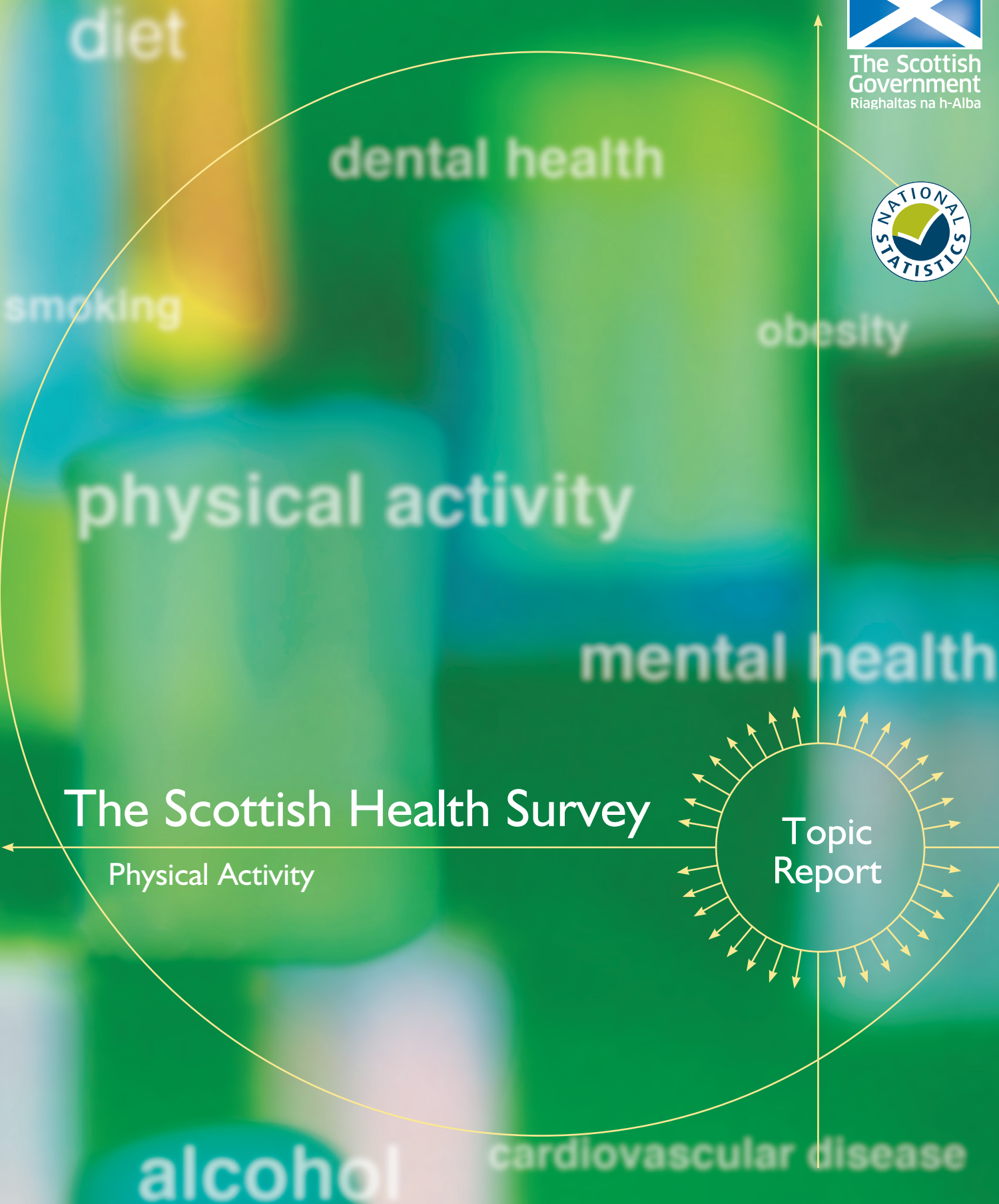




The Scottish Government
Riaghaltas na h-Alba



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Abbreviations used in the report

BMI	Body mass index
CMO	Chief Medical Officer
DIY	Do it yourself
GDP	Gross Domestic Product
LLI	Long term limiting illness
MVPA	Moderate to Vigorous Physical Activity
NCD	Non-communicable diseases
PAIP	Physical Activity Implementation Plan
SHeS	Scottish Health Survey
SIGN	Scottish Intercollegiate Guidelines Network
UN	United Nations
WEMWEBS	Warwick-Edinburgh Mental Well-being Scale
WHO	World Health Organisation

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EXECUTIVE SUMMARY

This study presents an analysis of factors significantly associated with adults (age 16+ years) meeting the physical activity guidelines in Scotland in 2012. It is based on logistic regression analysis of the Scottish Health Survey (SHeS), the only national level data source of total physical activity levels in the adult population in Scotland. It is the first study to use logistic regression on the physical activity data in the SHeS, an approach which creates a more robust analysis of the variation in physical activity levels across different population groups than achieved through simple bivariate analysis alone.

This study also examined if a change in physical activity guidelines, which took place across the four home nations of the UK in 2011, affected the range and/or patterning of factors associated with meeting the guidelines. The previous guidelines stipulated that 30 minutes of moderate to vigorous physical activity (MVPA) should take place on at least five days of the week. The new guidelines removed the frequency stipulation, with 150 minutes of MVPA per week now recommended (though the guidelines still suggest activity over 5 days is one way to meet this, and also recommend some activity daily). The guideline change substantially increased the proportion of adult population in Scotland who met the guidelines from 38% in 2011 to 62% in 2012.

A third aspect of the study was to examine the factors associated with any participation in the different domains of physical activity measured in the SHeS that make up overall activity levels (sport and exercise; walking; housework/gardening/DIY and activity in paid work (occupational physical activity)).

The analysis on the 2012 SHeS found that demographic and health and lifestyle factors were of primary importance with meeting the 2012 physical activity guidelines, whereas socioeconomic factors were overall less influential. The exception to this was economic activity status, which showed a relatively strong influence on likelihood of meeting the guidelines. The factors in 2012 most strongly associated with meeting the new guidelines were economic activity status, self-assessed health, age, sex and mental wellbeing.

The change to the physical activity guidelines in 2011 has had little substantial effect on the overall patterning of who is most likely to meet the guidelines, though the range of significant factors associated with the new guidelines increased. The most influential factors in 2011 associated with meeting the previous guidelines were economic activity status, disability, obesity, sex and age.

