particular individual or address in the results.

The first section is about all kinds of activities you may have done for getting about, in the home, at the workplace or as a sport.

For each of these we would like to ask you about activities you may have done, how often you did them and how much time you spent on each.

Firstly a few questions about **getting about.**

S1Q1
Can you read through the list of activities and tell me which if any of them you have done over the last 12 months [that is, since $month $year]. Please do not include walking or cycling you do at work but do include walking or cycling **to** work.

Please think only of occasions when you were walking or cycling for at least ten minutes without stopping.

**INTERVIEWER INSTRUCTION QUESTIONS S1Q1-S1Q5:**
**REMIND RESPONDENT THAT ONLY OCCASIONS OF 10 MINUTES OR MORE COUNT.**

BRIEFING NOTES (NOT SCRIPTED):
- GETTING SOMEWHERE AND BACK COUNTS AS TWO OCCASIONS AS LONG AS EACH WALK IS MORE THAN TEN MINUTES.
- IF WALKING IS DONE BOTH FOR RECREATION AND TO GET SOMEWHERE AT THE SAME TIME ASK WHAT WAS THE MAIN PURPOSE OF THE WALK AND CODE ACCORDINGLY. AVOID DOUBLE COUNTING.

SHOW S1Q1 "GETTING ABOUT" SHOWCARD

S1Q1
Have you done <insert activity> in the last 12 months? MULTICODE

| | | S1Q1 12 months | | S1Q2 4 weeks | |
|---|---|---|---|---|---|
| | | Yes | No | Yes | No |
| 1 | A walk for recreation (for at least 10 minutes) | 1 | 2 | 1 | 2 |
| 2 | A walk to get somewhere (for at least 10 minutes) | 1 | 2 | 1 | 2 |
| 3 | A cycle ride for recreation (for at least 10 minutes) | 1 | 2 | 1 | 2 |
| 4 | A cycle ride to get somewhere (for at least 10 minutes) | 1 | 2 | 1 | 2 |
| 5 | None of these <SINGLE CODE> | 1 | 2 | 1 | 2 |

S1Q2 IF YES, Have you done <insert activity> in the last 4 weeks?
**CODE IN TABLE ABOVE**

S1Q3 IF YES AT S1Q2, On which days have you done <insert activity> in the last 7 days?
MULTICODE

| | | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday | None |
|---|---|---|---|---|---|---|---|---|---|
| 01 | A walk for recreation (least 10 minutes) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 02 | A walk to get somewhere (least 10 minutes) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 03 | A cycle ride for recreation (least 10 minutes) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 04 | A cycle ride to get somewhere (least 10 minutes) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

PROGRAMMING: KEEP THE NUMBERING OF ACTIVITIES THROUGHOUT EACH SECTION SO THAT THE NUMBERS FIT TO THE NUMBERS ON THE SHOWCARD!!! (I.E. KEEP SAME NUMBERS FOR ACTIVITIES IN S1Q1, S1Q2 ETC.)

S1Q5a How long in total have you spent doing <insert activity> in the last 7 days?

| | Hours | Minutes |
|---|---|---|
| A walk for recreation (least 10 minutes) | | |
| A walk to get somewhere (least 10 minutes) | | |

Range
10 minutes – 40 hours

S1Q6a How would you describe your usual walking pace when <insert activity>?

SHOW S1Q6a "WALKING" SHOWCARD

| | A slow pace | A steady average pace | A fairly brisk pace | A fast pace | Don't know |
|---|---|---|---|---|---|
| walking for recreation | 1 | 2 | 3 | 4 | 5 |
| walking to get somewhere | 1 | 2 | 3 | 4 | 5 |

S1Q5b How long in total have you spent doing <insert activity> in the last 7 days?

| | Hours | Minutes |
|---|---|---|
| A cycle ride for recreation (for at least ten minutes) | | |
| a cycle ride to get somewhere (for at least ten minutes) | | |

Range
10 minutes – 40 hours

S1Q6b Was the effort you put into <insert activity> usually enough to raise your breathing rate?

| | S1Q6b Breathing rate | | S1Q7 Out of breath or sweat | |
|---|---|---|---|---|
| | Yes | No | Yes | No |
| Cycling for recreation | 1 | 2 | 1 | 2 |
| Cycling to get somewhere | 1 | 2 | 1 | 2 |

S1Q7 IF YES, And was the effort you put into <insert activity> usually enough to make you out of breath or sweat? **CODE IN TABLE ABOVE**

INTERVIEWER INSTRUCTION
At S1Q5a AND S1Q5b
IF ASKED STRESS THAT THIS IS TIME SPENT ACTUALLY DOING THE ACTIVITY AND DOES NOT INCLUDE FOR EXAMPLE TIME SPENT GETTING TO AND FROM VENUES, TIME SPENT CHANGING OR SOCIALISING.

S1Q8
Now I am going to ask you a few questions about your activity in the **home.**

For the purpose of this research we are only interested in those activities that raised your breathing rate.

Please read through the list of activities and tell me which if any of them you have done over the last 12 months [that is, since $month $year].

[Work through 'home activity' grid]

SHOW S1Q8 "HOME ACTIVITY" SHOWCARD

S1Q8

Have you done <insert activity> in the last 12 months? MULTICODE

| | | S1Q8 12 months | | S1Q9 4 weeks | |
|---|---|---|---|---|---|
| | | Yes | No | Yes | No |
| 1 | Housework that raised your breathing rate (for at least ten minutes) | 1 | 2 | 1 | 2 |
| 2 | DIY (for at least ten minutes) | 1 | 2 | 1 | 2 |
| 3 | Gardening (for at least ten minutes) | 1 | 2 | 1 | 2 |
| 4 | Other activity – specify | 1 | 2 | 1 | 2 |
| 5 | None of these <SINGLE CODE> | 1 | 2 | 1 | 2 |

S1Q9 IF YES, Have you done <insert activity> in the last 4 weeks?
**CODE IN TABLE ABOVE**

S1Q10 IF YES AT S1Q9, On which days have you done <insert activity> in the last 7 days?
MULTICODE

| | | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday | None |
|---|---|---|---|---|---|---|---|---|---|
| 01 | Housework that raised your breathing rate (for at least ten minutes) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 02 | DIY (for at least ten minutes) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 03 | Gardening (for at least ten minutes) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 04 | Other activity - specify | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

PROGRAMMING: KEEP THE NUMBERING OF ACTIVITIES THROUGHOUT EACH SECTION SO THAT THE NUMBERS FIT TO THE NUMBERS ON THE SHOWCARD!!!

S1Q12 How long in total have you spent doing <insert activity> in the last 7 days?

| | Hours | Minutes |
|---|---|---|
| Housework that raised your breathing rate (for at least ten minutes) | | |
| DIY (for at least ten minutes) | | |
| Gardening (for at least ten minutes) | | |
| Other activity – specify | | |

Range

10 minutes – 40 hours

S1Q14 Was the effort you put into <insert activity> usually enough to make you out of breath or sweat??

| | S1Q7 Out of breath or sweat | |
|---|---|---|
| | Yes | No |
| Housework that raised your breathing rate (for at least ten minutes) | 1 | 2 |
| DIY (for at least ten minutes) | 1 | 2 |
| Gardening (for at least ten minutes) | 1 | 2 |
| Other activity – specify | 1 | 2 |

The next section is about activities you may have done in the **workplace.**

Which of these best describes you?

S1Q15a
SHOW "WORKING STATUS" SHOWCARD

| | | |
|---|---|---|
| **IN PAID JOB** | | |
| Working full-time 30 hrs+/week | 1 | GO TO S1Q15B |
| Working 8-29 hrs/week | 2 | |
| Working less than 8 hrs/week | 3 | |
| **NO PAID JOB** | | |
| Retired from full-time job | 4 | GO TO S1Q23 |
| Unemployed | 5 | |
| Housewife | 6 | |
| Student | 7 | |
| Other, please specify | 8 | |

---

IF CODES 1-3 IN S1Q15a

S1Q15b
How many days a week do you normally work (part-time or full-time)?
ENTER A NUMERIC NUMBER BETWEEN 0 AND 7

| | | |
|---|---|---|
| Days | | Range 0 ... 7 |
| Refused | -99 | |

---

IF RESPONDENT WORKS AT LEAST ONE DAY A WEEK (S1Q15b > 0) ASK

S1Q16
Now I am going to ask you a few questions about your activity **in the workplace.**
Please read through the list of activities and tell me which if any of them you have done over the last 12 months [that is, since $month $year] in the workplace.
PROMPT:
Walks have to be continuous (without stopping).
WALKING OR CYCLING TO WORK AND BACK SHOULD **NOT** BE INCLUDED HERE.

[Work through 'work activity' grid]
SHOW S1Q16 "WORK ACTIVITY" SHOWCARD

S1Q16
Have you done <insert activity> in the last 12 months? MULTICODE

| | | S1Q16 12 months | | S1Q17 4 weeks | |
|---|---|---|---|---|---|
| | | Yes | No | Yes | No |
| 1 | Walking about while at work (for at least 10 minutes) | 1 | 2 | 1 | 2 |
| 2 | Manual labour (of bouts of at least 10 minutes) | 1 | 2 | 1 | 2 |
| 3 | A cycle ride while at work (for at least 10 minutes) | 1 | 2 | 1 | 2 |
| 4 | Other exercise / physical activity while at work (for at least 10 minutes) | 1 | 2 | 1 | 2 |
| 5 | None of these <SINGLE CODE> | 1 | 2 | 1 | 2 |

S1Q17 IF YES, Have you done <insert activity> in the last 4 weeks?
**CODE IN TABLE ABOVE**

S1Q16 STRESS THIS ONLY INCLUDES ACTIVITIES AT WORK OR FOR GETTING TO WORK.

S1Q18 IF YES AT S1Q17, On which days (were you / have you done) <insert activity> in the last 7 days? MULTICODE

| | | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday | None |
|---|---|---|---|---|---|---|---|---|---|
| 01 | Walking about while at work (for at least 10 minutes) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 02 | Manual labour (of bouts of at least 10 minutes) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 03 | A cycle ride while at work (for at least 10 minutes) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 04 | Other exercise / physical activity while at work (for at least 10 minutes) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

PROGRAMMING: KEEP THE NUMBERING OF ACTIVITIES THROUGHOUT EACH SECTION SO THAT THE NUMBERS FIT TO THE NUMBERS ON THE SHOWCARD!!!

S1Q20 How long in total have you spent doing <insert activity> in the last 7 days?

| | Hours | Minutes | Range |
|---|---|---|---|
| Walking about while at work (for at least 10 minutes) | | | |
| Manual labour (of bouts of at least 10 minutes) | | | |
| A cycle ride while at work (for at least 10 minutes) | | | 10 minutes – 40 hours |
| Other exercise / physical activity while at work (for at least 10 minutes) | | | |

S1Q21a How would you describe your usual walking pace while at work?

SHOW S1Q21a "WALKING" SHOWCARD

| | A slow pace | A steady average pace | A fairly brisk pace | A fast pace | Don't know |
|---|---|---|---|---|---|
| Walking about while at work (for at least 10 minutes) | 1 | 2 | 3 | 4 | 5 |

S1Q21 Was the effort you put into <insert activity> usually enough to raise your breathing rate?

| | S1Q21 Breathing rate | | S1Q22 Out of breath or sweat | |
|---|---|---|---|---|
| | Yes | No | Yes | No |
| Manual labour (of bouts of at least 10 minutes) | 1 | 2 | 1 | 2 |
| A cycle ride while at work | 1 | 2 | 1 | 2 |

| | | | | |
|---|---|---|---|---|
| (for at least 10 minutes) | | | | |
| Other exercise / physical activity while at work (for at least 10 minutes) | 1 | 2 | 1 | 2 |

S1Q22 IF YES, And was the effort you put into <insert activity> usually enough to make you out of breath or sweat? **CODE IN TABLE ABOVE**

INTERVIEWER NOTES (NOT IN SCRIPT):

- PERIODS OF WALKING IN WORK HOURS NEED TO BE CONTINUOUS AND UNINTERRUPTED WALKS FOR AT LEAST TEN MINUTES.
- BOUTS / OCCASIONS ARE DEFINED AS A CONTINUOUS SESSION OF ACTIVITY, E.G. BETWEEN BREAKS, PERIODS OF SITTING DOWN ETC.

S1Q23
Finally **sport**.
Can you please read through the list of sports and tell me which if any of them you have done over the last 12 months that is, since [$month $year].

SHOW S1Q23 "SPORT ACTIVITY" SHOWCARD
[Work through sports activity grid]

PROGRAMMING: KEEP THE NUMBERING OF ACTIVITIES THROUGHOUT EACH SECTION SO THAT THE NUMBERS FIT TO THE NUMBERS ON THE SHOWCARD!!!

| | | | |
|---|---|---|---|
| 1 | American football | 25 | Martial Arts (include self defence, tai chi, Taekwondo, Judo and Karate) |
| 2 | Angling / fishing | 26 | Motor sports |
| 3 | Badminton | 27 | Netball |
| 4 | Basketball | 28 | Rugby (union or league) |
| 5 | Bowls – indoors | 29 | Shooting |
| 6 | Bowls - outdoor / lawn | 30 | Skiing |
| 7 | Canoeing | 31 | Snooker, pool, billiards |
| 8 | Camogie | 32 | Snowboarding |
| 9 | Cricket | 33 | Squash |
| 10 | Cycling (SEE CHECK AT S1Q24A) | 34 | Swimming or diving |
| 11 | Darts | 35 | Table Tennis |
| 12 | Dance | 36 | Tennis |
| 13 | Exercise bike / running machine / spinning class / other exercise machines | 37 | Tenpin bowling |
| 14 | Football / soccer indoors (including 5-a-side) | 38 | Track and field athletics |
| 15 | Football / soccer outdoors (including 5-a-side) | 39 | Walking (SEE CHECK AT S1Q24B) |
| 16 | Gaelic Football | 40 | Weight training / lifting / body building |
| 17 | Golf, pitch and putt, putting (exclude crazy and miniature) | 41 | Windsurfing / boardsailing |
| 18 | Gymnastics | 42 | Yachting or dinghy sailing |
| 19 | Hockey (exclude ice or roller) | 43 | Yoga |
| 20 | Horse riding (exclude polo) | 44 | Other 1 - specify |
| 21 | Hurling | 45 | Other 2 - specify |
| 22 | Ice skating (exclude roller skating) | 46 | Other 3 - specify |
| 23 | Jogging | 47 | Other 4 - specify |
| 24 | Keep fit, aerobics | 48 | None |

IF CYCLING IS MENTIONED AT S1Q23 AND WAS MENTIONED EARLIER IN THE TRANSPORTATION OR WORK DOMAIN ASK:

S1Q24a
Are these cycling activities in addition to any cycling already mentioned for getting about, getting to your workplace or during your work?

| | |
|---|---|
| Yes | CODE S1Q23/10 (CYCLING) AS 1 (YES) AND CONTINUE WITH ROUTING B |
| No | |

IF WALKING IS MENTIONED in S1Q23 AND WAS MENTIONED EARLIER IN THE TRANSPORTATION OR WORK DOMAIN ASK:

S1Q24b
Are these walking activities in addition to any walking already mentioned for getting about, getting to your workplace or during your work?

| | |
|---|---|
| Yes | CODE S1Q23/36 (WALKING) AS 1 (YES) AND CONTINUE WITH ROUTING B |
| No | |

IF S1Q23 ≠ 48 'None' ASK S1Q24
ONLY SHOW SPORTS WHICH WERE SELECTED AT S1Q23
S1Q24
Have you done <insert activity> in the last 4 weeks?

| | | | |
|---|---|---|---|
| 1 | American football | 25 | Martial Arts |
| 2 | Angling / fishing | 26 | Motor sports |
| 3 | Badminton | 27 | Netball |
| 4 | Basketball | 28 | Rugby |
| 5 | Bowls – indoors | 29 | Shooting |
| 6 | Bowls - outdoor / lawn | 30 | Skiing |
| 7 | Canoeing | 31 | Snooker, pool, billiards |
| 8 | Camogie | 32 | Snowboarding |
| 9 | Cricket | 33 | Squash |
| 10 | Cycling | 34 | Swimming or diving |
| 11 | Darts | 35 | Table Tennis |
| 12 | Dance | 36 | Tennis |
| 13 | Exercise bike / running machine etc | 37 | Tenpin bowling |
| 14 | Football / soccer indoors | 38 | Track and field athletics |
| 15 | Football / soccer outdoors | 39 | Walking |
| 16 | Gaelic Football | 40 | Weight training / lifting / body building |
| 17 | Golf, pitch and putt, putting | 41 | Windsurfing / boardsailing |
| 18 | Gymnastics | 42 | Yachting or dinghy sailing |
| 19 | Hockey | 43 | Yoga |
| 20 | Horse riding | 44 | Other 1 - specify |
| 21 | Hurling | 45 | Other 2 - specify |
| 22 | Ice skating | 46 | Other 3 - specify |
| 23 | Jogging | 47 | Other 4 - specify |
| 24 | Keep fit, aerobics | 48 | None |

IF S1Q24 ≠ 48 'None' ASK S1Q25
ONLY SHOW SPORTS WHICH WERE SELECTED AT S1Q24
S1Q25
On which days have you done <insert activity> in the last 7 days?

| | | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday | None |
|---|---|---|---|---|---|---|---|---|---|
| 1 | American football | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 2 | Angling / fishing | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 3 | Badminton | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 4 | Basketball | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 5 | Bowls – indoors | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 6 | Bowls - outdoor / lawn | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 7 | Canoeing | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 8 | Camogie | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | Cricket | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 10 | Cycling | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 11 | Darts | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 12 | Dance | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 13 | Exercise bike / running machine / etc | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 14 | Football / soccer indoors | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 15 | Football / soccer outdoors | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 16 | Gaelic Football | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 17 | Golf, pitch and putt, putting | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 18 | Gymnastics | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 19 | Hockey | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 20 | Horse riding | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 21 | Hurling | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 22 | Ice skating | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 23 | Jogging | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 24 | Keep fit, aerobics | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 25 | Martial Arts | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 26 | Motor sports | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 27 | Netball | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 28 | Rugby | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 29 | Shooting | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 30 | Skiing | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 31 | Snooker, pool, billiards | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 32 | Snowboarding | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 33 | Squash | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 34 | Swimming or diving | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 35 | Table Tennis | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 36 | Tennis | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 37 | Tenpin bowling | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 38 | Track and field athletics | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 39 | Walking | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 40 | Weight training / lifting / body building | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 41 | Windsurfing / boardsailing | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 42 | Yachting or dinghy sailing | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 43 | Yoga | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 44 | Other 1 – specify | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 45 | Other 2 – specify | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 46 | Other 3 – specify | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 47 | Other 4 – specify | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

ONLY SHOW SPORTS WHICH WERE NOT 8 'NONE' AT S1Q25
S1Q27 How long in total have you spent doing <insert activity> in the last 7 days?

| | Hours | Minutes | | Hours | Minutes |
|---|---|---|---|---|---|
| American football | | | Martial Arts | | |
| Angling / fishing | | | Motor sports | | |
| Badminton | | | Netball | | |
| Basketball | | | Rugby | | |
| Bowls – indoors | | | Shooting | | |
| Bowls - outdoor / lawn | | | Skiing | | |
| Canoeing | | | Snooker, pool, billiards | | |
| Camogie | | | Snowboarding | | |
| Cricket | | | Squash | | |
| Cycling | | | Swimming or diving | | |
| Darts | | | Table Tennis | | |
| Dance | | | Tennis | | |
| Exercise bike / running machine etc | | | Tenpin bowling | | |
| Football / soccer indoors | | | Track and field athletics | | |
| Football / soccer outdoors | | | Walking | | |
| Gaelic Football | | | Weight training / lifting / body building | | |
| Golf, pitch and putt, putting | | | Windsurfing / boardsailing | | |
| Gymnastics | | | Yachting or dinghy sailing | | |
| Hockey | | | Yoga | | |
| Horse riding | | | Other 1 – specify | | |
| Hurling | | | Other 2 – specify | | |
| Ice skating | | | Other 3 – specify | | |
| Jogging | | | Other 4 – specify | | |
| Keep fit, aerobics | | | | | |

INTERVIEWER INSTRUCTION
At S1Q27
IF ASKED STRESS THAT THIS IS TIME SPENT ACTUALLY DOING THE ACTIVITY AND DOES NOT INCLUDE FOR EXAMPLE TIME SPENT GETTING TO AND FROM VENUES, TIME SPENT CHANGING OR SOCIALISING.

S1Q28 Was the effort you put into <insert activity> usually enough to raise your breathing rate?

S1Q29 IF YES, And was the effort you put into <insert activity> usually enough to make you out of breath or sweat? **CODE IN TABLE BELOW**

| Shaded questions are not asked – sport set to pre-coded intensity | | S1Q28 Breathing rate | | S1Q29 Out of breath or sweat | | PRE-CODED INTENSITY LABEL |
|---|---|---|---|---|---|---|
| | | Yes | No | Yes | No | |
| 1 | American football | | | | | VIGOROUS |
| 2 | Angling / fishing | | | | | LIGHT |
| 3 | Badminton | | | 1 | 2 | MODERATE OR VIGOROUS |
| 4 | Basketball | | | 1 | 2 | MODERATE OR VIGOROUS |
| 5 | Bowls – indoors | 1 | 2 | 1 | 2 | |
| 6 | Bowls - outdoor / lawn | 1 | 2 | 1 | 2 | |
| 7 | Canoeing | 1 | 2 | 1 | 2 | |
| 8 | Camogie | | | 1 | 2 | MODERATE OR VIGOROUS |
| 9 | Cricket | | | | | MODERATE |
| 10 | Cycling | 1 | 2 | 1 | 2 | |
| 11 | Darts | | | | | LIGHT |
| 12 | Dance | 1 | 2 | 1 | 2 | |
| 13 | Exercise bike / running machine / etc | | | 1 | 2 | MODERATE OR VIGOROUS |
| 14 | Football / soccer indoors | | | 1 | 2 | MODERATE OR VIGOROUS |
| 15 | Football / soccer outdoors | | | 1 | 2 | MODERATE OR VIGOROUS |
| 16 | Gaelic Football | | | | | VIGOROUS |
| 17 | Golf, pitch and putt, putting | | | | | MODERATE |
| 18 | Gymnastics | | | 1 | 2 | MODERATE OR VIGOROUS |
| 19 | Hockey | | | | | VIGOROUS |
| 20 | Horse riding | | | 1 | 2 | MODERATE OR VIGOROUS |
| 21 | Hurling | | | | | VIGOROUS |
| 22 | Ice skating | | | 1 | 2 | MODERATE OR VIGOROUS |
| 23 | Jogging | | | | | VIGOROUS |
| 24 | Keep fit, aerobics | | | 1 | 2 | MODERATE OR VIGOROUS |
| 25 | Martial Arts | 1 | 2 | 1 | 2 | |
| 26 | Motor sports | 1 | 2 | 1 | 2 | |
| 27 | Netball | | | 1 | 2 | MODERATE OR VIGOROUS |
| 28 | Rugby | | | | | VIGOROUS |
| 29 | Shooting | | | | | LIGHT |
| 30 | Skiing | | | 1 | 2 | MODERATE OR VIGOROUS |
| 31 | Snooker, pool, billiards | | | | | LIGHT |
| 32 | Snowboarding | | | 1 | 2 | MODERATE OR VIGOROUS |
| 33 | Squash | | | 1 | 2 | MODERATE OR VIGOROUS |
| 34 | Swimming or diving | | | 1 | 2 | MODERATE OR VIGOROUS |

| | | | | | | |
|---|---|---|---|---|---|---|
| 35 | Table Tennis | 1 | 2 | 1 | 2 | |
| 36 | Tennis | | | 1 | 2 | MODERATE OR VIGOROUS |
| 37 | Tenpin bowling | 1 | 2 | 1 | 2 | |
| 38 | Track and field athletics | | | | | VIGOROUS |
| 39 | Walking | 1 | 2 | 1 | 2 | |
| 40 | Weight training / lifting / body building | | | 1 | 2 | MODERATE OR VIGOROUS |
| 41 | Windsurfing / boardsailing | | | 1 | 2 | MODERATE OR VIGOROUS |
| 42 | Yachting or dinghy sailing | 1 | 2 | 1 | 2 | |
| 43 | Yoga | 1 | 2 | 1 | 2 | |
| 44 | Other 1 – specify | 1 | 2 | 1 | 2 | |
| 45 | Other 2 – specify | 1 | 2 | 1 | 2 | |
| 46 | Other 3 – specify | 1 | 2 | 1 | 2 | |
| 47 | Other 4 – specify | 1 | 2 | 1 | 2 | |

S1Q100

ALL RESPONDENT THAT HAVE DONE AT LEAST ONE ACTIVITY IN AT LEAST MODERATE INTENSITY DURING THE LAST SEVEN DAYS

ONLY ROUTE ACTIVITIES WHICH HAVE BEEN DONE FOR AT LEAST MODERATE INTENSITY

Please think about the following activities that you have done in the last seven days:

- <INSERT ACTIVITY>
- <INSERT ACTIVITY>
- <INSERT ACTIVITY>
- <INSERT ACTIVITY>
- <INSERT ACTIVITY>

On which days did you spend doing one or more of these activities **combined** for at least 30 minutes? The 30 minutes can be made up of bouts of 10 minutes or more.

MULTICODE

| | Y | N |
|---|---|---|
| Monday | 1 | 2 |
| Tuesday | 1 | 2 |
| Wednesday | 1 | 2 |
| Thursday | 1 | 2 |
| Friday | 1 | 2 |
| Saturday | 1 | 2 |
| Sunday | 1 | 2 |
| None of the days <SINGLE CODE> | 1 | 2 |

CODING – NOT ASKED:
S1Code1 / S1Q30

| | | |
|---|---|---|
| IF S1Q23 (PARTICIPATION IN ANY SPORT IN THE LAST 12 MONTHS) OTHER THAN 48 (NONE). | CODE AS PARTICIPANT | 1 |
| ALL OTHERS | CODE AS NON-PARTICIPANT | 2 |

IF PARTICIPANT IN S1CODE1 (S1Q30 = 1)

S1Q31
Over the last 12 months [that is, since $month $year] would you say that your participation in sport and recreational physical activity has increased, decreased or stayed about the same?

SHOW S1Q31 "PARTICIPATION" SHOWCARD
PROBE

| | |
|---|---|
| Increased a lot | 1 |
| Increased a little | 2 |
| Stayed the same | 3 |
| Decreased a little | 4 |
| Decreased a lot | 5 |
| Don't know | 6 |

IF PARTICIPANT IN S1CODE1 (S1Q30 = 1)

S1Q32
Looking ahead over the next 12 months, would you **like to** participate more, less or about the same amount of sport and recreational physical activity compared to the last 12 months?

SHOW S1Q32/33 "FUTURE PARTICIPATION" SHOWCARD
PROBE

| | |
|---|---|
| Much more | 1 |
| A little more | 2 |
| Stay the same / No more or less | 3 |
| A little less | 4 |
| A lot less | 5 |
| Don't know | 6 |

IF PARTICIPANT IN S1CODE1 (S1Q30 = 1)

S1Q33
And do you **expect to** participate in sport and recreational physical activity more, less or about the same amount compared to the last 12 months?

SHOW S1Q32/33 "FUTURE PARTICIPATION" SHOWCARD
PROBE

| | |
|---|---|
| Much more | 1 |
| A little more | 2 |
| Stay the same / No more or less | 3 |
| A little less | 4 |
| A lot less | 5 |
| Don't know | 6 |

| Section 2 | Motivation and Barriers to participation |
|---|---|

| Section 2A | Non-Participants |
|---|---|

ASK ALL WHO HAVE NOT PARTICIPATED IN **SPORT** IN THE LAST 12 MONTHS (=NON-PARTICIPANTS, S1Q30 = 2).

S2AQ1
Please can you tell me how long ago you last participated in sport and recreational physical activity or have you never participated?

| | | |
|---|---|---|
| More than a year ago but less than 5 years ago | 1 | GO TO SECTION 2B |
| 5-10 years ago | 2 | GO TO SECTION 2D |
| 11-15 years ago | 3 | |
| 16-20 years ago | 4 | |
| 20+ years ago | 5 | |
| Never participated | 6 | GO TO SECTION 2C |
| Refused | 7 | GO TO SECTION 2D |
| Don't know | 8 | |

**Section 2B Ex-Participants**

ASK ALL WHO LAST PARTICIPATED BETWEEN 1 AND 5 YEARS AGO (S2AQ1=1)

S2BQ1 (EXPAR2)
What was the main sport or recreational physical activity that you participated in?

SHOW S2BQ1 "SPORT ACTIVITY" SHOWCARD

| | | | |
|---|---|---|---|
| 1 | American football | 25 | Martial Arts (include self defence, tai chi, Taekwondo, Judo and Karate) |
| 2 | Angling / fishing | 26 | Motor sports |
| 3 | Badminton | 27 | Netball |
| 4 | Basketball | 28 | Rugby (union or league) |
| 5 | Bowls – indoors | 29 | Shooting |
| 6 | Bowls - outdoor / lawn | 30 | Skiing |
| 7 | Canoeing | 31 | Snooker, pool, billiards |
| 8 | Camogie | 32 | Snowboarding |
| 9 | Cricket | 33 | Squash |
| 10 | Cycling | 34 | Swimming or diving |
| 11 | Darts | 35 | Table Tennis |
| 12 | Dance | 36 | Tennis |
| 13 | Exercise bike / running machine / spinning class / other exercise machines | 37 | Tenpin bowling |
| 14 | Football / soccer indoors (including 5-a-side) | 38 | Track and field athletics |
| 15 | Football / soccer outdoors (including 5-a-side) | 39 | Walking |
| 16 | Gaelic Football | 40 | Weight training / lifting / body building |
| 17 | Golf, pitch and putt, putting (exclude crazy and miniature) | 41 | Windsurfing / boardsailing |
| 18 | Gymnastics | 42 | Yachting or dinghy sailing |
| 19 | Hockey (exclude ice or roller) | 43 | Yoga |
| 20 | Horse riding (exclude polo) | 44 | Other 1 - specify |
| 21 | Hurling | 45 | Other 2 - specify |
| 22 | Ice skating (exclude roller skating) | 46 | Other 3 - specify |
| 23 | Jogging | 47 | Other 4 - specify |
| 24 | Keep fit, aerobics | 48 | None |

ASK ALL WHO LAST PARTICIPATED BETWEEN 1 AND 5 YEARS AGO (S2AQ1=1)

S2BQ2a
What were the reasons you stopped participating in sport and recreational physical activity?

SHOW S2BQ2/4 "REASONS FOR STOPPING PARTICIPATING" SHOWCARD
MULTI CODE

| | S2BQ2a | | |
|---|---|---|---|
| | Yes | No | S2BQ2b |
| Injury or illness | 1 | 2 | 1 |
| Too old | 1 | 2 | 2 |
| Lost interest | 1 | 2 | 3 |
| Friends stopped playing | 1 | 2 | 4 |
| Wasn't very good | 1 | 2 | 5 |
| Too busy – family constraints | 1 | 2 | 6 |
| Too busy – other | 1 | 2 | 7 |
| Moved house/job and lost contact with sport | 1 | 2 | 8 |
| Left school/university and lost contact with sport | 1 | 2 | 9 |
| No quality facilities available | 1 | 2 | 10 |
| Transport difficulties | 1 | 2 | 11 |
| Too expensive | 1 | 2 | 12 |
| Laziness | 1 | 2 | 13 |
| Self-consciousness | 1 | 2 | 14 |
| Other, please specify | 1 | 2 | 15 |
| Don't know <SINGLE CODE> | 1 | 2 | 16 |

ASK ALL WHO MENTIONED MORE THAN ONE REASON IN S2BQ2a

S2BQ2b (EXPAR6)
And what was the main reason you stopped participating in sport and recreational physical activity?

SHOW S2BQ2/4 "REASONS FOR STOPPING PARTICIPATING" SHOWCARD
SINGLE CODE

**CODE IN TABLE ABOVE**

ASK ALL WHO LAST PARTICIPATED BETWEEN 1 AND 5 YEARS AGO (S2AQ1=1)

S2BQ3 (EXPAR8a)
Have you ever tried to get back into sport or recreational physical activity after you stopped?

| | | |
|---|---|---|
| Yes | 1 | GO TO S2BQ4 |
| No | 2 | S2DQ1 |
| Don't know | 3 | |

ASK ALL WHO HAVE TRIED TO GET BACK INTO SPORT (S2BQ3 = 1)
S2BQ4a
What were the reasons that stopped you getting back into sport and recreational physical activity, even though you tried?

SHOW S2BQ2/4 "REASONS FOR STOPPING PARTICIPATING" SHOWCARD
MULTI CODE

| | S2BQ4a | | |
|---|---|---|---|
| | Yes | No | S2BQ4b |
| Injury or illness | 1 | 2 | 1 |
| Too old | 1 | 2 | 2 |
| Lost interest | 1 | 2 | 3 |
| Friends stopped playing | 1 | 2 | 4 |
| Wasn't very good | 1 | 2 | 5 |
| Too busy – family constraints | 1 | 2 | 6 |
| Too busy – other | 1 | 2 | 7 |
| Moved house/job and lost contact with sport | 1 | 2 | 8 |
| Left school/university and lost contact with sport | 1 | 2 | 9 |
| No quality facilities available | 1 | 2 | 10 |
| Transport difficulties | 1 | 2 | 11 |
| Too expensive | 1 | 2 | 12 |
| Laziness | 1 | 2 | 13 |
| Self-consciousness | 1 | 2 | 14 |
| Other, please specify | 1 | 2 | 15 |
| Don't know <SINGLE CODE> | 1 | 2 | 16 |

ASK ALL WHO MENTIONED MORE THAN ONE REASON IN S2BQ4a

S2BQ4b (EXPAR8b)a
What was the main reason that stopped you getting back into sport and recreational physical activity, even though you tried?

SHOW S2BQ2/4 "REASONS FOR STOPPING PARTICIPATING" SHOWCARD
SINGLE CODE
**CODE IN TABLE ABOVE**

**Section 2C Respondents who have never participated**

ASK ALL WHO NEVER PARTICIPATED IN SPORT (S2AQ1 = 6)

S2CQ1 (NEVPAR1)
Why have you never participated in sport and recreational physical activity?

DO NOT PROMPT
MULTICODE

| | | Y | N |
|---|---|---|---|
| 1 | Injury | 1 | 2 |
| 2 | Disability | 1 | 2 |
| 3 | No interest | 1 | 2 |
| 4 | Friends don't play | 1 | 2 |
| 5 | Too busy | 1 | 2 |
| 6 | Transport difficulties | 1 | 2 |
| 7 | Too expensive | 1 | 2 |
| 8 | Other, please specify | 1 | 2 |
| 9 | Don't know <SINGLE CODE> | 1 | 2 |

| Section 2D | Barrier statements and encouragement |
|---|---|

ASK ALL WHO HAVE NOT PARTICIPATED IN SPORT IN THE LAST 12 MONTHS (INCLUDING THOSE WHO NEVER PARTICIPATED) (S1Q30 = 2)

I'm going to read out a number of statements. For each one, please tell me to what extent you agree or disagree

SHOW S2DQ1-7 "ENCOURAGEMENT" SHOWCARD

| | |
|---|---|
| Strongly agree | 1 |
| Tend to agree | 2 |
| Neither agree nor disagree | 3 |
| Tend to disagree | 4 |
| Strongly disagree | 5 |
| Don't know | 6 |

RANDOMISE S2DQ1 – S2DQ7

S2DQ1 It is difficult for me to travel or get to places where I can take part in sport/physical activities
S2DQ2 Participating in sport/physical activities is too expensive.
S2DQ3 I have no one to do sport/physical activities with

IF YES IN S1Q15a (respondent works part or full time)
S2DQ4 I'm too busy at work to do sport/physical activities

ASK ALL WHO HAVE NOT PARTICIPATED IN SPORT IN THE LAST 12 MONTHS (INCLUDING THOSE WHO NEVER PARTICIPATED) (S1Q30 = 2)
S2DQ5 I don't have enough time for sport/physical activities
S2DQ6 I'm not really interested in sport/physical activities
S2DQ7 My health isn't good enough for sport/physical activities

---

ASK ALL WHO HAVE NOT PARTICIPATED IN SPORT IN THE LAST 12 MONTHS (INCLUDING THOSE WHO NEVER PARTICIPATED) (S1Q30 = 2)

S2DQ8 (EXPAR11 / NEVPAR1)
To what extent are you likely to want to participate in sport and recreational physical activity in the future?

SHOW S2DQ8 "LIKELIHOOD TO ENCOURAGE" SHOWCARD

| | | |
|---|---|---|
| Very likely | 1 | GO TO S2DQ9 |
| Fairly likely | 2 | |
| Not very likely | 3 | GO TO S3Q4 |
| Not at all likely | 4 | |
| Don't know | 5 | |

---

ASK ALL WHO SAY VERY/FAIRLY LIKELY TO WANT TO PARTICIPATE IN FUTURE

S2DQ9 (EXPAR12 / NEVPAR4)
What, if anything, would encourage you to participate in sport and recreational physical activity in the future?

SHOW S2DQ9/10 "THINGS TO ENCOURAGE" SHOWCARD
MULTI CODE

| | S2DQ9 | | |
|---|---|---|---|
| | Yes | No | S2DQ10 |
| Facilities nearer to home / work | 1 | 2 | 1 |
| Better quality facilities , please specify | 1 | 2 | 2 |
| Better opening hours | 1 | 2 | 3 |
| Better information on facilities I could use | 1 | 2 | 4 |
| Support for my specific needs , please specify | 1 | 2 | 5 |
| People to go with | 1 | 2 | 6 |
| Improved transport/access | 1 | 2 | 7 |
| Help with childcare/crèche facilities | 1 | 2 | 8 |
| Cheaper admission prices | 1 | 2 | 9 |
| Other, please specify | 1 | 2 | 10 |
| Nothing <SINGLE CODE> | 1 | 2 | 11 |
| Don't know <SINGLE CODE> | 1 | 2 | 12 |

ASK ALL WHO STATED MORE THAN ONE THING THAT WOULD ENCOURAGE THEM IN S2DQ9

S2DQ10

And what is the main thing that would encourage you to participate in sport and recreational physical activity in the future?

SHOW S2DQ9/10 "THINGS TO ENCOURAGE" SHOWCARD
SINGLE CODE

**CODE IN TABLE ABOVE**

| Section 2E | Participants |
|---|---|

ASK ALL PARTICIPANTS IN SPORT IN LAST 12 MONTHS (PARTICIPANTS)

S2EQ1a (MOTIV1)
What are your reasons for taking part in sport and recreational physical activity in the last 12 months?

IF NECESSARY: 'Are there any other reasons?'

SHOW S2EQ1 "MOTIVATION" SHOWCARD
MULTICODE

| | S2EQ1a | | |
|---|---|---|---|
| | Yes | No | S2EQ1b |
| To keep fit (not just to lose weight) | 1 | 2 | 1 |
| To lose weight | 1 | 2 | 2 |
| To keep in shape/toned | 1 | 2 | 3 |
| Just to enjoy it | 1 | 2 | 4 |
| To relieve stress | 1 | 2 | 5 |
| To help with an injury or disability | 1 | 2 | 6 |
| To meet with friends | 1 | 2 | 7 |
| To meet new people | 1 | 2 | 8 |
| To train / improve performance | 1 | 2 | 9 |
| To take part in competition | 1 | 2 | 10 |
| To take children | 1 | 2 | 11 |
| Part of my work | 1 | 2 | 12 |
| Part of my voluntary work | 1 | 2 | 13 |
| Other, please specify | 1 | 2 | 14 |
| Don't know <SINGLE CODE> | 1 | 2 | 15 |

---

ASK ALL WHO MENTIONED MORE THAN ONE REASON IN S2EQ1a

S2EQ1b
And what is your main reason for taking part in sport and recreational physical activity in the last 12 months?

SHOW S2EQ1 "MOTIVATION" SHOWCARD
SINGLE CODE

**CODE IN TABLE ABOVE**

S2EQ2 (MOTIV2)
What, if anything, would encourage you to take part in sport and recreational physical activity more often than you do at the moment?

SHOW S2EQ2/3 "THINGS TO ENCOURAGE" SHOWCARD
MULTI CODE

| | S2EQ2 | | |
|---|---|---|---|
| | Yes | No | S2EQ3 |
| Facilities nearer to home / work | 1 | 2 | 1 |
| Better quality facilities , please specify | 1 | 2 | 2 |
| Better opening hours | 1 | 2 | 3 |
| Better information on facilities I could use | 1 | 2 | 4 |
| Support for my specific needs , please specify | 1 | 2 | 5 |
| People to go with | 1 | 2 | 6 |
| Improved transport/access | 1 | 2 | 7 |
| Help with childcare/crèche facilities | 1 | 2 | 8 |
| Cheaper admission prices | 1 | 2 | 9 |
| Other, please specify | 1 | 2 | 10 |
| Nothing <SINGLE CODE> | 1 | 2 | 11 |
| Don't know <SINGLE CODE> | 1 | 2 | 12 |

ASK ALL WHO STATED MORE THAN ONE THING THAT WOULD ENCOURAGE THEM IN S2EQ2

S2EQ3

And what is the main thing that would encourage you to participate in sport and recreational physical activity more often than you do at the moment?

SHOW S2EQ2/3 "THINGS TO ENCOURAGE" SHOWCARD
SINGLE CODE

**CODE IN TABLE ABOVE**

ASK ALL WHO HAVE PARTICIPATED IN SPORT IN LAST 12 MONTHS

S2EQ5 (MOTIV3)
Who, if anyone, encouraged you to participate in any sport and recreational physical activity that you have done in the last 12 months?

SHOW S2EQ5/6 "INFLUENCERS" SHOWCARD
MULTICODE

| | S2EQ5 | | |
|---|---|---|---|
| | Yes | No | S2EQ6 |
| Partner / Spouse / boyfriend / girlfriend | 1 | 2 | 1 |
| Parents | 1 | 2 | 2 |
| Children | 1 | 2 | 3 |
| Siblings | 1 | 2 | 4 |
| Other family members | 1 | 2 | 5 |
| Friends | 1 | 2 | 6 |
| Teacher | 1 | 2 | 7 |
| Coach/instructor | 1 | 2 | 8 |
| Doctor/health professional | 1 | 2 | 9 |
| Other, please specify | 1 | 2 | 10 |
| No one in particular <SINGLE CODE> | 1 | 2 | 11 |
| I encouraged myself <SINGLE CODE> | 1 | 2 | 12 |
| Don't know <SINGLE CODE> | 1 | 2 | 13 |

IF MORE THAN ONE CODE OTHER THAN 7/8 SELECTED IN S2EQ5

S2EQ6 (MOTIV4)
And who would you say encouraged you the most?

SHOW S2EQ5/6 "INFLUENCERS" SHOWCARD
SINGLE CODE

**CODE IN TABLE ABOVE**

| Section 3 | Coaching |
|---|---|

IF PARTICIPATED IN SPORT IN LAST 12 MONTHS

S3Q1 (COACH1)
Now thinking about the last 12 months, have you received tuition from an instructor or coach to improve your performance in any sports or physical activities?

This is restricted to formal coaching and does not include, for example, informal coaching or advice received by family members, friends or other participants.

| | | |
|---|---|---|
| Yes | 1 | GO TO S3Q2 |
| No | 2 | GO TO S3Q4 |

IF S3Q1 (COACH1) = 1 (YES)

S3Q2 (COACH2)
In which, if any, of the following sports or physical activities have you received tuition from an instructor or coach in the last 12 months?

SHOW S3Q2/5 "SPORT ACTIVITY" SHOWCARD
CODE ALL THAT APPLY

| | | | |
|---|---|---|---|
| 1 | American football | 25 | Martial Arts (include self defence, tai chi, Taekwondo, Judo and Karate) |
| 2 | Angling / fishing | 26 | Motor sports |
| 3 | Badminton | 27 | Netball |
| 4 | Basketball | 28 | Rugby (union or league) |
| 5 | Bowls – indoors | 29 | Shooting |
| 6 | Bowls - outdoor / lawn | 30 | Skiing |
| 7 | Canoeing | 31 | Snooker, pool, billiards |
| 8 | Camogie | 32 | Snowboarding |
| 9 | Cricket | 33 | Squash |
| 10 | Cycling | 34 | Swimming or diving |
| 11 | Darts | 35 | Table Tennis |
| 12 | Dance | 36 | Tennis |
| 13 | Exercise bike / running machine / spinning class / other exercise machines | 37 | Tenpin bowling |
| 14 | Football / soccer indoors (including 5-a-side) | 38 | Track and field athletics |
| 15 | Football / soccer outdoors (including 5-a-side) | 39 | Walking |
| 16 | Gaelic Football | 40 | Weight training / lifting / body building |
| 17 | Golf, pitch and putt, putting (exclude crazy and miniature) | 41 | Windsurfing / boardsailing |
| 18 | Gymnastics | 42 | Yachting or dinghy sailing |
| 19 | Hockey (exclude ice or roller) | 43 | Yoga |
| 20 | Horse riding (exclude polo) | 44 | Other 1 - specify |
| 21 | Hurling | 45 | Other 2 - specify |
| 22 | Ice skating (exclude roller skating) | 46 | Other 3 - specify |
| 23 | Jogging | 47 | Other 4 - specify |
| 24 | Keep fit, aerobics | 48 | None |

IF S3Q1 (COACH1) = 1 (YES)

S3Q3 (COACH3)
Did you pay for coaching in the last 12 months?

Please consider only the amount you have paid for your own coaching.

INTERVIEWER INFORMATION:
MEMBERSHIP FEES OF A GYM WITH ACCESS TO FITNESS INSTRUCTORS SHOULD NOT BE INCLUDED.

ASK ALL

S3Q4 (COACH4)
Now thinking about the last 12 months, have you ever coached or instructed any sport or physical activities to participants or athletes to improve their performance? This excludes any sports coaching or instruction associated with teaching physical education (PE) in school.

| | | |
|---|---|---|
| Yes | 1 | GO TO S3Q5 |
| No | 2 | GO TO S4Q1 |

ASK ALL WHO HAVE GIVEN COACHING OR TUITION (S3Q4 (COACH4) = 1)

S3Q5
In which sports or physical activities have you coached or given instruction in the last 12 months?

SHOW S3Q2/5 "SPORT ACTIVITY" SHOWCARD
CODE ALL THAT APPLY

| | | | |
|---|---|---|---|
| 1 | American football | 25 | Martial Arts (include self defence, tai chi, Taekwondo, Judo and Karate) |
| 2 | Angling / fishing | 26 | Motor sports |
| 3 | Badminton | 27 | Netball |
| 4 | Basketball | 28 | Rugby (union or league) |
| 5 | Bowls – indoors | 29 | Shooting |
| 6 | Bowls - outdoor / lawn | 30 | Skiing |
| 7 | Canoeing | 31 | Snooker, pool, billiards |
| 8 | Camogie | 32 | Snowboarding |
| 9 | Cricket | 33 | Squash |
| 10 | Cycling | 34 | Swimming or diving |
| 11 | Darts | 35 | Table Tennis |
| 12 | Dance | 36 | Tennis |
| 13 | Exercise bike / running machine / spinning class / other exercise machines | 37 | Tenpin bowling |
| 14 | Football / soccer indoors (including 5-a-side) | 38 | Track and field athletics |
| 15 | Football / soccer outdoors (including 5-a-side) | 39 | Walking |
| 16 | Gaelic Football | 40 | Weight training / lifting / body building |
| 17 | Golf, pitch and putt, putting (exclude crazy and miniature) | 41 | Windsurfing / boardsailing |
| 18 | Gymnastics | 42 | Yachting or dinghy sailing |
| 19 | Hockey (exclude ice or roller) | 43 | Yoga |
| 20 | Horse riding (exclude polo) | 44 | Other 1 - specify |
| 21 | Hurling | 45 | Other 2 - specify |
| 22 | Ice skating (exclude roller skating) | 46 | Other 3 - specify |
| 23 | Jogging | 47 | Other 4 - specify |
| 24 | Keep fit, aerobics | | |

ASK ALL WHO HAVE GIVEN COACHING OR TUITION (S3Q4 (COACH4) = 1)

S3Q6
What level of sports coaching or instructing do you give?

SHOW S3Q6 "COACHING" SHOWCARD
MULTICODE

| | | Y | N |
|---|---|---|---|
| 1 | Beginners | 1 | 2 |
| 2 | Improvers | 1 | 2 |
| 3 | Club | 1 | 2 |
| 4 | County | 1 | 2 |
| 5 | Regional | 1 | 2 |
| 6 | National | 1 | 2 |
| 7 | International | 1 | 2 |
| 8 | Other levels, please specify | 1 | 2 |

| Section 4 | Club Membership |
|---|---|

ASK ALL

S4Q1 (CLUB1)
Over the past 4 weeks have you been a member of a club, specifically so that you can participate in any sport or physical activities?

COULD BE A HEALTH/ FITNESS CLUB, SOCIAL CLUB (EMPLOYEES/ YOUTH CLUB, PUB TEAM, SPORTS CLUB OR OTHER CLUB)

| | | |
|---|---|---|
| Yes | 1 | GO TO S4Q2 |
| No | 2 | GO TO S5Q1 |
| Don't know | 3 | |

---

ASK ALL WHO HAVE BEEN MEMBERS OF A CLUB IN THE PAST 4 WEEKS (S4Q1 = 1)

S4Q2 (CLUB 1a)
How many different clubs do you belong to?

ENTER A NUMERIC NUMBER BETWEEN 1 AND 99

---

ASK ALL WHO ARE MEMBERS OF A CLUB IN THE PAST 4 WEEKS (S4Q1 = 1)

S4Q3 (CLUB1b)
What type of club(s) do you belong to?

SHOW S4Q3 "CLUB" SHOWCARD
MULTICODE

| | | Y | N |
|---|---|---|---|
| 1 | Sports specific club | 1 | 2 |
| 2 | Multi-sport club | 1 | 2 |
| 3 | Private health club/country club/gym | 1 | 2 |
| 4 | Council run gym/fitness suite | 1 | 2 |
| 5 | Community Club/Group | 1 | 2 |
| 6 | Church-based club/group | 1 | 2 |
| 7 | Charity-based club/group | 1 | 2 |
| 8 | Other, please specify | 1 | 2 |

S4Q4 (CLUB2)
Which, if any of the following sports or physical activities do you take part in as a member of a club?

SHOW S4Q4 "SPORT ACTIVITY" SHOWCARD
CODE ALL THAT APPLY

| | | | |
|---|---|---|---|
| 1 | American football | 25 | Martial Arts (include self defence, tai chi, Taekwondo, Judo and Karate) |
| 2 | Angling / fishing | 26 | Motor sports |
| 3 | Badminton | 27 | Netball |
| 4 | Basketball | 28 | Rugby (union or league) |
| 5 | Bowls – indoors | 29 | Shooting |
| 6 | Bowls - outdoor / lawn | 30 | Skiing |
| 7 | Canoeing | 31 | Snooker, pool, billiards |
| 8 | Camogie | 32 | Snowboarding |
| 9 | Cricket | 33 | Squash |
| 10 | Cycling | 34 | Swimming or diving |
| 11 | Darts | 35 | Table Tennis |
| 12 | Dance | 36 | Tennis |
| 13 | Exercise bike / running machine / spinning class / other exercise machines | 37 | Tenpin bowling |
| 14 | Football / soccer indoors (including 5-a-side) | 38 | Track and field athletics |
| 15 | Football / soccer outdoors (including 5-a-side) | 39 | Walking |
| 16 | Gaelic Football | 40 | Weight training / lifting / body building |
| 17 | Golf, pitch and putt, putting (exclude crazy and miniature) | 41 | Windsurfing / boardsailing |
| 18 | Gymnastics | 42 | Yachting or dinghy sailing |
| 19 | Hockey (exclude ice or roller) | 43 | Yoga |
| 20 | Horse riding (exclude polo) | 44 | Other 1 - specify |
| 21 | Hurling | 45 | Other 2 - specify |
| 22 | Ice skating (exclude roller skating) | 46 | Other 3 - specify |
| 23 | Jogging | 47 | Other 4 - specify |
| 24 | Keep fit, aerobics | 48 | None |

| Section 5 | Competition |
|---|---|

IF PARTICIPATED IN SPORT IN LAST 12 MONTHS (S1Q30 = 1)

S5Q1 (COMP1)
Have you taken part in any sporting competition or organised activity event or in the last 12 months, that is, since [$month $year]?