Substantial differences were found in the types of people most likely to take part in the different activity domains. For example, in contrast to findings for meeting physical activity guidelines, socioeconomic factors (income, educational attainment and deprivation) were found to have more of an influence on participation in sport and exercise and a strong association with occupational physical activity. Age was not found to be an influential factor for participation in walking (with the exception of women) and the relationship found for women was not what might have been expected. In contrast to the finding that age tends to typically be negatively associated with levels of physical activity, the likelihood of walking in women increased with age. Perhaps less surprisingly, substantial differences between men

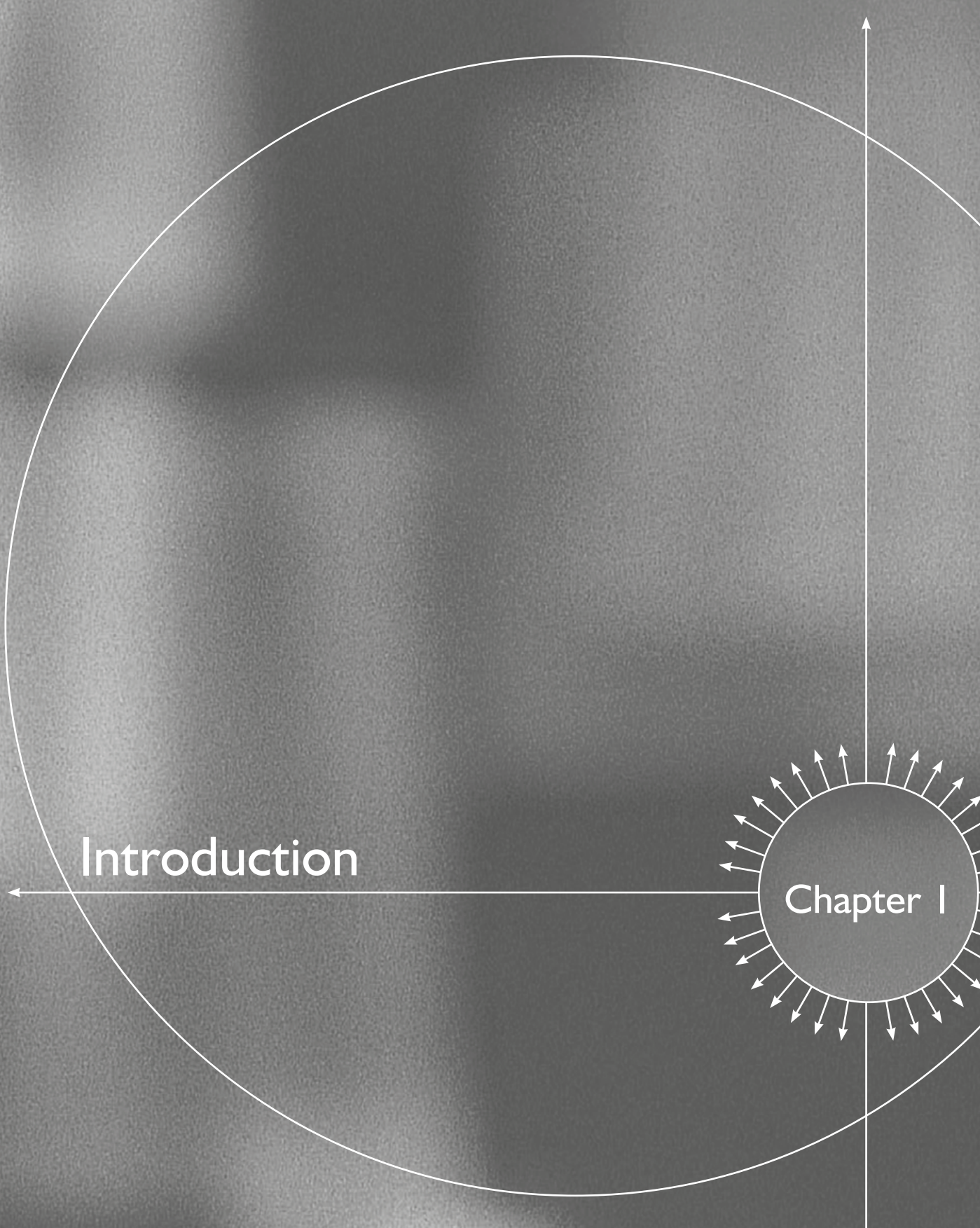
and women in doing housework were found, with women much more likely to do activity in the housework domain.

The socioeconomic patterning of physical activity is often cited as important, however, it is not always clear how much of an impact it has and there is criticism that the evidence base is weak on this issue with overreliance on self-report measures of physical activity and lack of account taken of socioeconomic patterning of physical activity in the different domains. The results from this study are consistent with other research in suggesting that measures of socioeconomic status are not as strongly associated with total physical activity as other factors. However, the analysis of the patterning of factors across the different domains found socioeconomic factors to be more influential in some areas. Higher socioeconomic groups were found to have higher levels of leisure time or moderate to vigorous physical activity compared to those in lower socioeconomic groups, but those in lower socioeconomic groups were found to take part in more occupational physical activity. These differences across the different domains may explain some of the inconsistencies encountered in the evidence base for the relationship between measures of socioeconomic status and total physical activity.

The socioeconomic patterning of sport and exercise participation has important implications. Due to the wider societal, technological and occupational labour market trends it is likely that occupational physical activity will make up less and less of total physical activity and action will be required to ensure higher participation of those from lower socioeconomic groups in other domains of physical activity.

A further consideration is the likelihood that many of the health and lifestyle factors found here to have a negative relationship with achieving physical activity recommendations have been shown to be more likely to be present in those in lower socioeconomic groups, for example obesity, smoking, poor mental and physical health. Thus, this reinforces the message that socioeconomic factors are important within a broader perspective.

Finally, this study adds further evidence to the importance of walking in addressing inequalities in physical activity participation and highlights the importance on the recent *Let's Get Scotland Walking – The National Walking Strategy* and the work that continues to implement this at national and local level.



Introduction

Chapter I

1. INTRODUCTION

This topic report presents the results of regression analyses into significant demographic, socioeconomic and health and lifestyle factors associated with adult (age 16+ years) physical activity levels using data from the 2012 Scottish Health Survey (SHeS)¹. The relationship between physical activity and age, sex and some socioeconomic variables has been described in the SHeS annual reports since 1995, however, regression analysis has not been done to date.

Exploratory analysis was also carried out on whether factors have changed as a result of a change in the physical activity guidelines which took place in 2011. The recommended level of activity for adults prior to 2011 was that they should do at least 30 minutes of moderate activity on most days of the week (i.e. on at least five), which could be accrued in bouts of at least 10 minutes' duration. In July 2011, drawing on recent evidence about activity and health, the Chief Medical Officers of each of the four UK countries agreed and introduced revised guidelines on physical activity. The revisions followed new guidance issued by the WHO and are in line with similar changes made to advice on activity levels in both the USA² and Canada³.

The new guidance, tailored to specific age groups over the life course, are as follows:

- **Early years (under 5 years)**
 - Physical activity should be encouraged from birth, particularly through floor-based play and water-based activities in safe environments.
 - Children of pre-school age who are capable of walking unaided should be physically active daily for at least 180 minutes (3 hours), spread throughout the day.
 - All under 5s should minimise the amount of time spent being sedentary (being restrained or sitting) for extended periods (except time spent sleeping).
- **Children and young people aged 5 to 18**
 - Should engage in moderate to vigorous activity for at least 60 minutes and up to several hours every day.
 - Vigorous activities, including those that strengthen muscles and bones, should be carried out on at least 3 days a week.
 - Extended periods of sedentary activities should be limited.
- **Adults aged 19 to 64⁴**
 - Should be active daily.
 - Should engage in at least moderate activity for a minimum of 150 minutes a week (accumulated in bouts of at least 10 minutes) - for example by being active for 30 minutes on five days a week.
 - Alternatively, 75 minutes of vigorous activity spread across the week will confer similar benefits to 150 minutes of moderate activity (or a combination of moderate and vigorous activity).
 - Activities that strengthen muscles should be carried out on at least two days a week.