This may include participation in sporting competition in five a side football, marathon, charity walks etc.

Please do not include any organising, teaching, coaching or refereeing.

| | | |
|---|---|---|
| Yes | 1 | GO TO S5Q2 |
| No | 2 | GO TO S6Q1 |

ASK ALL WHO HAVE TAKEN PART IN ORGANISED COMPETITION IN LAST 12 MONTHS (S5Q1 (COMP1) = 1)

S5Q2 (COMP2)
Which, if any, of the following sports or physical activities have you taken part in an organised competition in the last 12 months, [that is, since $month $year]?

SHOW S5Q2 "SPORT ACTIVITY" SHOWCARD

MULTICODE

| | | | |
|---|---|---|---|
| 1 | American football | 25 | Martial Arts (include self defence, tai chi, Taekwondo, Judo and Karate) |
| 2 | Angling / fishing | 26 | Motor sports |
| 3 | Badminton | 27 | Netball |
| 4 | Basketball | 28 | Rugby (union or league) |
| 5 | Bowls – indoors | 29 | Shooting |
| 6 | Bowls - outdoor / lawn | 30 | Skiing |
| 7 | Canoeing | 31 | Snooker, pool, billiards |
| 8 | Camogie | 32 | Snowboarding |
| 9 | Cricket | 33 | Squash |
| 10 | Cycling | 34 | Swimming or diving |
| 11 | Darts | 35 | Table Tennis |
| 12 | Dance | 36 | Tennis |
| 13 | Exercise bike / running machine / spinning class / other exercise machines | 37 | Tenpin bowling |
| 14 | Football / soccer indoors (including 5-a-side) | 38 | Track and field athletics |
| 15 | Football / soccer outdoors (including 5-a-side) | 39 | Walking |
| 16 | Gaelic Football | 40 | Weight training / lifting / body building |
| 17 | Golf, pitch and putt, putting (exclude crazy and miniature) | 41 | Windsurfing / boardsailing |
| 18 | Gymnastics | 42 | Yachting or dinghy sailing |
| 19 | Hockey (exclude ice or roller) | 43 | Yoga |
| 20 | Horse riding (exclude polo) | 44 | Other 1 - specify |
| 21 | Hurling | 45 | Other 2 - specify |
| 22 | Ice skating (exclude roller skating) | 46 | Other 3 - specify |
| 23 | Jogging | 47 | Other 4 - specify |
| 24 | Keep fit, aerobics | 48 | None |

| Section 6 | Volunteering |
|---|---|

ASK ALL

I would now like to ask you a couple of questions about any sports volunteering that you may have done without receiving any payment except to cover expenses.

This could be, for example, helping to run an event, raising money, providing transport or coaching and mentoring but do not include time spent solely supporting your own family members.

S6Q1 (VOL1)
So during the last 12 months, that is, since [$month $year] have you done any sports voluntary work?

| | | |
|---|---|---|
| Yes | 1 | GO TO S6Q2 |
| No | 2 | GO TO S7Q1 |
| Don't know | 3 | |

---

ASK ALL WHO SAY THEY HAVE BEEN DOING SPORTS VOLUNTARY WORK
(S6Q1 = 1)

S6Q2
For which of the following types of organisations do you normally undertake sports volunteering for?

SHOW S6Q2 "SPORTS VOLUNTEERING" SHOWCARD

MULTICODE

| | | Y | N |
|---|---|---|---|
| 1 | Club | 1 | 2 |
| 2 | Governing Body of Sport | 1 | 2 |
| 3 | Community project / scheme | 1 | 2 |
| 4 | Local authorities / council | 1 | 2 |
| 5 | Private coaching operation | 1 | 2 |
| 6 | Primary / secondary schools | 1 | 2 |
| 7 | Further education / higher education | 1 | 2 |
| 8 | Church / church-based groups | 1 | 2 |
| 9 | Charities / charity-based groups | 1 | 2 |
| 10 | Other type of organisation, please specify | 1 | 2 |

---

ASK ALL WHO DID SPORTS VOLUNTARY WORK (S6Q1 = 1)

S6Q3 (VOL2a)
With which activities do you help?

SHOW S6Q3 "VOLUNTEERING ACTIVITIES" SHOWCARD

MULTICODE

| | | Y | N |
|---|---|---|---|
| 1 | Administration | 1 | 2 |
| 2 | Coaching | 1 | 2 |
| 3 | Refereeing/umpiring/officiating | 1 | 2 |
| 4 | Stewarding | 1 | 2 |
| 5 | Catering | 1 | 2 |
| 6 | Transport | 1 | 2 |
| 7 | Fundraising | 1 | 2 |
| 8 | Other, please specify | 1 | 2 |

ASK ALL WHO HAVE VOLUNTEERED IN SPORT IN LAST 12 MONTHS

S6Q4
During the last four weeks that is that is, since [$day $month] how much time have you spent on voluntary sports work?

| | | |
|---|---|---|
| Hours | | NUMBER RANGE 0 to 600 |
| Minutes | | NUMBER RANGE 0 to 59 |

| Section 7 | Paid Sports Work |
|---|---|

ASK ALL

What about paid sports work you may have done. That is sports work where you have received payment for your time rather that just expenses.

S7Q1 (PAID1)
So during the last 12 months, that is, since [$month $year] have you done any paid sports work?

| | | |
|---|---|---|
| Yes | 1 | GO TO S7Q2 |
| No | 2 | GO TO S8Q1 |
| Don't know | 3 | |

---

ASK ALL WHO HAVE DONE PAID SPORTS WORK IN THE LAST 12 MONTHS
(S7Q1 = 1)

S7Q2
During the last four weeks that is, since [$day $month] how much time in total have you spent on paid sports work?

| | | |
|---|---|---|
| Hours | | NUMBER RANGE 0 to 600 |
| Minutes | | NUMBER RANGE 0 to 59 |

---

ASK ALL WHO HAVE DONE ANY PAID SPORTS WORK (S7Q1 = 1)

S7Q3
And can you tell me, is that paid part-time or paid seasonal, or it is paid full-time?

| | |
|---|---|
| Paid part-time or paid seasonal (less than 30 hours paid work per week) | 1 |
| Paid full-time (over 30 hours paid work per week) | 2 |
| Other, please specify | 3 |
| Don't know | 4 |

ASK ALL WHO HAVE DONE ANY PAID SPORTS WORK (S7Q1 = 1)

S7Q4 (PAID2)
For which, if any of the following types of organisations or projects do you undertake your paid sports work for?

SHOW S7Q4 "PAID SPORTS WORK" SHOWCARD
MULTICODE

| | | Y | N |
|---|---|---|---|
| 1 | Club | 1 | 2 |
| 2 | Governing Body of Sport | 1 | 2 |
| 3 | Community project / scheme | 1 | 2 |
| 4 | Local authorities / council | 1 | 2 |
| 5 | Private coaching operation | 1 | 2 |
| 6 | Primary / secondary schools | 1 | 2 |
| 7 | Further education / higher education | 1 | 2 |
| 8 | Church / church-based groups | 1 | 2 |
| 9 | Charities / charity-based groups | 1 | 2 |
| 10 | Other type of organisation, please specify | 1 | 2 |

## Section 8 Facilities

ASK ALL WHO HAVE PARTICIPATED IN SPORT IN LAST 12 MONTHS

S8Q1
Thinking about all the sport and physical activities in which you take part in, are there facilities available for you to participate in these activities which are within 20 minutes of your home (either by walking or by some other means of transport)?

IF YES PROBE 'ALL OR SOME'

| | |
|---|---|
| Yes - for all of my sports | 1 |
| Yes - for some of my sports | 2 |
| No – for none of my sports | 3 |
| Don't know | 4 |

## Section 9 Spectating

ASK ALL

S9Q1 (SPEC1)
In the last 12 months, [that is, since $month $year], how often, if at all, have you attended live sporting events in Northern Ireland as a spectator? Please do not include if you attended because you were coaching, refereeing or teaching.

| | |
|---|---|
| Never | 1 |
| Once | 2 |
| 2-5 times | 3 |
| 6-10 times | 4 |
| 11-20 times | 5 |
| 21-50 times | 6 |
| More than 50 times | 7 |
| Refused | 8 |
| Don't know | 9 |

ASK ALL

S9Q2 (SPEC2)
In the last 12 months, [that is, since $month $year] how often, if at all, have you attended live sporting events outside of Northern Ireland as a spectator? Please do not include if you attended because you were coaching, refereeing or teaching.

| | | |
|---|---|---|
| Never | 1 | GO TO S10Q1 |
| Once | 2 | GO TO S9Q3 |
| 2-5 times | 3 | |
| 6-10 times | 4 | |
| 11-20 times | 5 | |
| 21-50 times | 6 | |
| More than 50 times | 7 | |
| Refused | 8 | GO TO S10Q1 |
| Don't know | 9 | |

ASK ALL WHO HAVE ATTENDED EVENTS OUTSIDE NI

S9Q3
And in which country did you attend these live sporting events in the last 12 months?
DO NOT PROMPT

MULTICODE

| | | Y | N |
|---|---|---|---|
| 1 | Republic of Ireland | 1 | 2 |
| 2 | England | 1 | 2 |
| 3 | Scotland | 1 | 2 |
| 4 | Wales | 1 | 2 |
| 5 | France | 1 | 2 |
| 6 | Germany | 1 | 2 |
| 7 | Italy | 1 | 2 |
| 8 | Poland | 1 | 2 |
| 9 | Spain | 1 | 2 |
| 10 | Australia | 1 | 2 |
| 11 | USA | 1 | 2 |
| 12 | Canada | 1 | 2 |
| 13 | Other country, please specify | 1 | 2 |

| Section 10 | Satisfaction |
|---|---|

ASK ALL

S10Q1
In the last 12 months, that is, since [$month $year], have you used any sport and recreational physical activity facilities in your local area?

| | |
|---|---|
| Yes | 1 |
| No | 2 |
| Don't know | 3 |

In the following we would like to ask you some questions about your satisfaction with sport provision in your area and different aspects of the facilities provided. If you can not answer a question from your own experience, tell us what your perception is.

ASK ALL

S10Q2 (SAT4)
Overall, how satisfied are you with sports provision in Northern Ireland?

SHOW S10Q2-11 "SATISFACTION" SHOWCARD

| | |
|---|---|
| Very satisfied | 1 |
| Fairly satisfied | 2 |
| Neither satisfied nor dissatisfied | 3 |
| Fairly dissatisfied | 4 |
| Very dissatisfied | 5 |
| Don't know | 6 |

ASK ALL

S10Q3
Overall, how satisfied are you with sports provision in your local area?

SHOW S10Q2-11 "SATISFACTION" SHOWCARD

| | |
|---|---|
| Very satisfied | 1 |
| Fairly satisfied | 2 |
| Neither satisfied nor dissatisfied | 3 |
| Fairly dissatisfied | 4 |
| Very dissatisfied | 5 |
| Don't know | 6 |

ASK ALL

For each of the following aspects, please tell me how satisfied or dissatisfied you are.

ROTATE S10Q4 – S10Q10

| | | Very satisfied | Fairly satisfied | Neither satisfied nor dissatisfied | Fairly dissatisfied | Very dissatisfied | Don't know |
|---|---|---|---|---|---|---|---|
| S10Q4 | The range of different sport and leisure facilities in your local area. | 1 | 2 | 3 | 4 | 5 | 6 |
| S10Q5 | The overall quality of sport and leisure facilities in your local area. | 1 | 2 | 3 | 4 | 5 | 6 |
| S10Q6 | The opportunities to socialise through sport in your local area. | 1 | 2 | 3 | 4 | 5 | 6 |
| S10Q7 | The opportunities to participate in the sport you like at a time that is convenient for you. | 1 | 2 | 3 | 4 | 5 | 6 |
| S10Q8 | The overall maintenance and cleanliness of sport and leisure facilities you have visited in your local area. | 1 | 2 | 3 | 4 | 5 | 6 |
| S10Q9 | The cost of sport and leisure provision in your local area. | 1 | 2 | 3 | 4 | 5 | 6 |
| S10Q10 | The helpfulness and competence of staff working in sport and leisure facilities you have visited in your local area. | 1 | 2 | 3 | 4 | 5 | 6 |
| S10Q11 | The accessibility of sport and leisure provision in your local area. | 1 | 2 | 3 | 4 | 5 | 6 |

ASK ALL WHO ANSWERED CODES 2-5 IN S10Q11

S10Q12
How do you think the accessibility can be improved?

SHOW S10Q12 "ACCESSIBILITY" SHOWCARD
MULTICODE

| | | Y | N |
|---|---|---|---|
| 1 | Facilities closer to my home | 1 | 2 |
| 2 | Facilities closer to my work | 1 | 2 |
| 3 | More parking spaces | 1 | 2 |
| 4 | Better accessibility of facilities for disabled / handicapped people | 1 | 2 |
| 5 | Better public transport | 1 | 2 |
| 6 | Other, please specify | 1 | 2 |
| 7 | Don't know <SINGLE CODE> | 1 | 2 |

## Section 11 Economic and related questions

EMPTY

| Section 12 | Perceived Health and happiness |
|---|---|

ASK ALL

S12Q1 (HEAL1)
We would now like to ask you some questions about your general health and well-being.

Over the past 12 months would you say that your health has been?

READ OUT

| | |
|---|---|
| Very good | 1 |
| Good | 2 |
| Average | 3 |
| Poor | 4 |
| Very poor | 5 |
| Refused | 6 |
| Don't know | 7 |

---

S12Q2

In general, how happy would you say you are? Please rate on a scale of 1 - 10 where 1 is "Extremely unhappy" and 10 is "Extremely happy".

SHOW S12Q2 "HAPPINESS" SHOWCARD

| Extremely unhappy | | | | | | | | | Extremely happy | Don't know | Refused |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | -97 | -99 |

S12Q3

What do you think is the recommended minimum amount of physical activity that raises the breathing rate needed for a healthy life style?

This includes all types of physical activity, such as sport, housework, gardening, DIY or walking.

SHOW S12Q3 "PHYSICAL ACTIVITY" SHOWCARD
SINGLE CODE

| | | |
|---|---|---|
| A | 90minutes per day, every day | 1 |
| B | 60 minutes per day, every day | 2 |
| C | 30 minutes per day, every day | 3 |
| D | 15 minutes per day, every day | 4 |
| | | |
| E | 90 minutes per day, 5 days per week | 5 |
| F | 60 minutes per day, 5 days per week | 6 |
| G | 30 minutes per day, 5 days per week | 7 |
| H | 15 minutes per day, 5 days per week | 8 |
| | | |
| I | 90 minutes per day, 3 days per week | 9 |
| J | 60 minutes per day, 3 days per week | 10 |
| K | 30 minutes per day, 3 days per week | 11 |
| L | 15 minutes per day, 3 days per week | 12 |
| | | |
| M | 90 minutes per day, 1 day per week | 13 |
| N | 60 minutes per day, 1 day per week | 14 |
| O | 30 minutes per day, 1 day per week | 15 |
| P | 15 minutes per day, 1 day per week | 16 |

| Section 13 | Fruit and vegetables |
|---|---|

ASK ALL

We would now like to ask you some questions about your general eating habits.

S13Q1 (FRU1)
How many portions of fruit do you eat on a typical day?

Please have a look at this card showing how a portion of fruit is defined.

SHOW S13Q1 "FRUIT" SHOWCARD

**One portion of fruit:**

- 1 slice of large fruit e.g. melon or pineapple;
- 1 piece of medium sized fruit e.g. a pear, banana or apple;
- 2 small fruits e.g. kiwis, mandarins or plums;
- 1 cup of very small fruit e.g. grapes or strawberries;
- 1 tablespoon of raisins or three dried apricots;
- 1 glass of fruit juice (fruit juice can be counted as only 1 portion each day).

Fruit squash, Fruit yoghurt, Fruit cake, Jam, Fruit and nut chocolate do not count as fruit.

| Portions | | Range 0...100 |
|---|---|---|
| Don't know | -97 | |
| Refused | -99 | |

ASK ALL

S13Q2 (FRU2)
How many portions of vegetables do you eat on a typical day?

SHOW S13Q2 "VEGETABLES" SHOWCARD

**One portion of vegetables:**

- 3 tablespoons or 5 dessert spoons of cooked vegetables;
- 1 dessert bowl of salad;

Count vegetables in ready meals if you can estimate the portion.

Do not include potatoes.

*INTERVIEWER NOTE (NOT IN SCRIPT):*
*REMIND RESPONDENTS THAT POTATOES DO NOT COUNT AS VEGETABLES.*

| Portions | | Range 0...100 |
|---|---|---|
| Don't know | -97 | |
| Refused | -99 | |

## Section 14 Alcohol and smoking

ASK ALL

We would now like to know a little bit about your drinking and smoking habits. Please remember that any information you give is totally confidential and no-one will find out what you have said.

S14Q2 (ALSMO2)
How many units of alcohol do you drink in a typical week?

SHOW S14Q2 "ALCOHOL" SHOWCARD

**One unit of alcohol:**

- ½ a pint of ordinary beer/lager/cider;
- a bottle of ordinary beer / lager / cider;
- 1 single measure of spirits;
- 1 small glass of wine;
- 1 measure of fortified wine (sherry, port etc)
- 1 small bottle of alcopops

| Units | | Range 0...100 |
|---|---|---|
| Don't know | -97 | |
| Respondent does not drink alcohol | -98 | |
| Refused | -99 | |

---

ASK ALL WHO AT LEAST 1 UNIT IN S14Q2

S14Q1 (ALSMO1)
On how many days in a typical week do you drink alcohol?

| Days | | Range 0...7 |
|---|---|---|
| Don't know | -97 | |
| Refused | -99 | |

ASK ALL

S14Q3 (ALSMO3)
Which of these best describes your smoking habits?

SHOW S14Q3 "SMOKING" SHOWCARD

| | |
|---|---|
| I smoke daily | 1 |
| I smoke occasionally but not every day | 2 |
| I used to smoke daily, but now not at all | 3 |
| I used to smoke occasionally, but now not at all | 4 |
| I have never smoked | 5 |
| Refused | 6 |
| Don't know | 7 |

| Section 15 | Demographics section |
|---|---|

Overview questions

| | |
|---|---|
| SDQ1 | gender |
| SDQ2 | age |
| SDQ2h | height |
| SDQ2w | weight |
| SDQ3 | marital status |
| SDQ4 | household size |
| SDQ5 | children in household |
| SDQ6 | age of children in household |
| SDQ7 | property ownership |
| SDQ8 | car ownership |
| SDQ9 | working status |
| SDQ10 | educational attainment |
| SDQ11 | religious denomination |
| SDQ12 | ethnic group |
| SDQ13 | long-standing illness or disability |
| SDQ14 | limitation of activities due to illness or disability |
| SDQ15 | sexual orientation |
| SDQ16 | household's income |
| SDQ17 | personal income |
| SDQ18 | past change in personal financial circumstances |
| SDQ19 | anticipated future change in personal financial circumstances |
| SDEG1–SDSEG11 | questions to determine social economic grade |
| SBACK1-SBACK3 | questions for backtracking, time, date |

I would finally like to ask you some general questions which are useful for analysis purposes. Please remember, this study is conducted anonymously and it will not be possible to identify any individual from the data.

DQ1
CODE GENDER

| | |
|---|---|
| Male | 1 |
| Female | 2 |

---

ASK ALL

SDQ2a
What was your age on your last birthday?

| | | |
|---|---|---|
| Years | | Range 16....100 |
| Refused | -99 | |

---

IF REFUSED IN SDQ2a

SDQ2b
For the purpose of this study we need to find out which age group you belong to. May I ask, are you aged between ...?

READ OUT

| | |
|---|---|
| 16 - 24 | 1 |
| 25 - 34 | 2 |
| 35 - 44 | 3 |
| 45 - 54 | 4 |
| 55 - 64 | 5 |
| 65+ | 6 |
| Estimation | MULTIPUNCH |

---

ASK ALL

SDQ2h
How tall are you?

USE TRANSFORMATION TABLE TO CONVERT FEET AND INCHES INTO CENTIMETRES

| | | |
|---|---|---|
| Centimetres | | Range 100 to 299 |
| Don't know | -97 | |
| Refused | -99 | |

---

ASK ALL

SDQ2W
How much do you weigh?

USE TRANSFORMATION TABLE TO CONVERT STONE & POUNDS INTO KILOGRAMS

| | | |
|---|---|---|
| Kilograms | | Range 40 to 200 |
| Don't know | -97 | |
| Refused | -99 | |

SDQ3
Which of these describes you?

SHOW "MARITAL STATUS" SHOWCARD

| | |
|---|---|
| Single | 1 |
| Married/Living as married | 2 |
| Living in a civil partnership | 3 |
| Widowed | 4 |
| Divorced/separated | 5 |

SDQ4
How many people are there in your household aged 16 + including yourself?

| | | |
|---|---|---|
| People | | Range 1 ... 20 |
| Refused | -99 | |

SDQ5
How many children under the age of 16 are there in your household?

| | | |
|---|---|---|
| Children | | Range 0 ... 20 |
| Refused | -99 | |

IF CHILDREN IN HOUSEHOLD

SDQ6
And what ages are the children in your household?

| | Child 1 | Child 2 | Child 3 | Child 4 | etc | Count across |
|---|---|---|---|---|---|---|
| 1 year or younger | | | | | | Sdq6_01 |
| 2 | | | | | | Sdq6_02 |
| 3 | | | | | | Sdq6_03 |
| 4 | | | | | | Sdq6_04 |
| 5 | | | | | | Sdq6_05 |
| 6 | | | | | | Sdq6_06 |
| 7 | | | | | | Sdq6_07 |
| 8 | | | | | | Sdq6_08 |
| 9 | | | | | | Sdq6_09 |
| 10 | | | | | | Sdq6_10 |
| 11 | | | | | | Sdq6_11 |
| 12 | | | | | | Sdq6_12 |
| 13 | | | | | | Sdq6_13 |
| 14 | | | | | | Sdq6_14 |
| 15 years | | | | | | Sdq6_15 |
| Refused | | | | | | Sdq6_16 |

SDQ7
Is your home owned or rented?

PROBE

| | |
|---|---|
| Owned outright | 1 |
| Being bought on mortgage | 2 |
| Rented NIHE | 3 |
| Rented privately | 4 |
| Other, please specify | 5 |

---

SDQ8
How many cars or light vans are there in your household?

| | |
|---|---|
| 1 car or light van | 1 |
| 2 cars or light vans | 2 |
| 3+ cars or light vans | 3 |
| None | 4 |

---

SDQ9

➔ see S1Q15a

---

SDQ10
Using this card, please tell me which, if any, is the highest educational or professional qualification you have obtained. Just read out the letter which applies.

IF STILL STUDYING, CHECK FOR HIGHEST ACHIEVED SO FAR.

SHOW SDQ10 "QUALIFICATIONS" SHOWCARD

| | | |
|---|---|---|
| A | GCSE (including NVQ Level 2), GCE 'O' Level (including CSE Grade 1), Senior Certificate, BTEC (General), BEC (General) | 1 |
| B | BETC (National), TEC (National), BEC (National), ONC, OND | 2 |
| C | GCE 'A'-Level (including NVQ Level 3) | 3 |
| D | BTEC (Higher), BEC (Higher), TEC (Higher), HNC, HND | 4 |
| E | Bachelor degree or equivalent | 5 |
| F | Masters/PhD or equivalent | 6 |
| G | Vocational qualifications | 7 |
| H | Other | 8 |
| I | No formal qualifications | 9 |
| J | Still studying | 10 |

---

SDQ11
What is your religious denomination?
Please tell me the letter beside your religious grouping on the card if you prefer.

SHOW SDQ11 "RELIGION" SHOWCARD

| | | |
|---|---|---|
| Q | Protestant | 1 |
| L | Catholic | 2 |
| A | Jewish | 3 |
| T | Other | 4 |
| N | None | 5 |
| | Refused | 6 |

SDQ12
To which of these ethnic groups do you belong?

SHOW SDQ12 "ETHNICITY" SHOWCARD

| | |
|---|---|
| White | 1 |
| Chinese | 2 |
| Irish Traveller | 3 |
| Indian | 4 |
| Pakistani | 5 |
| Bangladeshi | 6 |
| Black-Caribbean | 7 |
| Black-African | 8 |
| Black Other, please specify | 9 |
| Mixed Ethnic Group , please specify | 10 |
| Refused | 11 |

SDQ13
Do you have a temporary health problem, a long-standing illness, disability or infirmity? By longstanding I mean anything that has troubled you over a long period of time or that is likely to affect you over a period of time.

INCLUDE PROBLEMS DUE TO AGE. MULTICODE

| | | |
|---|---|---|
| Yes – temporary health problem | 1 | GO TO SDQ14 |
| Yes – long-standing illness | 2 | |
| Yes – long-standing disability or infirmity | 3 | |
| No <SINGLE CODE> | 4 | GO TO SDQ15 |
| Refused <SINGLE CODE> | 5 | |

IF HEALTH PROBLEM, LONG-STANDING ILLNESS OR INFIRMITY (SDQ13=1/2/3)

SDQ14
Does this health problem or disability limit your activities in any way?

| | |
|---|---|
| Yes | 1 |
| No | 2 |
| Refused | 3 |

IF HEALTH PROBLEM OR LONG-STANDING ILLNESS (SDQ12=1/2)

SDQ14a
Does this health problem involve breathing problems?

| | |
|---|---|
| Yes | 1 |
| No | 2 |
| Refused | 3 |

SDQ15
And is your sexual orientation towards someone of ...
Please tell me the letter beside your sexual orientation on the card if you prefer.

SHOW SDQ15 "SEXUAL ORIENTATION" SHOWCARD

| | | |
|---|---|---|
| Q | The same sex | 1 |
| L | The other sex | 2 |
| A | Both | 3 |
| T | None | 4 |
| N | Refused | 5 |

SDQ17
Looking at this card, can you tell me which letter corresponds to your total **personal** income before tax and including any benefits you receive?

SHOW SDQ17 "PERSONAL INCOME" SHOWCARD

| | **PER WEEK** | **PER MONTH** | **PER YEAR** | |
|---|---|---|---|---|
| K | Less than £96 | Less than £417 | Less than £5,000 | 1 |
| G | £97 - £192 | £418 - £833 | £5,000 - £9999 | 2 |
| O | £193 - £288 | £834 - £1,250 | £10,000 - £14,999 | 3 |
| J | £289 - £385 | £1,251 - £1,667 | £15,000 - £19,999 | 4 |
| M | £386 - £481 | £1,668 - £2,083 | £20,000 - £24,999 | 5 |
| L | £482 - £577 | £2,084 - £2,500 | £25,000 - £29,999 | 6 |
| P | £578 - £673 | £2,501 - £2,917 | £30,000 - £34,999 | 7 |
| N | £674 - £769 | £2,918 - £3,333 | £35,000 - £39,999 | 8 |
| H | £770 - £962 | £3,334 - £4,167 | £40,000 - £49,999 | 9 |
| I | £963 or more | £4,168 or more | £50,000 or more per year | 10 |
| | Refused | Refused | Refused | 77 |
| | Don't Know | Don't Know | Don't Know | 99 |

SDQ16
Please tell me your estimation of the **household's** annual income before tax. If you prefer tell me the letter beside the income band.

SHOW SDQ16 "HOUSEHOLD INCOME" SHOWCARD

| | PER WEEK | PER MONTH | PER YEAR | |
|---|---|---|---|---|
| K | Less than £96 | Less than £417 | Less than £5,000 | 1 |
| G | £97 - £192 | £418 - £833 | £5,000 - £9999 | 2 |
| O | £193 - £288 | £834 - £1,250 | £10,000 - £14,999 | 3 |
| J | £289 - £385 | £1,251 - £1,667 | £15,000 - £19,999 | 4 |
| M | £386 - £481 | £1,668 - £2,083 | £20,000 - £24,999 | 5 |
| L | £482 - £577 | £2,084 - £2,500 | £25,000 - £29,999 | 6 |
| P | £578 - £673 | £2,501 - £2,917 | £30,000 - £34,999 | 7 |
| N | £674 - £769 | £2,918 - £3,333 | £35,000 - £39,999 | 8 |
| H | £770 - £962 | £3,334 - £4,167 | £40,000 - £49,999 | 9 |
| I | £963 or more | £4,168 or more | £50,000 or more per year | 10 |
| | Refused | Refused | Refused | 77 |
| | Don't Know | Don't Know | Don't Know | 99 |

SDQ18
To what degree do you think that your **personal** financial circumstances have improved or got worse over the **last** twelve months?

| | |
|---|---|
| Improved a lot | 1 |
| Improved a little | 2 |
| Stayed the same | 3 |
| Got slightly worse | 4 |
| Got a lot worse | 5 |
| Don't know | 6 |

SDQ19
To what degree do you think that your personal financial circumstances will improve or get worse over the **next** twelve months?

| | |
|---|---|
| Improve a lot | 1 |
| Improve a little | 2 |
| Stay the same | 3 |
| Get slightly worse | 4 |
| Get a lot worse | 5 |
| Don't know | 6 |

| Section 15b | Demographics section – questions to determine SEG |
|---|---|

SDSEG1
Which member of your household would you say is the CHIEF INCOME EARNER (CIE), that is the person with the largest income, whether from employment, pensions, state benefits, investments or any other sources?

IF EQUAL INCOME IS CLAIMED FOR TWO PEOPLE, CLASSIFY THE OLDER AS THE C.I.E.

| | | |
|---|---|---|
| Self | 1 | GO TO SDSEG2<br>SHOW TEXT 'Respondent is CIE' |
| Other, please specify | 2 | GO TO SDSEG3 |

IF OTHER IN SDSEG1

SDSEG2
Is <INSERT 2 FROM SDSEG1> related to you?

| | | |
|---|---|---|
| Yes | 1 | SHOW TEXT 'Respondent is CIE' |
| No | 2 | Continue |

SDSEG3
Does the C.I.E. have a paid job full-time or part-time?

| | | |
|---|---|---|
| Yes | 1 | GO TO SDSEG5 |
| No | 2 | SDSEG4 |

ASK ALL WHO STATED THE CHIEF INCOME EARNER DOES NOT HAVE A PAID JOB

SDSEG4
Looking at this card, please tell me the statement that best describes the C.I.E. Just read out the letter that applies.

SHOW SDSEG4 "NO PAID JOB" SHOWCARD

| | | | |
|---|---|---|---|
| A | Retired, gets pension from previous job | 1 | ASK OCC. DETAILS OF PREVIOUS JOB IN SDSEG5 |
| B | Unemployed, less than 2 months | 2 | |
| C | Sick, still receiving pay or statutory pay from job | 3 | |
| D | Widow, receiving pension from husband's previous job | 4 | ASK OCC. DETAILS OF HUSBAND'S PREVIOUS JOB IN SDSEG5 |
| E | Divorced/separated, receiving maintenance from ex-spouse | 5 | |
| F | Full-time student | 6 | CODE SG C1 |
| G | Not working, private means | 7 | ASSESSMENT BY INTERVIEWER |
| H | Unemployed longer than 2 months | 8 | CODE SG E |
| I | Sick – only receiving Income Support or Invalidity Benefit | 9 | |
| J | Receiving State Pension only | 10 | |

SDSEG5
What is the job title of the (C.I.E.)?

| |
|---|
| |
| Don't know |

SDSEG7
What type of firm/organisation does/did (C.I.E.) work for?

| |
|---|
| |
| Don't know |

SDSEG8
Does/did (C.I.E.) have any position/rank/grade in the organisation (i.e. responsible for the work of other people)?

PROMPT AS APPROPRIATE (Foreman, Sergeant, Office Manager, Executive, Officer etc.)

| |
|---|
| |
| No |

SDSEG9
How many people is/was (C.I.E.) responsible for?

| |
|---|
| Don't know |

SDSEG10
Does (C.I.E.) have any qualifications related to this job?

PROMPT AS APPROPRIATE: Apprenticeship, professional qualifications, University degree

| |
|---|
| No |

SDSEG11
ASSESS SOCIAL GRADE

| | |
|---|---|
| A | 1 |
| B | 2 |
| C1 | 3 |
| C2 | 4 |
| D | 5 |
| E | 6 |

| Section 15c | Back-checking |
|---|---|

SBack1
Telephone number

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |

| | |
|---|---|
| In household | 1 |
| None | 2 |
| Refused to say | 3 |
| Yes, but ex-directory | 4 |

---

SBack2
Date of Interview:

| | |
|---|---|
| | <dd.mm.yy> |

---

SBack3
Day of Interview:

| | |
|---|---|
| Monday | 1 |
| Tuesday | 2 |
| Wednesday | 3 |
| Thursday | 4 |
| Friday | 5 |
| Saturday | 6 |
| Sunday | 7 |