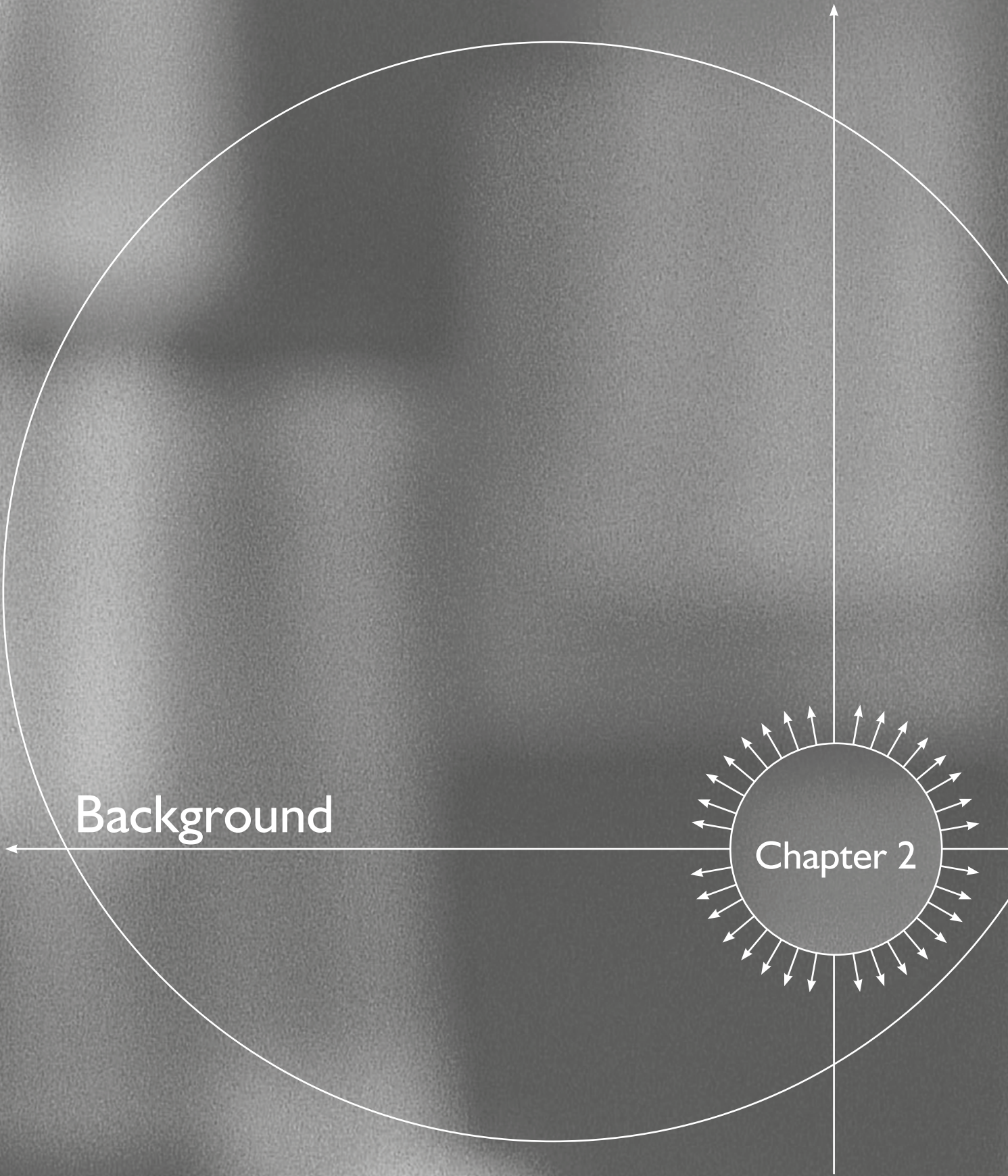
- Extended periods of sedentary activities should be limited.
- **Adults aged 65 and over**
 - In addition to the guidance set out above for adults aged 19-64, older adults are advised that any amount of physical activity is better than none, and more activity provides greater health benefits.
 - Older adults at risk of falls should incorporate activities to improve balance and coordination on at least two days a week.

Monitoring the adherence to the revised guidelines required some changes to the SHeS questions on physical activity in 2012. The revised guidelines for adults still advise people to accumulate 150 minutes of moderate activity per week, but critically removes the stipulation of achieving this by accumulating 30 minutes on at least 5 days per week (though this remains one way to meet guidelines). It is clear that the change in guidelines has led to a marked increase in the proportion of adults who now meet the physical activity guidelines, however, no analysis has been done to date on how the guideline change may have impacted on the demographic, socioeconomic and health patterning of physical activity.

A third aspect of this study was to explore the key factors associated with the different domains of physical activity that contribute to overall physical activity and whether there were differences in associated factors by domain compared to meeting physical activity guidelines. The domains investigated were: sport and exercise; walking; housework; gardening/manual/DIY and occupational physical activity. To date, there has been far less focus on most of these domains, with a tendency to concentrate on leisure time physical activity⁵ which may include sport and exercise and walking.

In summary the report has three key aims:

1. to investigate factors that are significantly associated with meeting the adult physical activity guidelines in the Scottish population
2. to investigate whether the change in physical activity guidelines in 2011 affected the factors associated with meeting the guidelines
3. to investigate the factors significantly associated with taking part in activity in the different domains that make up total physical activity



Background

Chapter 2

2. BACKGROUND

2.1 Benefits of physical activity and the policy context

The health benefits of a physically active lifestyle are well documented. Globally, physical inactivity is one of the leading causes of chronic disease mortality, such as heart disease, stroke, diabetes and certain cancers⁶. Lee *et al.* (2012) estimated that inactivity caused more than 5.3 million deaths globally in 2008, approximately 9% of premature deaths for that year. The impact of inactivity was similar to that for smoking or obesity. Declining physical activity is often associated with rising GDP, though the problem of physical inactivity is increasingly being seen in low income countries as well as middle and high income parts of the world.

The *Toronto Charter for Physical Activity*⁷, the gold standard advocacy tool for physical activity, was published in 2009 following extensive worldwide stakeholder consultation. The Charter includes guiding principles for a population-based approach to physical activity, including building capacity in research, evaluation and surveillance of population physical activity.

In 2004, WHO published the *Global Strategy on Diet and Physical Activity and Health*⁸ with the overall goal of protecting and promoting health through healthy eating and physical activity. This was followed in 2010 with the *WHO Global Recommendations on Physical Activity for Health*⁹, which recommended the setting of national guidelines on the frequency, duration, intensity, type and total amount of physical activity required by different age groups and the establishment of national surveillance mechanisms to monitor population levels of physical activity.

In 2013, the World Health Assembly agreed on a set of global voluntary targets which include a 25% reduction of premature mortality from noncommunicable diseases (NCDs) and a 10% decrease in physical inactivity by 2025. This *Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013-2020*¹⁰ guides Member States, WHO and other UN Agencies on how to effectively achieve these targets.