---

SBack4
Length of Interview:

| | |
|---|---|
| | 0....100 |

---

SBack5
Assignment No: From Quota Sheet

| | | | | |
|---|---|---|---|---|
| | | | | |

**Intv. Name:**

*Capital Letters Please*

**Intv. No:**

| | | |
|---|---|---|
| | | |

End

# APPENDIX 5

# CORRELATION ANALYSIS

# FULL OUTPUT

# APPENDIX 6

# REGRESSION ANALYSIS

# FULL OUTPUT

# Physical Activity Analysis

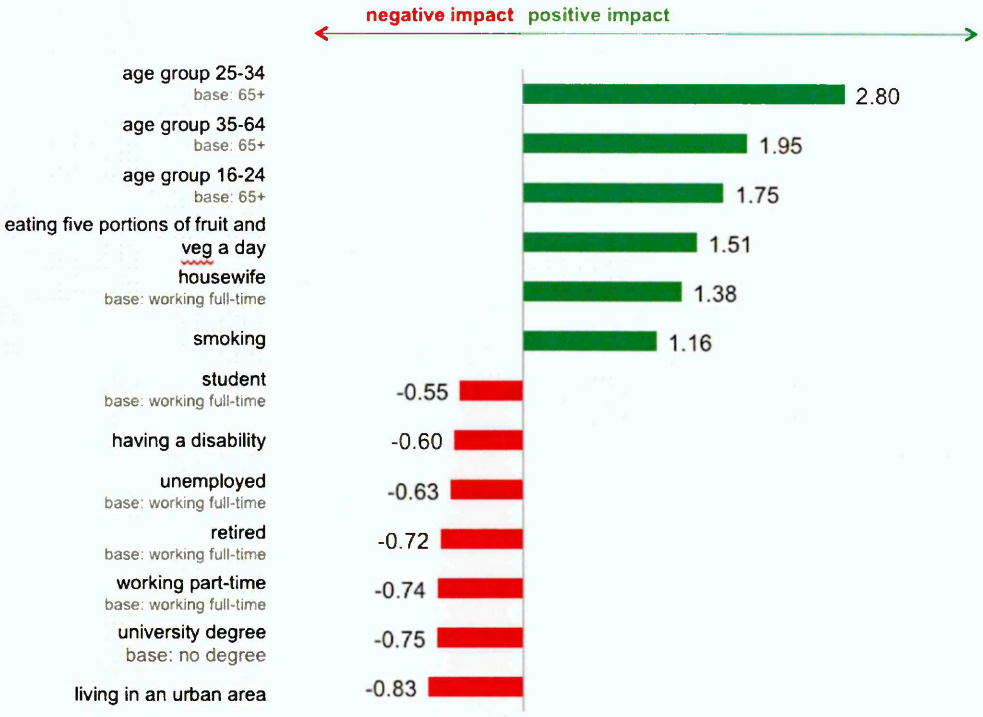
## ACTIVE 1

**Classification Table[a]**

| Observed | | | Predicted | | |
|---|---|---|---|---|---|
| | | | Regression variable: Achieving the CMA's recommendation through all 4 domains | | |
| | | | no | yes | Percentage Correct |
| Step 1 | Regression variable: Achieving the CMA's recommendation through all 4 domains | no | 1.656 | 1.295 | 56.1 |
| | | yes | 562 | 1065 | 65.5 |
| | Overall Percentage | | | | 59.4 |

a. The cut value is .354

| | Base | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I.for EXP(B) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lower | Upper |
| LRgender | female | .090 | .072 | 1.591 | 1 | .207 | 1.094 | .951 | 1.259 |
| LRage16to24 | 65+ | .557 | .175 | 10.158 | 1 | .001 | 1.745 | 1.239 | 2.458 |
| LRage25to34 | 65+ | 1.031 | .159 | 41.850 | 1 | .000 | 2.804 | 2.052 | 3.832 |
| LRage35to64 | 65+ | .669 | .136 | 24.065 | 1 | .000 | 1.952 | 1.494 | 2.550 |
| LRurbanrural | rural | -.190 | .082 | 5.381 | 1 | .020 | .827 | .704 | .971 |
| LRquals | no degree | -.288 | .097 | 8.777 | 1 | .003 | .750 | .620 | .907 |
| LRdisability | no disability | -.513 | .089 | 33.284 | 1 | .000 | .599 | .503 | .713 |
| LRalco | Within recommended | .169 | .138 | 1.503 | 1 | .220 | 1.185 | .904 | 1.553 |
| LRsmoking | non-smoker | .150 | .075 | 3.980 | 1 | .046 | 1.162 | 1.003 | 1.346 |
| LRfiveaday | less than 5 portions | .413 | .066 | 39.074 | 1 | .000 | 1.512 | 1.328 | 1.721 |
| LRmarried | not married or living as married | .068 | .078 | .751 | 1 | .386 | 1.070 | .918 | 1.247 |
| LRworkingpart | working full time | -.295 | .104 | 8.038 | 1 | .005 | .744 | .607 | .913 |
| LRretired | working full time | -.333 | .140 | 5.668 | 1 | .017 | .717 | .545 | .943 |
| LRstudent | working full time | -.594 | .164 | 13.075 | 1 | .000 | .552 | .400 | .762 |
| LRhousewife | working full time | .322 | .131 | 6.078 | 1 | .014 | 1.381 | 1.068 | 1.784 |
| LRunemployed | working full time | -.459 | .151 | 9.217 | 1 | .002 | .632 | .470 | .850 |
| LRsocA | social class E | .530 | .229 | 5.384 | 1 | .020 | 1.700 | 1.086 | 2.660 |
| LRsocB | social class E | .203 | .137 | 2.200 | 1 | .138 | 1.225 | .937 | 1.603 |
| LRsocC1 | social class E | .109 | .121 | .814 | 1 | .367 | 1.116 | .880 | 1.415 |
| LRsocC2 | social class E | .181 | .123 | 2.157 | 1 | .142 | 1.199 | .941 | 1.526 |
| LRsocD | social class E | .156 | .137 | 1.303 | 1 | .254 | 1.169 | .894 | 1.529 |
| LRreligionC | Protestant | .035 | .066 | .280 | 1 | .597 | 1.036 | .910 | 1.179 |
| Constant | | -1.229 | .200 | 37.854 | 1 | .000 | .293 | | |


negative impact
positive impact
age group 25-34
base: 65+
2.80
age group 35-64
base: 65+
1.95
age group 16-24
base: 65+
1.75
eating five portions of fruit and veg a day
1.51
housewife
base: working full-time
1.38
smoking
1.16
student
base: working full-time
-0.55
having a disability
-0.60
unemployed
base: working full-time
-0.63
retired
base: working full-time
-0.72
working part-time
base: working full-time
-0.74
university degree
base: no degree
-0.75
living in an urban area
-0.83

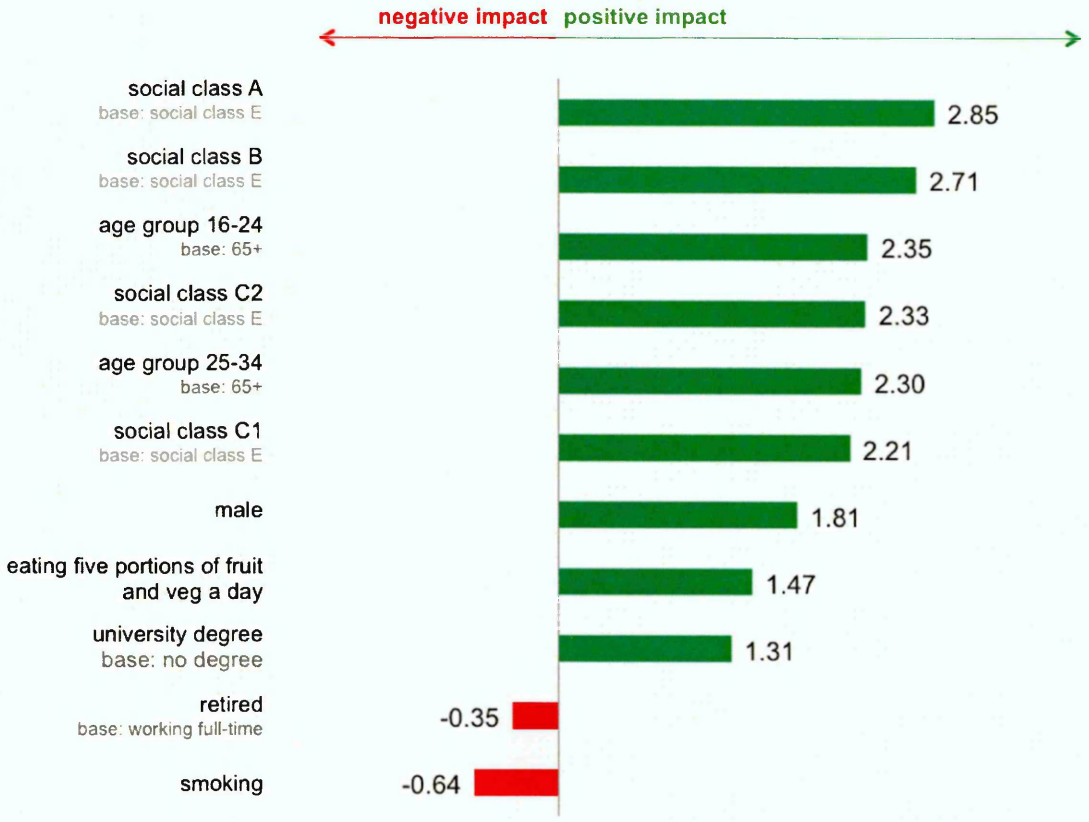
## ACTIVE 2

**Classification Table[a]**

| Observed | | | Predicted | | |
|---|---|---|---|---|---|
| | | | Regression variable: Meeting the CMO's recommendation and participating in at least moderate intensity sport on at least three days per week for at least 30 min. | | Percentage Correct |
| | | | no | Yes | |
| Step 1 | Regression variable: Meeting the CMO's recommendation and participating in at least moderate intensity sport on at least three days per week for at least 30 min. | no | 2.462 | 1.664 | 59.7 |
| | | yes | 150 | 302 | 66.8 |
| | Overall Percentage | | | | 60.4 |

a. The cut value is .098

| | Base | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I.for EXP(B) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lower | Upper |
| LRgender | female | .594 | .115 | 26.558 | 1 | .000 | 1.811 | 1.445 | 2.270 |
| LRage16to24 | 65+ | .854 | .330 | 6.717 | 1 | .010 | 2.350 | 1.231 | 4.483 |
| LRage25to34 | 65+ | .833 | .311 | 7.194 | 1 | .007 | 2.300 | 1.251 | 4.227 |
| LRage35to64 | 65+ | .273 | .290 | .889 | 1 | .346 | 1.314 | .745 | 2.319 |
| LRurbanrural | rural | .025 | .133 | .035 | 1 | .851 | 1.025 | .791 | 1.329 |
| LRquals | no degree | .270 | .137 | 3.903 | 1 | .048 | 1.311 | 1.002 | 1.714 |
| LRdisability | no disability | .044 | .151 | .085 | 1 | .770 | 1.045 | .778 | 1.404 |
| LRalco | Within recommended | .044 | .208 | .046 | 1 | .831 | 1.045 | .695 | 1.571 |
| LRsmoking | non-smoker | -.449 | .129 | 12.159 | 1 | .000 | .638 | .496 | .821 |
| LRfiveaday | less than 5 portions | .385 | .105 | 13.420 | 1 | .000 | 1.470 | 1.196 | 1.806 |
| LRmarried | not married or living as married | -.165 | .128 | 1.667 | 1 | .197 | .848 | .660 | 1.089 |
| LRworkingpart | working full time | -.190 | .168 | 1.278 | 1 | .258 | .827 | .594 | 1.150 |
| LRretired | working full time | -1.052 | .294 | 12.823 | 1 | .000 | .349 | .196 | .621 |
| LRstudent | working full time | -.290 | .222 | 1.703 | 1 | .192 | .748 | .484 | 1.156 |
| LRhousewife | working full time | -.146 | .250 | .340 | 1 | .560 | .865 | .530 | 1.411 |
| LRunemployed | working full time | .234 | .243 | .927 | 1 | .336 | 1.264 | .784 | 2.037 |
| LRsocA | social class E | 1.048 | .356 | 8.642 | 1 | .003 | 2.851 | 1.418 | 5.732 |
| LRsocB | social class E | .998 | .253 | 15.532 | 1 | .000 | 2.714 | 1.652 | 4.458 |
| LRsocC1 | social class E | .794 | .239 | 11.077 | 1 | .001 | 2.213 | 1.386 | 3.533 |
| LRsocC2 | social class E | .846 | .238 | 12.637 | 1 | .000 | 2.330 | 1.462 | 3.714 |
| LRsocD | social class E | .316 | .274 | 1.326 | 1 | .250 | 1.371 | .801 | 2.348 |
| LRreligionC | Protestant | .083 | .104 | .637 | 1 | .425 | 1.087 | .886 | 1.333 |
| Constant | | -3.657 | .400 | 83.570 | 1 | .000 | .026 | | |


negative impact
positive impact
social class A
base: social class E
2.85
social class B
base: social class E
2.71
age group 16-24
base: 65+
2.35
social class C2
base: social class E
2.33
age group 25-34
base: 65+
2.30
social class C1
base: social class E
2.21
male
1.81
eating five portions of fruit and veg a day
1.47
university degree
base: no degree
1.31
retired
base: working full-time
-0.35
smoking
-0.64

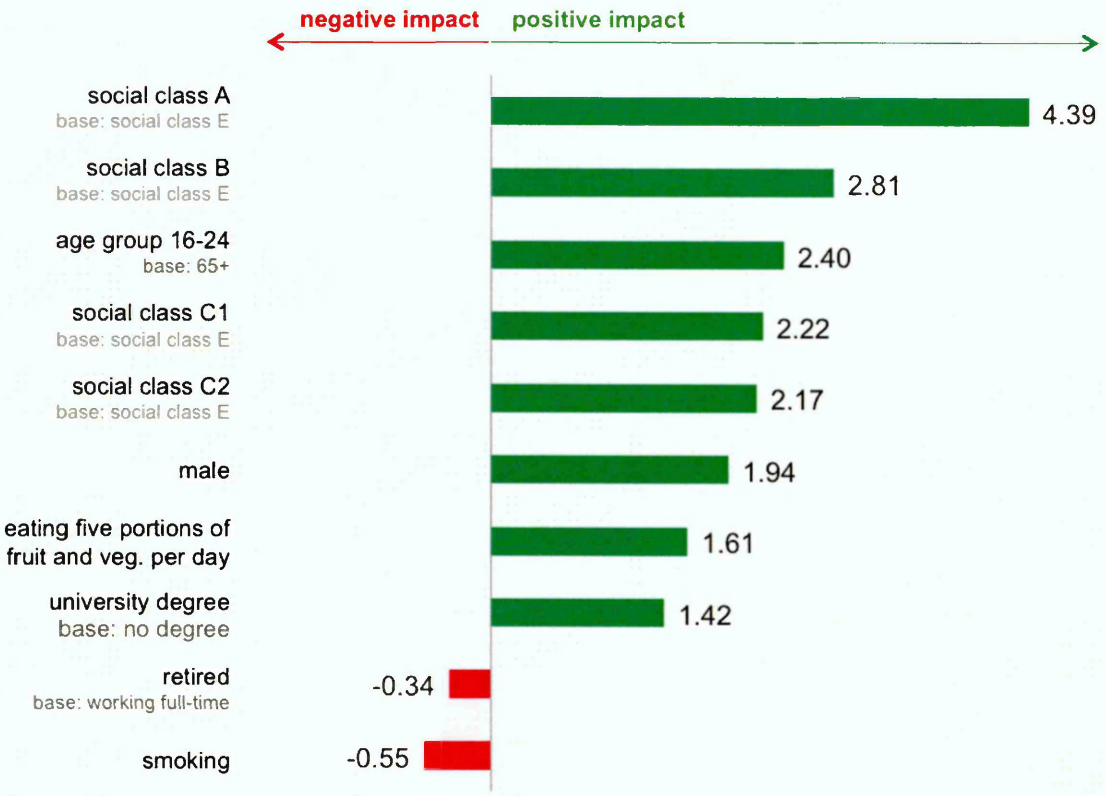
**ACTIVE 3**

**Classification Table[a]**

| Observed | | | Predicted | | |
|---|---|---|---|---|---|
| | | | Participation in moderate intensity sport on at least 3 days per week | | |
| | | | no | yes | Percentage Correct |
| Step 1 | Participation in moderate intensity sport on at least 3 days per week | no | 2,415 | 1,528 | 61.2 |
| | | yes | 178 | 457 | 72.0 |
| | Overall Percentage | | | | 62.7 |

a. The cut value is .138

| | Base | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I.for EXP(B) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lower | Upper |
| LRgender | female | .662 | .101 | 43.118 | 1 | .000 | 1.940 | 1.592 | 2.364 |
| LRage16to24 | 65+ | .874 | .304 | 8.253 | 1 | .004 | 2.395 | 1.320 | 4.347 |
| LRage25to34 | 65+ | .720 | .287 | 6.306 | 1 | .012 | 2.055 | 1.171 | 3.606 |
| LRage35to64 | 65+ | .245 | .266 | .848 | 1 | .357 | 1.278 | .759 | 2.152 |
| LRurbanrural | rural | .227 | .121 | 3.544 | 1 | .060 | 1.255 | .991 | 1.589 |
| LRquals | no degree | .347 | .158 | 4.844 | 1 | .028 | 1.415 | 1.039 | 1.928 |
| LRdisability | no disability | -.224 | .141 | 2.536 | 1 | .111 | .800 | .607 | 1.053 |
| LRalco | Within recommended | .128 | .179 | .513 | 1 | .474 | 1.137 | .800 | 1.616 |
| LRsmoking | non-smoker | -.604 | .115 | 27.521 | 1 | .000 | .547 | .436 | .685 |
| LRfiveaday | less than 5 portions | .476 | .092 | 26.584 | 1 | .000 | 1.610 | 1.343 | 1.929 |
| LRmarried | not married or living as married | -.139 | .115 | 1.450 | 1 | .228 | .870 | .695 | 1.091 |
| LRworkingpart | working full time | -.244 | .148 | 2.705 | 1 | .100 | .784 | .586 | 1.048 |
| LRretired | working full time | -1.082 | .263 | 16.946 | 1 | .000 | .339 | .202 | .567 |
| LRstudent | working full time | .105 | .181 | .335 | 1 | .563 | 1.111 | .779 | 1.584 |
| LRhousewife | working full time | -.276 | .226 | 1.500 | 1 | .221 | .759 | .487 | 1.180 |
| LRunemployed | working full time | .190 | .220 | .745 | 1 | .388 | 1.209 | .786 | 1.862 |
| LRsocA | social class E | 1.479 | .300 | 24.292 | 1 | .000 | 4.387 | 2.437 | 7.899 |
| LRsocB | social class E | 1.032 | .222 | 21.707 | 1 | .000 | 2.807 | 1.818 | 4.334 |
| LRsocC1 | social class E | .798 | .212 | 14.177 | 1 | .000 | 2.221 | 1.466 | 3.365 |
| LRsocC2 | social class E | .776 | .212 | 13.430 | 1 | .000 | 2.174 | 1.435 | 3.293 |
| LRsocD | social class E | .502 | .235 | 4.581 | 1 | .032 | 1.653 | 1.043 | 2.618 |
| LRreligionC | Protestant | .048 | .092 | .277 | 1 | .599 | 1.050 | .876 | 1.257 |
| Constant | | -3.671 | .368 | 99.538 | 1 | .000 | .025 | | |


negative impact
positive impact
social class A
base: social class E
4.39
social class B
base: social class E
2.81
age group 16-24
base: 65+
2.40
social class C1
base: social class E
2.22
social class C2
base: social class E
2.17
male
1.94
eating five portions of fruit and veg. per day
1.61
university degree
base: no degree
1.42
retired
base: working full-time
-0.34
smoking
-0.55

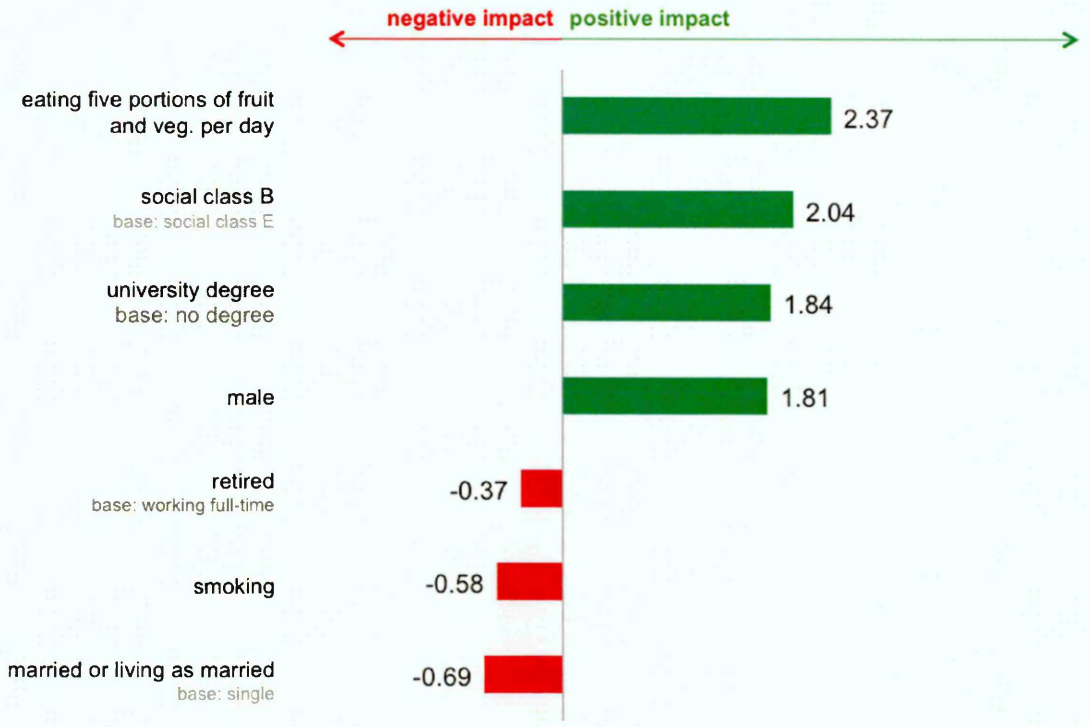
## ACTIVE 4

**Classification Table[a]**

| Observed | | Predicted | | |
|---|---|---|---|---|
| | | Regression variable: Achieving the CMA's recommendation through sport only | | Percentage Correct |
| | | no | Yes | |
| Step 1 | | | | |
| Regression variable: Achieving the CMA's recommendation through sport only | no | 2.933 | 1.438 | 67.1 |
| | yes | 60 | 146 | 70.9 |
| Overall Percentage | | | | 67.3 |

a. The cut value is .045

| | Base | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I.for EXP(B) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lower | Upper |
| LRgender | female | .593 | .164 | 13.100 | 1 | .000 | 1.809 | 1.312 | 2.493 |
| LRage16to24 | 65+ | .385 | .446 | .744 | 1 | .388 | 1.470 | .613 | 3.524 |
| LRage25to34 | 65+ | .028 | .427 | .004 | 1 | .947 | 1.029 | .446 | 2.375 |
| LRage35to64 | 65+ | -.114 | .392 | .085 | 1 | .770 | .892 | .414 | 1.923 |
| LRurbanrural | rural | -.035 | .185 | .036 | 1 | .849 | .965 | .671 | 1.388 |
| LRquals | no degree | .609 | .191 | 10.205 | 1 | .001 | 1.839 | 1.265 | 2.673 |
| LRdisability | no disability | -.405 | .244 | 2.763 | 1 | .096 | .667 | .414 | 1.075 |
| LRalco | Within recommended | .410 | .267 | 2.356 | 1 | .125 | 1.506 | .893 | 2.542 |
| LRsmoking | non-smoker | -.545 | .192 | 8.071 | 1 | .004 | .580 | .398 | .844 |
| LRfiveaday | less than 5 portions | .863 | .154 | 31.232 | 1 | .000 | 2.371 | 1.752 | 3.209 |
| LRmarried | not married or living as married | -.367 | .181 | 4.109 | 1 | .043 | .693 | .486 | .988 |
| LRworkingpart | working full time | -.088 | .240 | .134 | 1 | .714 | .916 | .573 | 1.465 |
| LRretired | working full time | -1.004 | .412 | 5.943 | 1 | .015 | .366 | .163 | .821 |
| LRstudent | working full time | -.098 | .302 | .106 | 1 | .744 | .906 | .502 | 1.638 |
| LRhousewife | working full time | -.206 | .392 | .277 | 1 | .599 | .814 | .378 | 1.753 |
| LRunemployed | working full time | .347 | .352 | .974 | 1 | .324 | 1.415 | .710 | 2.819 |
| LRsocA | social class E | -.060 | .602 | .010 | 1 | .921 | .942 | .289 | 3.067 |
| LRsocB | social class E | .712 | .352 | 4.093 | 1 | .043 | 2.037 | 1.022 | 4.059 |
| LRsocC1 | social class E | .580 | .333 | 3.021 | 1 | .082 | 1.785 | .929 | 3.432 |
| LRsocC2 | social class E | .477 | .337 | 1.998 | 1 | .158 | 1.611 | .832 | 3.120 |
| LRsocD | social class E | .216 | .385 | .315 | 1 | .575 | 1.241 | .583 | 2.641 |
| LRreligionC | Protestant | .082 | .149 | .306 | 1 | .580 | 1.086 | .811 | 1.453 |
| Constant | | -4.005 | .553 | 52.396 | 1 | .000 | .018 | | |


negative impact
positive impact
eating five portions of fruit and veg. per day
2.37
social class B
base: social class E
2.04
university degree
base: no degree
1.84
male
1.81
retired
base: working full-time
-0.37
smoking
-0.58
married or living as married
base: single
-0.69

# HEALTH ANALYSIS

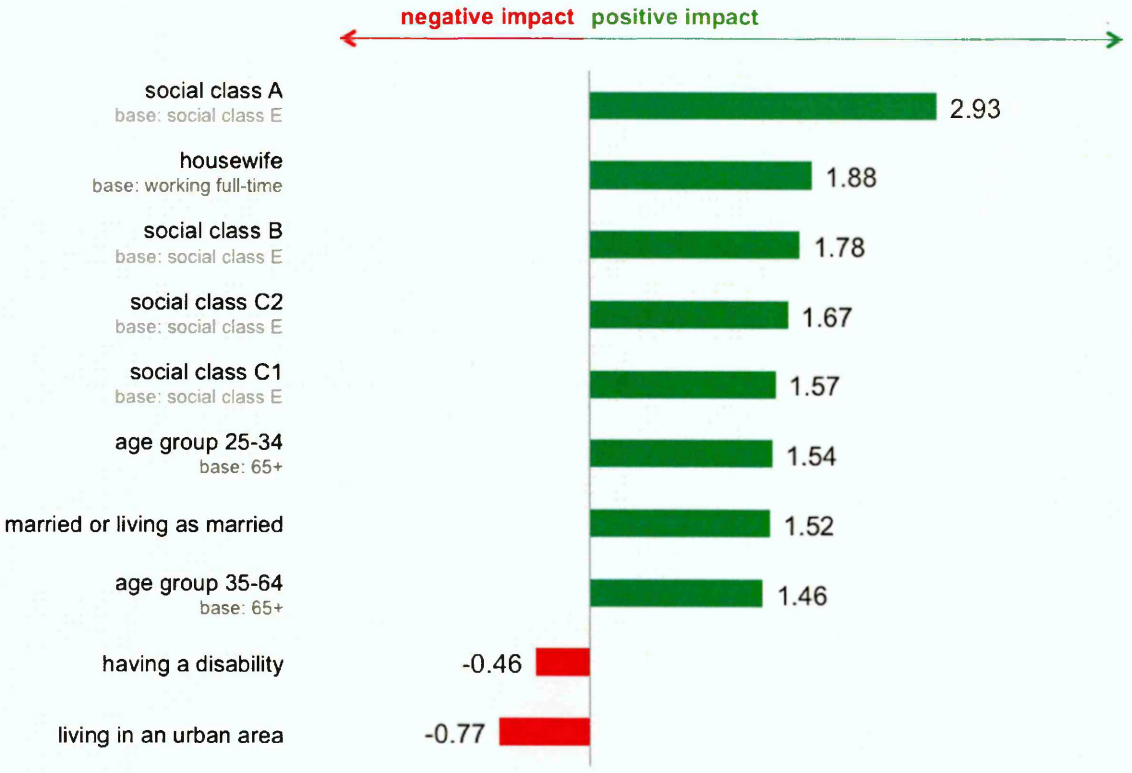
## MODEL CITIZENS

**Classification Table[a]**

| Observed | | | Predicted | | |
|---|---|---|---|---|---|
| | | | Meeting the CMA's recommendation (active1), no smoking; alco within recommended, healthy BMI, 5 portions of fruit and veg | | Percentage Correct |
| | | | no | yes | |
| Step 1 | Meeting the CMA's recommendation (active1), no smoking; alco within recommended, healthy BMI, 5 portions of fruit and veg | no | 2,247 | 1,749 | 56.2 |
| | | yes | 185 | 397 | 68.2 |
| | Overall Percentage | | | | 57.8 |

a. The cut value is .127

| | Base | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I.for EXP(B) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lower | Upper |
| LRgender | female | -.089 | .103 | .760 | 1 | .383 | .914 | .748 | 1.118 |
| LRage16to24 | 65+ | -.311 | .274 | 1.285 | 1 | .257 | .733 | .428 | 1.254 |
| LRage25to34 | 65+ | .434 | .216 | 4.023 | 1 | .045 | 1.543 | 1.010 | 2.356 |
| LRage35to64 | 65+ | .379 | .185 | 4.196 | 1 | .041 | 1.461 | 1.017 | 2.100 |
| LRurbanrural | rural | -.265 | .109 | 5.902 | 1 | .015 | .767 | .620 | .950 |
| LRquals | no degree | .231 | .125 | 3.401 | 1 | .065 | 1.260 | .986 | 1.611 |
| LRdisability | no disability | -.788 | .139 | 32.242 | 1 | .000 | .455 | .346 | .597 |
| LRmarried | not married or living as married | .418 | .115 | 13.257 | 1 | .000 | 1.519 | 1.213 | 1.902 |
| LRworkingpart | working full time | -.234 | .155 | 2.285 | 1 | .131 | .791 | .584 | 1.072 |
| LRretired | working full time | .253 | .186 | 1.838 | 1 | .175 | 1.288 | .893 | 1.856 |
| LRstudent | working full time | .065 | .283 | .052 | 1 | .819 | 1.067 | .613 | 1.858 |
| LRhousewife | working full time | .631 | .169 | 13.999 | 1 | .000 | 1.880 | 1.351 | 2.616 |
| LRunemployed | working full time | -.212 | .253 | .702 | 1 | .402 | .809 | .493 | 1.328 |
| LRsocA | social class E | 1.074 | .275 | 15.270 | 1 | .000 | 2.928 | 1.708 | 5.018 |
| LRsocB | social class E | .575 | .195 | 8.662 | 1 | .003 | 1.777 | 1.212 | 2.605 |
| LRsocC1 | social class E | .451 | .179 | 6.376 | 1 | .012 | 1.570 | 1.106 | 2.228 |
| LRsocC2 | social class E | .515 | .182 | 8.036 | 1 | .005 | 1.674 | 1.172 | 2.391 |
| LRsocD | social class E | .258 | .211 | 1.498 | 1 | .221 | 1.295 | .856 | 1.959 |
| LRreligionC | Protestant | .167 | .093 | 3.193 | 1 | .074 | 1.182 | .984 | 1.419 |
| Constant | | -2.662 | .275 | 93.886 | 1 | .000 | .070 | | |

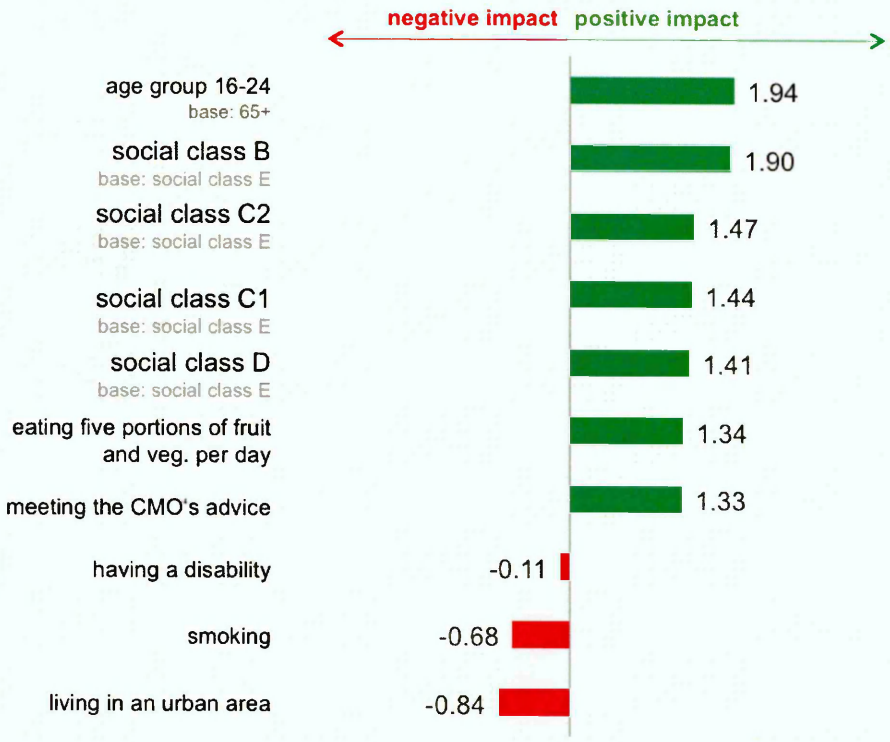

negative impact
positive impact
social class A
base: social class E
2.93
housewife
base: working full-time
1.88
social class B
base: social class E
1.78
social class C2
base: social class E
1.67
social class C1
base: social class E
1.57
age group 25-34
base: 65+
1.54
married or living as married
1.52
age group 35-64
base: 65+
1.46
having a disability
-0.46
living in an urban area
-0.77

## VERY GOOD HEALTH

**Classification Table[a]**

| Observed | | | Predicted | | |
|---|---|---|---|---|---|
| | | | LRverygoodhealth | | |
| | | | .00 | 1.00 | Percentage Correct |
| Step 1 | LRverygoodhealth | .00 | 1,612 | 1,568 | 50.7 |
| | | 1.00 | 254 | 1143 | 81.8 |
| | Overall Percentage | | | | 60.2 |

| | Base | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I.for EXP(B) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lower | Upper |
| LRgender | female | .018 | .077 | .057 | 1 | .811 | 1.018 | .877 | 1.183 |
| LRage16to24 | 65+ | .662 | .196 | 11.414 | 1 | .001 | 1.938 | 1.320 | 2.846 |
| LRage25to34 | 65+ | .289 | .184 | 2.461 | 1 | .117 | 1.335 | .931 | 1.915 |
| LRage35to64 | 65+ | .209 | .163 | 1.650 | 1 | .199 | 1.232 | .896 | 1.695 |
| LRurbanrural | rural | -.176 | .087 | 4.129 | 1 | .042 | .838 | .707 | .994 |
| LRquals | no degree | .103 | .101 | 1.046 | 1 | .306 | 1.109 | .910 | 1.352 |
| LRdisability | no disability | -2.229 | .153 | 211.341 | 1 | .000 | .108 | .080 | .145 |
| LRalco | Within recommended | .140 | .148 | .894 | 1 | .344 | 1.150 | .861 | 1.536 |
| LRsmoking | non-smoker | -.386 | .084 | 21.211 | 1 | .000 | .680 | .577 | .801 |
| LRfiveaday | less than 5 portions | .290 | .071 | 16.540 | 1 | .000 | 1.337 | 1.162 | 1.537 |
| LRmarried | not married or living as married | .071 | .086 | .685 | 1 | .408 | 1.074 | .907 | 1.271 |
| LRworkingpart | working full time | .088 | .109 | .651 | 1 | .420 | 1.092 | .882 | 1.352 |
| LRretired | working full time | -.260 | .165 | 2.489 | 1 | .115 | .771 | .558 | 1.065 |
| LRstudent | working full time | .125 | .157 | .634 | 1 | .426 | 1.133 | .833 | 1.541 |
| LRhousewife | working full time | .221 | .147 | 2.249 | 1 | .134 | 1.247 | .935 | 1.664 |
| LRunemployed | working full time | .020 | .173 | .013 | 1 | .908 | 1.020 | .727 | 1.431 |
| LRsocA | social class E | .312 | .247 | 1.596 | 1 | .206 | 1.367 | .842 | 2.219 |
| LRsocB | social class E | .640 | .152 | 17.832 | 1 | .000 | 1.897 | 1.409 | 2.554 |
| LRsocC1 | social class E | .367 | .137 | 7.166 | 1 | .007 | 1.443 | 1.103 | 1.888 |
| LRsocC2 | social class E | .382 | .139 | 7.562 | 1 | .006 | 1.466 | 1.116 | 1.925 |
| LRsocD | social class E | .343 | .154 | 4.959 | 1 | .026 | 1.409 | 1.042 | 1.905 |
| LRreligionC | Protestant | .123 | .071 | 3.014 | 1 | .083 | 1.131 | .984 | 1.299 |
| LRactive1 | not meeting the CMO's recommendation | .281 | .072 | 15.199 | 1 | .000 | 1.325 | 1.150 | 1.526 |
| Constant | | -1.223 | .227 | 28.907 | 1 | .000 | .294 | | |