At a UK level, inactivity was estimated to have caused 3% of disability-adjusted years of life lost in 2002, representing a direct cost to the NHS of £1.06 billion^{11,12}. Few studies have estimated the indirect costs of physical inactivity (in contrast to other issues such as alcohol misuse). One exception is a 2002 study commissioned by the UK Department for Culture, Media and Sport which summed direct and indirect costs to the NHS, including loss of earnings due to inability to work and premature death. This produced a total estimated cost of physical inactivity of £8.2 billion¹³.

In Scotland, it is estimated that low activity contributes to around 2,500 deaths per year and costs the NHS £94 million annually¹⁴. This is a conservative estimate as the analysis was limited by what data was available and indirect costs have not been estimated for Scotland.

In addition to the impact on chronic physical health conditions, there is also evidence that increased activity can improve mental wellbeing, a key health priority in Scotland. The Royal College of Psychiatrists recommends exercise as a

treatment for depression in adults¹⁵, and the Scottish Intercollegiate Guidelines Network (SIGN) national clinical guideline for non-pharmaceutical management of depression states that structured exercise programmes may be an option for depressed people^{16,17}. Physical activity is also associated with better health and cognitive function among older people, and can reduce the risk of falls in those with mobility problems¹⁸.

For children, evidence suggests that high activity levels in childhood confer both immediate and longer-term benefits, for example by promoting cognitive skills and bone strength, reducing the incidence of metabolic risk factors such as obesity and hypertension¹⁹, and setting in place activity habits that endure into adulthood²⁰.

It is estimated that becoming more active could increase life expectancy by more than a year given the average levels of inactivity at the moment in Scotland²¹. Doing moderate physical activity for at least 150 minutes a week has been shown to be a key determinant of increased energy expenditure and thus fundamental to energy balance and weight control²².

A number of wider global trends have impacted on population physical activity levels in Scotland, as in other high and middle income countries, in recent decades. These include an ageing population, technological change, changes to transport (especially the rise of car use), the rise in sedentary leisure options and decline in manual occupational sector²³.

In acknowledgement of these wider trends, and the evidence on the benefits of active lifestyles, Scotland has been actively developing national level policy on physical activity for over ten years. The original physical activity strategy, *Let's Make Scotland More Active*²⁴, was published in 2003 and reviewed in 2008²⁵. More recently, the national Physical Activity Implementation Plan (PAIP), *A More Active Scotland; Building a Legacy from the Commonwealth Games*, was published in 2014²⁶. The PAIP is a new 10 year plan which adapts the key elements of the 2010 *Toronto Charter for Physical Activity* to Scotland and links this directly to the Scottish Government's legacy ambitions for the 2014 Commonwealth Games.

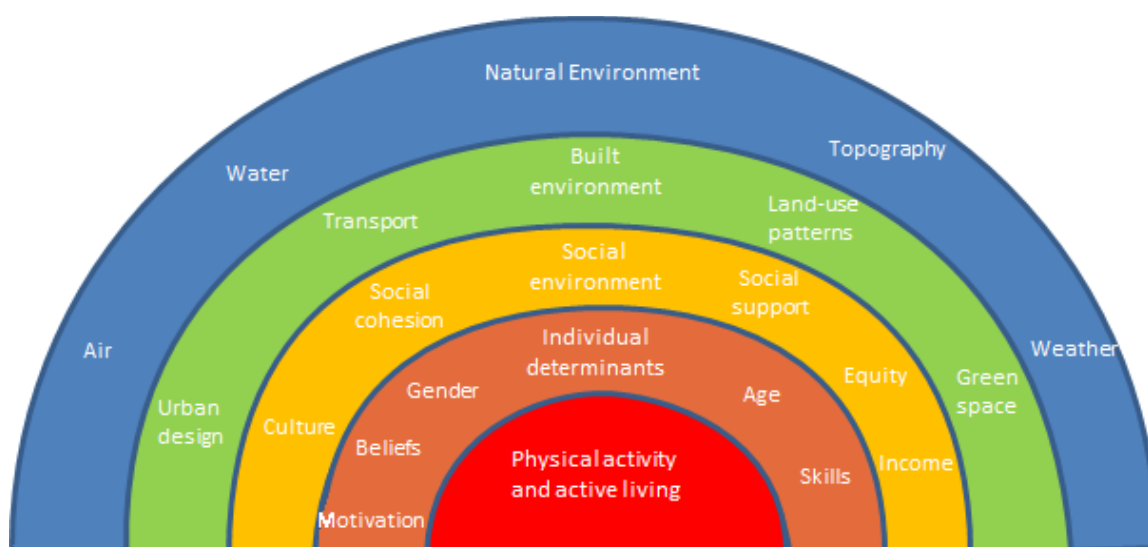
Specific policies on increasing activity in the composite domains of physical activity have also been developed in Scotland. These include, in the sport and active recreation domain, *Reaching Higher*, the 2007 sports strategy with twin aims of increasing participation in sport and improving Scotland's high performance sporting success²⁷. More recently, the youth sports strategy, *Giving Children and Young People a Sporting Chance*, included the aim of reaching those currently disengaged in formal or informal sport²⁸.

Active travel policy interventions to encourage more people to undertake more active journeys include the *Cycling Action Plan for Scotland*²⁹, and the most recent physical activity policy, the *National Walking Strategy*³⁰. The latter sets out the case for increased participation in walking, both for recreational purposes and for active travel. It demonstrates the contribution such an increase would make to a range of national government objectives. Work is currently underway to develop a delivery plan underpinning the walking strategy.

2.2 Evidence on factors associated with physical activity

An increasing body of evidence is developing around understanding what factors are associated with being physically active in an effort to find solutions to encourage more people to be more active more often, and to aid in targeting interventions. Figure 1 is one illustration of the wide range of factors, including environmental, socioeconomic, psychological and demographic ones that have been shown to have a relationship to physical activity outcomes³¹.

Figure 1: Social Ecological model of the determinants of physical activity



Edwards and Tsouros (2006)

It is important to emphasise at this point that any model of explanation produced from an analysis, such as in this study, will only be partial. The Scottish Health Survey, and many similar surveys do not cover this range of factors. This study focussed on demographic, socioeconomic and health and lifestyle factors available in the Scottish Health Survey and that were supported for inclusion in our analysis by previous evidence, drawing primarily on a recent systematic review of reviews of correlates and determinants of physical activity by Baumann *et al.* (2012)³². This mapped the range of factors varyingly associated with physical activity in adults, children and adolescents across high, middle and low-income countries. A review of domain related physical activity by Beenackers *et al.* (2012)³³ was also useful.

Bauman *et al.* (2012) concluded that there was clear evidence that health status and self-efficacy are causally related to physical activity. In addition, they considered there was consistent evidence that age, sex, education level, ethnic origin, being overweight or obese, perceived effort and social support were all associated (correlated) with physical activity. The authors noted, however, that much of the research has concentrated on physical activity during leisure time, with little conducted on other domains of physical activity, such as transport, home-based or occupation related. A view echoed by Beenackers *et al.* (2012).