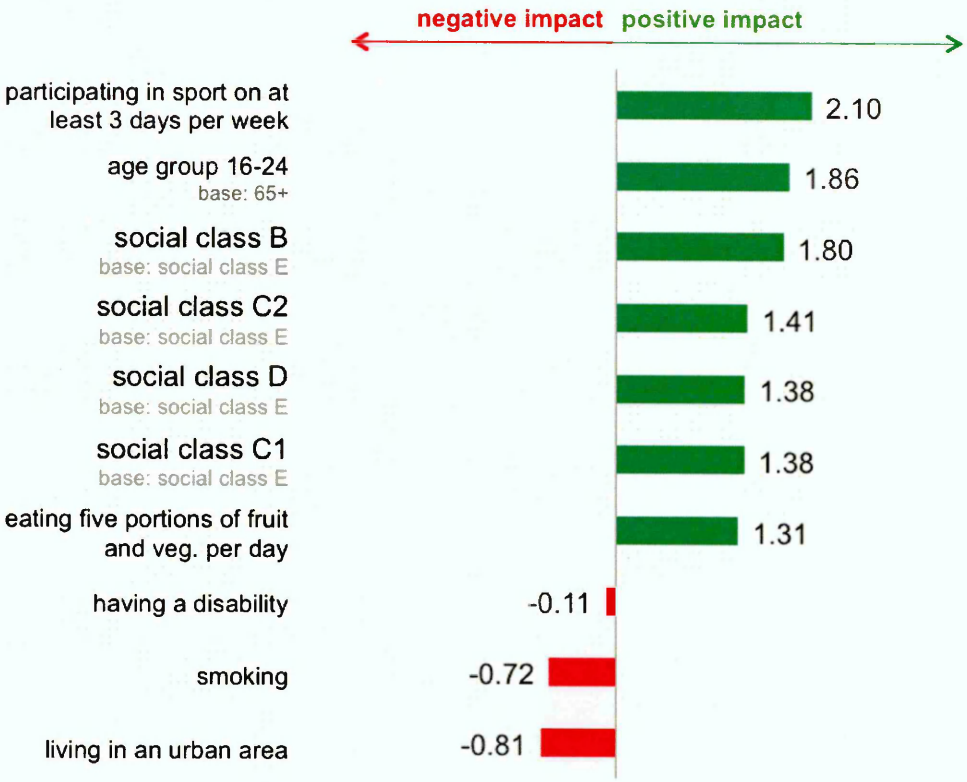

negative impact
positive impact
age group 16-24
base: 65+
1.94
social class B
base: social class E
1.90
social class C2
base: social class E
1.47
social class C1
base: social class E
1.44
social class D
base: social class E
1.41
eating five portions of fruit and veg. per day
1.34
meeting the CMO's advice
1.33
having a disability
-0.11
smoking
-0.68
living in an urban area
-0.84

**Classification Table[a]**

| Observed | | Predicted | | |
|---|---|---|---|---|
| | | LRverygoodhealth | | Percentage Correct |
| | | .00 | 1.00 | |
| Step 1 | LRverygoodhealth .00 | 1,612 | 1,568 | 50.7 |
| | LRverygoodhealth 1.00 | 254 | 1143 | 81.8 |
| | Overall Percentage | | | 60.2 |

a. The cut value is .305

| | Base | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I.for EXP(B) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lower | Upper |
| LRgender | female | -.038 | .077 | .244 | 1 | .621 | .962 | .827 | 1.120 |
| LRage16to24 | 65+ | .619 | .197 | 9.891 | 1 | .002 | 1.858 | 1.263 | 2.733 |
| LRage25to34 | 65+ | .305 | .184 | 2.734 | 1 | .098 | 1.356 | .945 | 1.946 |
| LRage35to64 | 65+ | .238 | .163 | 2.140 | 1 | .144 | 1.269 | .922 | 1.746 |
| LRurbanrural | rural | -.213 | .087 | 5.985 | 1 | .014 | .808 | .681 | .958 |
| LRquals | no degree | .052 | .102 | .264 | 1 | .607 | 1.054 | .863 | 1.287 |
| LRdisability | no disability | -2.255 | .154 | 215.656 | 1 | .000 | .105 | .078 | .142 |
| LRalco | Within recommended | .134 | .149 | .812 | 1 | .367 | 1.144 | .854 | 1.532 |
| LRsmoking | non-smoker | -.326 | .084 | 14.929 | 1 | .000 | .722 | .611 | .851 |
| LRfiveaday | less than 5 portions | .273 | .072 | 14.448 | 1 | .000 | 1.313 | 1.141 | 1.512 |
| LRmarried | not married or living as married | .097 | .087 | 1.247 | 1 | .264 | 1.102 | .930 | 1.306 |
| LRworkingpart | working full time | .087 | .109 | .629 | 1 | .428 | 1.091 | .880 | 1.352 |
| LRretired | working full time | -.202 | .166 | 1.485 | 1 | .223 | .817 | .591 | 1.131 |
| LRstudent | working full time | .066 | .159 | .172 | 1 | .678 | 1.068 | .783 | 1.458 |
| LRhousewife | working full time | .262 | .147 | 3.179 | 1 | .075 | 1.300 | .974 | 1.734 |
| LRunemployed | working full time | -.026 | .174 | .023 | 1 | .880 | .974 | .692 | 1.370 |
| LRsocA | social class E | .249 | .248 | 1.003 | 1 | .316 | 1.282 | .788 | 2.086 |
| LRsocB | social class E | .585 | .152 | 14.736 | 1 | .000 | 1.796 | 1.332 | 2.421 |
| LRsocC1 | social class E | .321 | .138 | 5.435 | 1 | .020 | 1.378 | 1.052 | 1.805 |
| LRsocC2 | social class E | .344 | .140 | 6.072 | 1 | .014 | 1.411 | 1.073 | 1.855 |
| LRsocD | social class E | .325 | .155 | 4.430 | 1 | .035 | 1.384 | 1.023 | 1.874 |
| LRreligionC | Protestant | .117 | .071 | 2.689 | 1 | .101 | 1.124 | .977 | 1.293 |
| LRsport3days | less than 3 sport days per week | .742 | .096 | 60.017 | 1 | .000 | 2.099 | 1.740 | 2.532 |
| Constant | | -1.223 | .227 | 28.907 | 1 | .000 | .294 | | |


negative impact
positive impact
participating in sport on at least 3 days per week
2.10
age group 16-24
base: 65+
1.86
social class B
base: social class E
1.80
social class C2
base: social class E
1.41
social class D
base: social class E
1.38
social class C1
base: social class E
1.38
eating five portions of fruit and veg. per day
1.31
having a disability
-0.11
smoking
-0.72
living in an urban area
-0.81

## HAPPINESS ANALYSIS

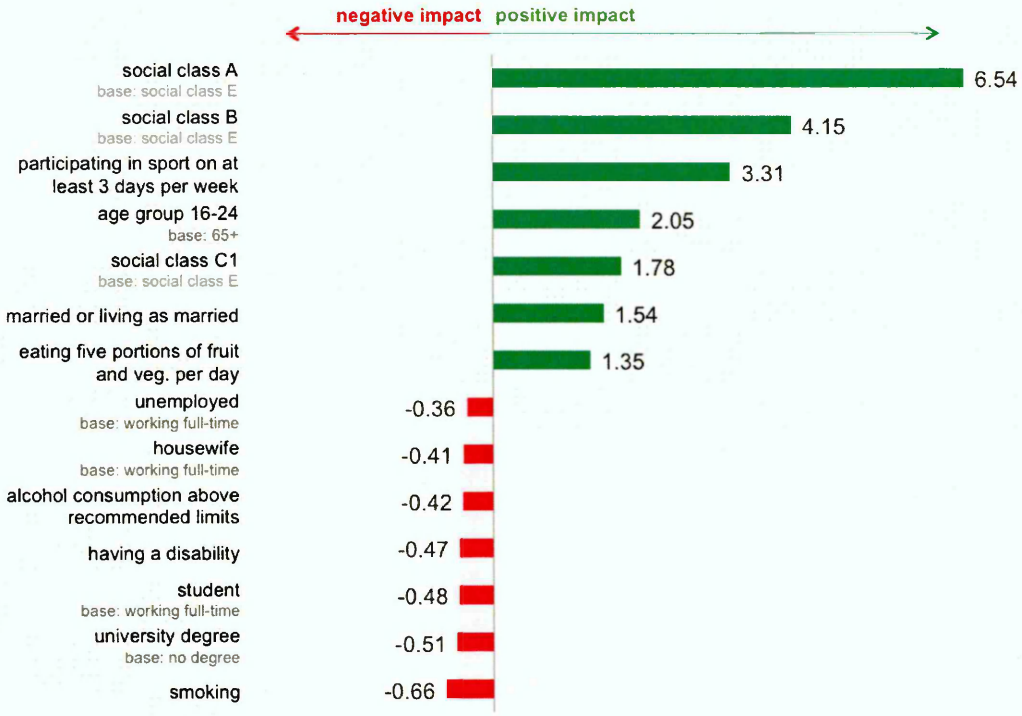
## HAPPINESS 1

**Classification Table[a]**

| Observed | | Predicted | | |
|---|---|---|---|---|
| | | Regression variable: Being happy or very happy as opposed to unhappy | | Percentage Correct |
| | | no | Yes | |
| Step 1 | | | | |
| Regression variable: Being happy or very happy as opposed to unhappy | no | 300 | 135 | 68.9 |
| | yes | 1,193 | 2,945 | 71.2 |
| Overall Percentage | | | | 70.9 |

a. The cut value is .904

| | Base | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I.for EXP(B) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lower | Upper |
| LRgender | female | .043 | .123 | .120 | 1 | .729 | 1.044 | .820 | 1.329 |
| LRage16to24 | 65+ | .716 | .282 | 6.460 | 1 | .011 | 2.046 | 1.178 | 3.553 |
| LRage25to34 | 65+ | -.023 | .242 | .009 | 1 | .923 | .977 | .608 | 1.569 |
| LRage35to64 | 65+ | -.223 | .189 | 1.387 | 1 | .239 | .800 | .552 | 1.160 |
| LRurbanrural | rural | -.213 | .158 | 1.821 | 1 | .177 | .808 | .593 | 1.101 |
| LRquals | no degree | -.682 | .186 | 13.454 | 1 | .000 | .506 | .351 | .728 |
| LRdisability | no disability | -.760 | .121 | 39.312 | 1 | .000 | .467 | .369 | .593 |
| LRalco | Within recommended | -.869 | .197 | 19.507 | 1 | .000 | .419 | .285 | .617 |
| LRsmoking | non-smoker | -.413 | .118 | 12.241 | 1 | .000 | .662 | .525 | .834 |
| LRfiveaday | less than 5 portions | .298 | .114 | 6.775 | 1 | .009 | 1.347 | 1.076 | 1.686 |
| LRmarried | not married or living as married | .428 | .123 | 12.228 | 1 | .000 | 1.535 | 1.207 | 1.951 |
| LRworkingpart | working full time | -.201 | .200 | 1.015 | 1 | .314 | .818 | .553 | 1.209 |
| LRretired | working full time | -.243 | .223 | 1.197 | 1 | .274 | .784 | .507 | 1.212 |
| LRstudent | working full time | -.745 | .311 | 5.721 | 1 | .017 | .475 | .258 | .874 |
| LRhousewife | working full time | -.887 | .207 | 18.301 | 1 | .000 | .412 | .274 | .618 |
| LRunemployed | working full time | -1.027 | .208 | 24.450 | 1 | .000 | .358 | .238 | .538 |
| LRsocA | social class E | 1.878 | .660 | 8.101 | 1 | .004 | 6.541 | 1.795 | 23.844 |
| LRsocB | social class E | 1.424 | .264 | 29.000 | 1 | .000 | 4.154 | 2.474 | 6.975 |
| LRsocC1 | social class E | .577 | .183 | 9.895 | 1 | .002 | 1.780 | 1.243 | 2.550 |
| LRsocC2 | social class E | .277 | .181 | 2.342 | 1 | .126 | 1.319 | .925 | 1.880 |
| LRsocD | social class E | -.062 | .189 | .109 | 1 | .741 | .939 | .649 | 1.360 |
| LRreligionC | Protestant | -.025 | .110 | .053 | 1 | .817 | .975 | .786 | 1.210 |
| LRsport3days | less than 3 sport days per week | 1.197 | .275 | 18.894 | 1 | .000 | 3.310 | 1.930 | 5.679 |
| Constant | | 2.580 | .307 | 70.378 | 1 | .000 | 13.191 | | |


negative impact
positive impact
social class A
base: social class E
6.54
social class B
base: social class E
4.15
participating in sport on at least 3 days per week
3.31
age group 16-24
base: 65+
2.05
social class C1
base: social class E
1.78
married or living as married
1.54
eating five portions of fruit and veg. per day
1.35
unemployed
base: working full-time
-0.36
housewife
base: working full-time
-0.41
alcohol consumption above recommended limits
-0.42
having a disability
-0.47
student
base: working full-time
-0.48
university degree
base: no degree
-0.51
smoking
-0.66

## HAPPINESS 2

**Classification Table[a]**

| Observed | | | Predicted | | |
|---|---|---|---|---|---|
| | | | Regression variable: Being very happy as opposed happy or unhappy | | Percentage Correct |
| | | | no | Yes | |
| Step 1 | Regression variable: Being very happy as opposed happy or unhappy | No | 951 | 625 | 60.4 |
| | | yes | 1,002 | 1,995 | 66.6 |
| | Overall Percentage | | | | 64.4 |

a. The cut value is .655

| | Base | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I.for EXP(B) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lower | Upper |
| LRgender | female | -.023 | .073 | .102 | 1 | .750 | .977 | .847 | 1.127 |
| LRage16to24 | 65+ | .685 | .174 | 15.429 | 1 | .000 | 1.983 | 1.409 | 2.791 |
| LRage25to34 | 65+ | -.197 | .156 | 1.597 | 1 | .206 | .821 | .605 | 1.115 |
| LRage35to64 | 65+ | -.033 | .130 | .063 | 1 | .802 | .968 | .751 | 1.248 |
| LRurbanrural | rural | -.161 | .088 | 3.364 | 1 | .067 | .852 | .717 | 1.011 |
| LRquals | no degree | -.176 | .101 | 3.012 | 1 | .083 | .839 | .688 | 1.023 |
| LRdisability | no disability | -.681 | .082 | 69.460 | 1 | .000 | .506 | .431 | .594 |
| LRalco | Within recommended | -.312 | .141 | 4.937 | 1 | .026 | .732 | .555 | .964 |
| LRsmoking | non-smoker | -.519 | .075 | 47.885 | 1 | .000 | .595 | .514 | .689 |
| LRfiveaday | less than 5 portions | .149 | .068 | 4.848 | 1 | .028 | 1.161 | 1.017 | 1.326 |
| LRmarried | not married or living as married | .475 | .077 | 38.306 | 1 | .000 | 1.608 | 1.383 | 1.869 |
| LRworkingpart | working full time | -.093 | .108 | .743 | 1 | .389 | .911 | .737 | 1.126 |
| LRretired | working full time | .249 | .139 | 3.181 | 1 | .075 | 1.282 | .976 | 1.685 |
| LRstudent | working full time | -.082 | .172 | .227 | 1 | .634 | .921 | .657 | 1.291 |
| LRhousewife | working full time | .044 | .135 | .106 | 1 | .745 | 1.045 | .802 | 1.362 |
| LRunemployed | working full time | -.327 | .145 | 5.069 | 1 | .024 | .721 | .543 | .959 |
| LRsocA | social class E | .252 | .241 | 1.092 | 1 | .296 | 1.286 | .802 | 2.062 |
| LRsocB | social class E | .495 | .136 | 13.321 | 1 | .000 | 1.641 | 1.258 | 2.140 |
| LRsocC1 | social class E | .115 | .114 | 1.015 | 1 | .314 | 1.122 | .897 | 1.404 |
| LRsocC2 | social class E | .327 | .119 | 7.538 | 1 | .006 | 1.387 | 1.098 | 1.753 |
| LRsocD | social class E | .248 | .132 | 3.542 | 1 | .060 | 1.281 | .990 | 1.658 |
| LRreligionC | Protestant | .043 | .067 | .399 | 1 | .528 | 1.044 | .914 | 1.191 |
| LRsport3days | less than 3 sport days per week | .610 | .109 | 31.519 | 1 | .000 | 1.840 | 1.487 | 2.277 |
| Constant | | .462 | .193 | 5.721 | 1 | .017 | 1.587 | | |