The association of ethnicity with physical activity is further supported by findings from analysis of the Scottish Health Survey³⁴ and the Health Survey for England³⁵.

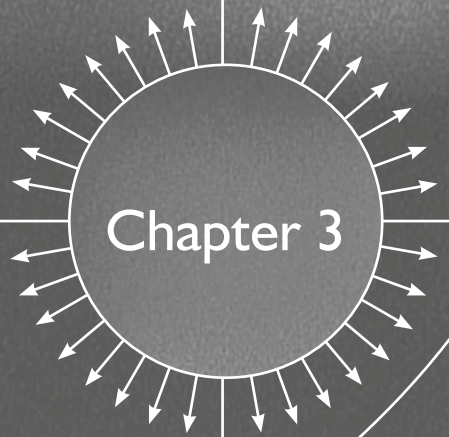
The 2012 Scottish Health Survey Topic Report: Equality Groups found Pakistani respondents to be least likely of all ethnic groups to meet recommended activity guidelines³⁶.

According to the Bauman review, income, socioeconomic status and lower occupational status all had some evidence to suggest they are associated with physical activity, however, marital status was not found to be a determinant and the evidence inconclusive for marital status as a correlate. The study also indicated there is evidence to support the association of mental wellbeing.

The Bauman review does not mention religion, however, the Scottish Health Survey Topic Report: Equality Groups (2012) found that adults who said they belonged to no religion were most likely to meet the physical activity recommendations and participate in sports compared to Muslims and members of the Church of Scotland.

Methodology

Chapter 3



3. METHODOLOGY

3.1 Measurement of physical activity

Measuring physical activity through surveys is complex. To understand the extent to which national guidelines are met, information is required on three key dimensions of activity:

- Intensity: effort required to carry out activity (low, moderate, vigorous)
- Duration: length of time activity carried out (usually in minutes)
- Frequency: number of sessions over a fixed period (per week)

In the SHeS, the intensity level of activities mentioned by participants was estimated to help assess adherence to the physical activity guidelines. The four categories of physical activity 'intensity' were vigorous/moderate/light and inactive. As the guidelines refer to moderate or vigorous activity, only activity reported in these categories were included in analysis of meeting physical activity guidelines. Further details on how intensity of different activities within each of the domains of physical activity assessed in the Scottish Health Survey can be found in the Scottish Health Survey 2012 - Volume 1 Main Report and supplementary technical report³⁷.

Physical activity can also take place in a number of different contexts or domains. The Scottish Health Survey asks respondents about their physical activity in five main domains which make up the physical activity measurement:

- Activity at work (occupational physical activity)
- Housework
- Manual/gardening/DIY work
- Walking
- Sports and exercise

For the last four domains, survey respondents are asked to report any activities that lasted at least 10 minutes and the number of days in the past four weeks in which they had taken part in such activities. For walking, participants are also asked on how many days they had taken more than one walk of at least 10 minutes. Where a participant has taken more than one walk, the total time spent walking for that day was calculated as twice the average reported walk time.

It is worth noting that the walking domain in the SHeS includes walking for recreational purposes and walking for transport and so, while it is the closest domain to active travel, it does not completely map onto this physical activity context.

Further, in response to concerns that the method for grading the intensity of walking was underestimating older adults' exertion levels, an additional question on walking was asked of those aged over 65 in the 2012 survey:

During the past four weeks, was the effort of walking for 10 minutes or more usually enough to make you breathe faster, feel warmer or sweat?

The overall impact of this addition on physical activity estimates for all adults was shown in the 2012 Health Survey Report to be minimal. The addition did, however, affect older age groups in the way expected – a higher proportion of older age groups met the 2012 guideline. It is possible this change could contribute to differences in patterning of physical activity between 2011 and 2012.

To analyse patterning of factors in relation to the different domains of physical activity, derived binary outcome variables were created for each of the domains (any/no participation).

Occupational physical activity was calculated in a slightly different way in this study than the approach in the 2012 Scottish Health Survey. The 2012 Scottish Health Survey used an updated definition of occupational physical activity which combined information on intensity of activity carried out in work with a new question on sedentary behaviour in work to produce estimates of the duration of moderate activity at work per week. In this study, a respondent was classified as participating in occupational physical activity if they reported being either very or fairly physically active in work. Those reporting low or no physical activity in work were classified as non-participants. This simpler methodology was used because our interest was to understand factors associated with any participation in activity in the respective domains.

3.2 Logistic regression

Regression analysis was used to explore whether or not various demographic, socioeconomic and health/lifestyle variables were independently associated with (a) meeting the physical activity guidelines in 2011 and 2012 and (b) any participation in the different domains of physical activity.

Logistic regression is a statistical technique that enables examination of the relationship between a dependent variable (in this case, either meeting the physical activity guidelines or participation in activity in different domains) and various independent (or predictor) variables (sex, age, income, health status etc). The analysis identifies which of these independent variables are significantly and independently associated with the dependent variable after controlling for inter-relationships between the variables. The analysis also gives an indication of the relative strength of different factors.

Logistic regression models the log 'odds' of a binary outcome variable (for example, the odds of meeting the physical activity guidelines compared to not meeting them). The odds ratio is a measure of the likelihood of the outcome for one group compared to another group.

Odds ratios describe the strength of association between two binary variable values. For example, if being young has an odds ratio of 2, it means that the odds of achieving the recommended physical activity levels are two times higher in those who are young compared to those who are older, when all the other variables in the model are held constant.

Bivariate analysis (cross-tabulation) was conducted on 2012 data for meeting the physical activity guidelines with a range of demographic, socioeconomic and health and lifestyle factors identified for investigation based on the literature, see Table 1.

Table 1: Factors from the Scottish Health Survey identified for inclusion in bivariate analyses*

Demographic	Socioeconomic	Health and lifestyle
Age	Equivalised Income	Self-assessed health
Sex	Area deprivation	Disability (long-standing illness)
Marital Status	Economic activity status	BMI
	Level of Education	Mental Well-being (MWB)
		Life satisfaction
		Cigarette smoking

* More detail on variables used in the bivariate analysis is available in Table 9 in Appendix A.

Although there is evidence indicating a possible impact of ethnicity and religion on physical activity, this present study is of a single year's survey data, and the sample sizes for individual ethnic and religious groups were too small to include in any meaningful analysis.

As noted in Chapter 2, environmental factors are important in relation to physical activity. Urban/Rural classification and Health Board were tested and found to be non-significant and so were excluded from further analysis. Other environmental factors were not tested because relevant variables were not present in the SHeS.

Chi-squared tests of association and significance level were performed and results are presented in Chapter 3. Multivariate logistic regression models were subsequently created to examine the relationship between the range of factors and the likelihood of meeting the physical activity guidelines in 2011 and 2012. Only variables that were significantly associated with physical activity outcomes in the bivariate analysis at the 95% level were included in the logistic regression models. Separate models were run for 2011 and 2012 to examine the effect of the guideline change.

A series of logistic regression models were also run to investigate factors associated with participation in the different domains of overall physical activity. Each of the regressions were repeated separately for men and women, as the literature suggests gender-specific differences in the factors associated with physical activity and meeting the recommended guidelines.

The analysis identifies which of the independent variables (e.g. income or marital status) are significantly and independently associated with the dependent variable (physical activity outcome), after controlling for inter-relationships between the other variables in the model. Collinearity (the association between two or more predictor variables) was tested and no relationships of sufficient strength were

identified to exclude any of the predictor variables from being entered into the model. Starting with a basic model containing just sex and age, each variable was added into the model using stepwise regression analysis in SAS. The models were run without constraints on the level to include or exclude each individual variable and changes in the odds ratios with each additional variable included were monitored as further check on potential collinearity³⁸. This stepwise method combines forward and backwards selection and allows identification of variables by order of association strength (based on chi-squared score). By using stepwise analysis it is possible to explore how adding new variables reduces the effect of previous variables, and also shows the increased/decreased explanation value (R^2), which explains how much the outcome is based on each variable, and overall for a combination of the predictive variables. Total model R^2 values are presented in Table 12 in Annex B showing the amount of physical activity outcome variation explained by each model.

The chi-squared scores for each of the predictor factors entered into the model were used to indicate which characteristics tested in this analysis had the highest relative influence on meeting the physical activity guidelines and to determine the order of variable entry into the model. For example, if the health predictor had a higher chi-square value than sex or age predictors, the health variable was entered first, and the chi-squared value would be recalculated for the remaining two variables. Odds ratios were calculated to show the odds of a category within a variable occurring compared to a specified reference category. All analyses were tested at the 5% significant level producing 95% confidence intervals.

All analysis is based on complete cases. No multiple imputation was used. Of the eligible sample of adults aged 16 and over, only two respondents were excluded through missing a physical activity outcome value and 25% were excluded from the main logistic regression due to missing predictor values.

3.3 Limitations of the analysis

The Scottish Health Survey relies on self-report of physical activity, which has well-recognised limitations in accurately assessing physical activity due to difficulty in accurately recalling physical activity, differences in perceptions of physical activity intensity and matching responses to what is perceived to be the societal norm (social desirability responding)³⁹. The advantages of using self-report are that it is easy to collect data from a large number of people at low cost, many survey instruments have been validated against more accurate methods and repeatedly used in research. Self-reported physical activity is widely used and, despite the issues with absolute accuracy, this research allows comparison to a large body of prior evidence. In addition, the SHeS calculates total physical activity based on questions about different domains of physical activity. This more specific approach to assessing total physical activity may be expected to reflect more accurately total physical activity.

The study is limited to analysis of variables that are in the SHeS. A wide range of other factors, including environmental, psychological and interpersonal ones have been shown to have a relationship to physical activity outcomes, as already outlined in Chapter 2. Thus any model of explanation produced from the analysis in this study will only be partial.

Finally, many of the factors examined in the models for this study are likely to have bidirectional relationships with physical activity. For example, if a relationship was found to exist between having a BMI of >30+ (obese) and meeting physical activity guidelines, it could be said that not meeting physical activity guidelines is associated with being obese, but equally that being obese is associated with not meeting the guidelines. No clear direction of causality can be claimed.

Results - Bivariate
associations with
physical activity

Chapter 4

4. RESULTS - BIVARIATE ASSOCIATIONS WITH PHYSICAL ACTIVITY

4.1 Meeting physical activity guidelines

Of the sample of 4807 adults, 62% met the recommended physical activity levels in 2012⁴⁰. Just over a fifth (21%) of adults had very low activity levels, participating in 30 minutes or less total physical activity per week, see Figure 2.

Figure 2: Population physical activity levels, 2012

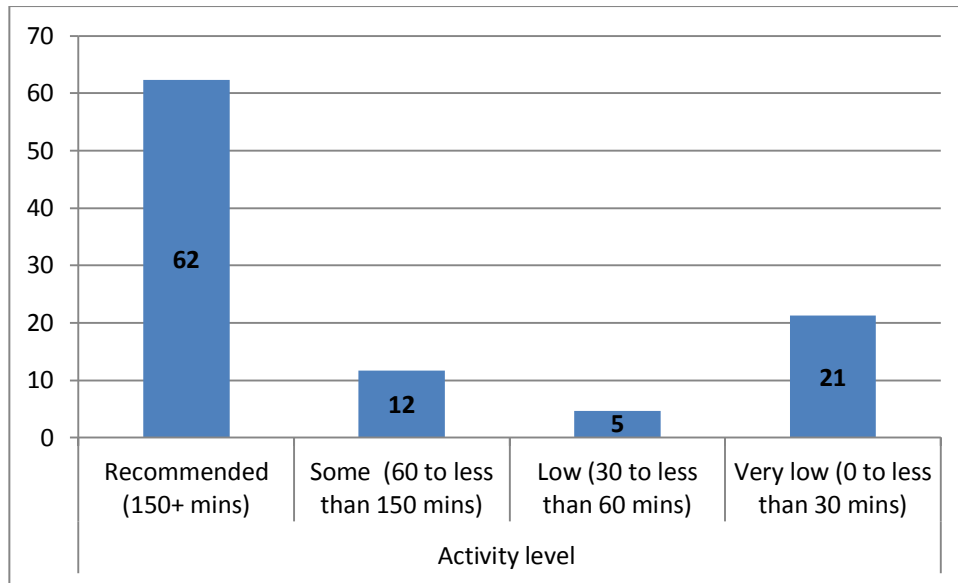
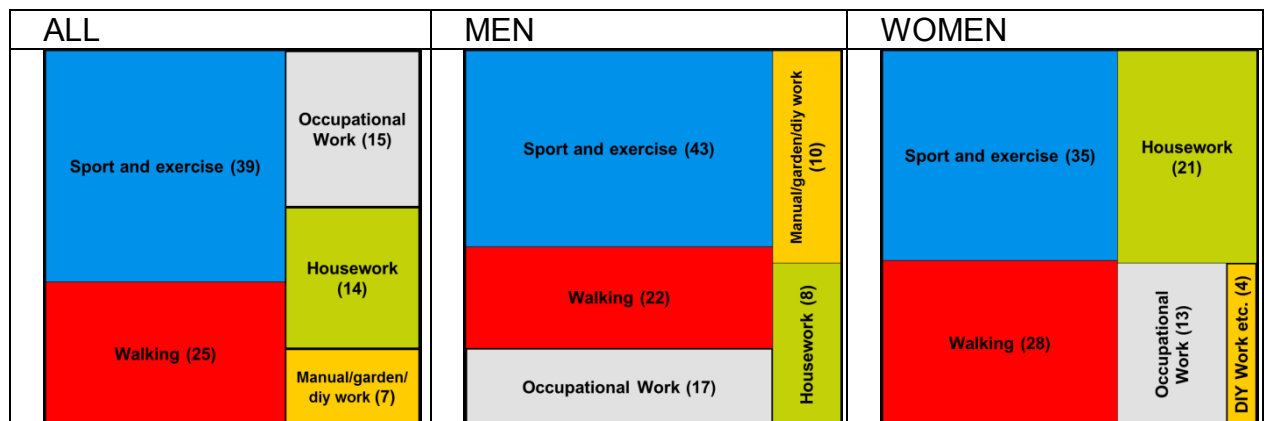


Figure 3 illustrates the proportion of physical activity taking place across the five domains of activity: at work, housework, manual/gardening/DIY work, walking and sports and exercise.

Figure 3: Participation in any physical activity by domain, 2012 (percentage of total hours, all respondents)



In 2012, physical activity in the domain of sport and exercise was proportionately the largest contributor to total physical activity (39%), followed by walking (25%). Sport and exercise remained the largest contributor to total physical activity for men, however, sport and exercise and walking were equal contributors for women.

For women, housework contributed more than occupational physical activity and was the third largest contributing domain (24%). Housework was less of a contributor to men's total physical activity. For men, occupational physical activity was third after sport and exercise and walking. When analysis was carried out on only those who met the guidelines, there was virtually no difference in the results.

Demographic Factors

All demographic factors were shown to be significantly associated with physical activity in the bivariate analyses:

Sex - More men than women reached the recommended physical activity levels in Scotland in 2012 (67% v 58%), see Figure 4.

Age - The analysis demonstrated a decline in achieving physical activity recommendations with increasing age. Amongst adult age groups in Scotland, the decline starts around age 45 and there is a further sharp decline at age 75 or over, see Figure 5. The age pattern is somewhat different for men and women, see Figure 6. The decline in men is fairly steady with age, whereas for women the proportion meeting the guidelines is fairly consistent until age 55. Both men and women experience a sharp drop from age 75. The gap between those in the younger age band and those ages 75+ is 50 percentage points (75% v 25%).

Marital status - There was no significant difference between the first four categories (married/civil partnership, living as married, single and separated). There was a significant difference compared to these four categories with a divorced/dissolved or widowed/surviving status. However, the majority of those who are widowed/surviving are aged at least 65, hence would be expected to have a lower rate of achieving the recommended physical activity level associated with their age.

When separate analyses were done by sex, the only significant difference was between men who were married (67%) and men who are co-habiting as though married (79%), see Figure 7.

Figure 4: Proportion meeting the recommended physical activity levels by sex, 2012

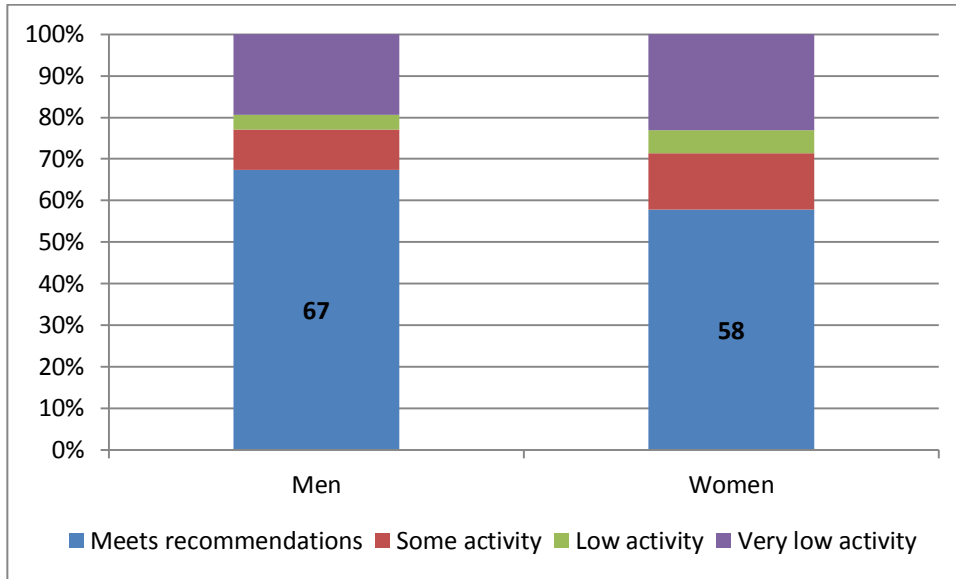


Figure 5: Proportion meeting the recommended physical activity levels by age, 2012

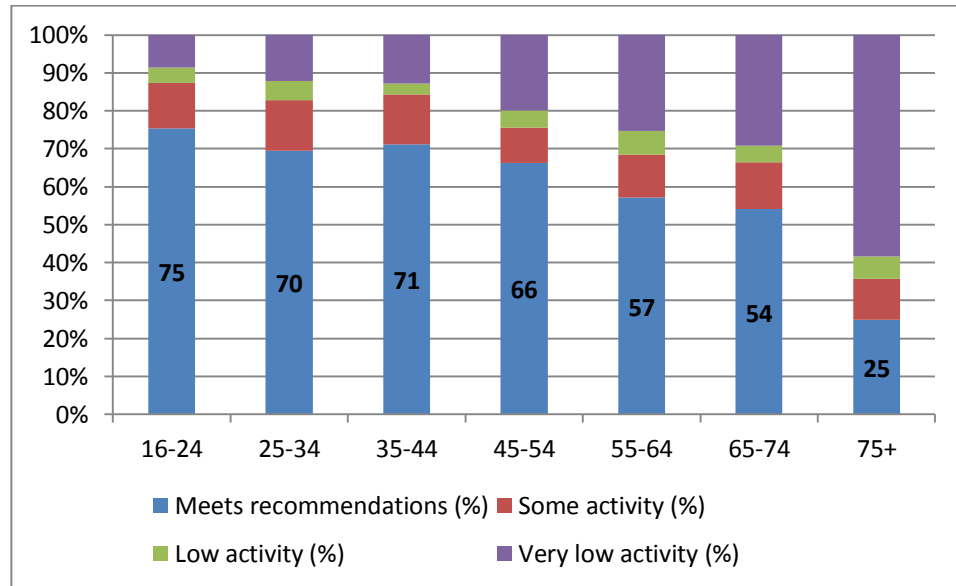


Figure 6: Proportion meeting the recommended physical activity levels by sex and age, 2012

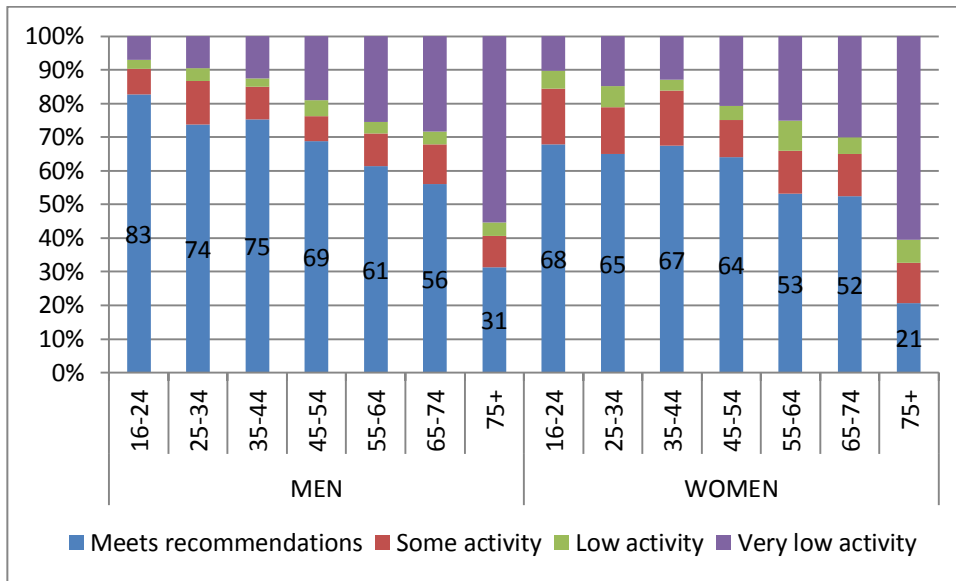
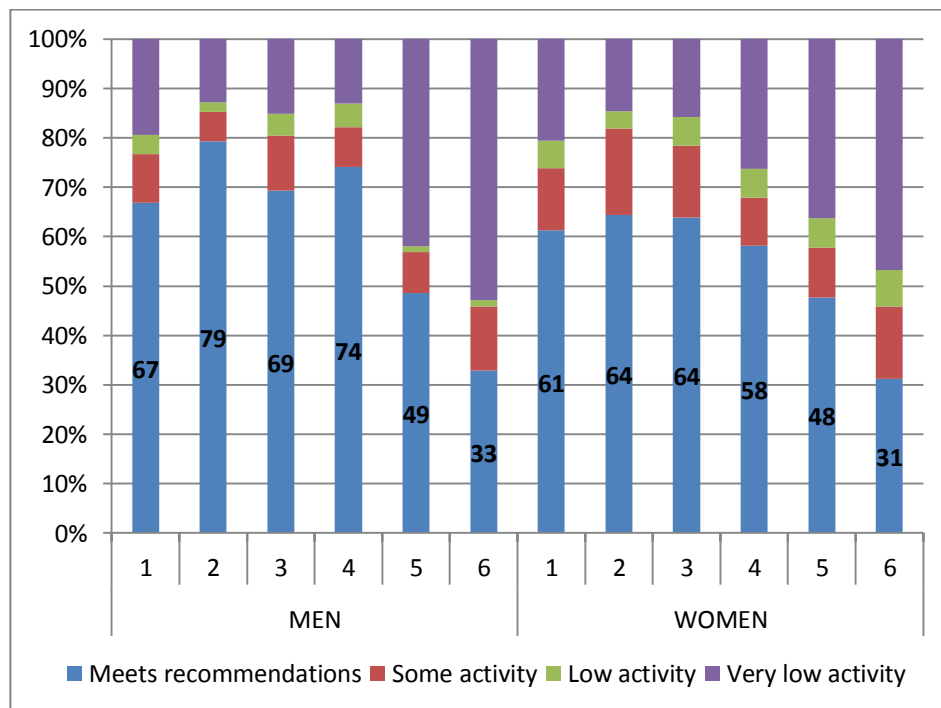


Figure 7: Proportion meeting the recommended physical activity levels by marital status, 2012



1-Married/civil partnership; 2-Living as married; 3-Single; 4-Separated; 5-Divorced/dissolved; 6-Widowed/surviving

Socioeconomic factors

All socioeconomic factors were shown to be significantly associated with physical activity in the bivariate analyses:

Income level - In 2012, there was a significant difference between those in the highest equivalised income band and those in the lower three income bands. There was no significant difference between the three lowest income bands. Three quarters (74%) of adults with an equivalised income of at least £39520 reached the recommended physical activity level compared to just under 50% of those with an equivalised income of less than £10672.

For both men and women, the trend was the same – the proportion of those reaching the recommended physical activity level tended to increase with increase in equivalised income. More men than women reached the recommended level in each of the income bands except the lowest income quintile; 79% of men and 67% of women in the highest income quintile compared to 49% of men and 50% of women in the lowest equivalised income group, see Figure 8. The decline in meeting activity recommendations with decreasing income is accompanied by a corresponding rise in inactivity (rather than 'some' or 'low' activity).

Area deprivation - As area deprivation increases, the proportion of adults reaching the recommended physical activity levels decreases. Nearly 80% of those in the least deprived quintile reached the recommended physical activity level compared to just over 54% in the most deprived quintile. There was a significant difference between the least deprived quintile and the 1st, 2nd and 3rd most deprived quintiles.

For men the same general trend was found with a significant difference between the most deprived quintile and the three least deprived quintiles. There was a 21 percentage point gap in men's physical activity levels between those in the least deprived and most deprived quintiles (77% v 56%). The relationship was less stark, though still apparent for women, with a 14 percentage point difference in women's activity levels between those in the least deprived and most deprived quintiles (66% v 52%), see Figure 9.

Economic activity status - While no significant difference was found between students and those in paid work, the rest of the categories (unemployed/unable to work/retired/looking after family/other) were found to have significantly lower proportions meeting the physical activity recommendations. Full time students and those in paid work had the highest rate of meeting the recommended physical activity levels (77% and 75%) compared to 58% of those unemployed and 15% of those unable to work, see Figure 10.

Education - The only notable variation of physical activity by education was significantly lower levels of activity amongst those with either no qualifications or those with other school level qualifications compared to those with at least standard grade qualification and above, see Figure 11.

Figure 8: Proportion meeting the recommended physical activity levels by sex and equivalised income, 2012

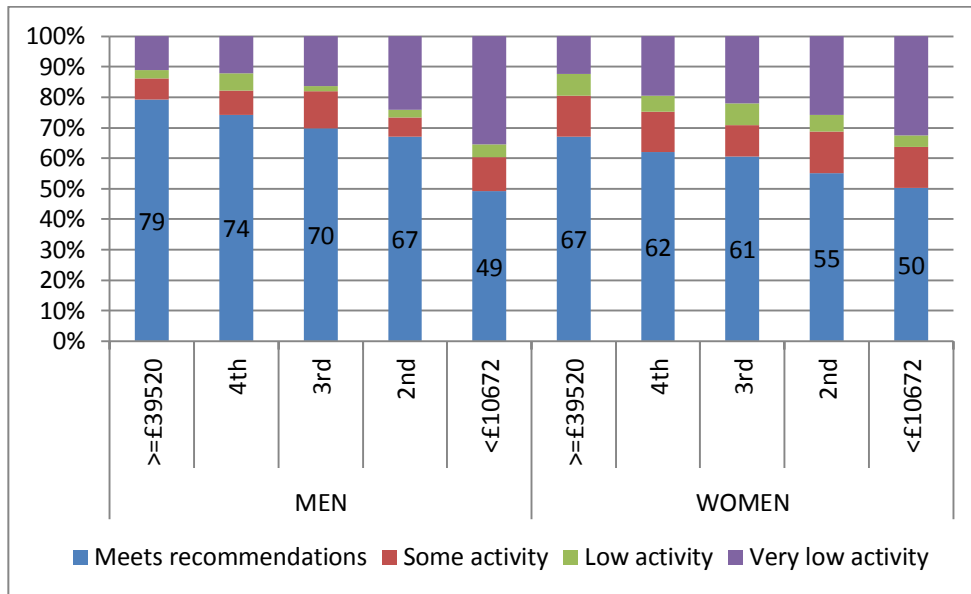


Figure 9: Proportion meeting the recommended physical activity levels by sex and area deprivation, 2012

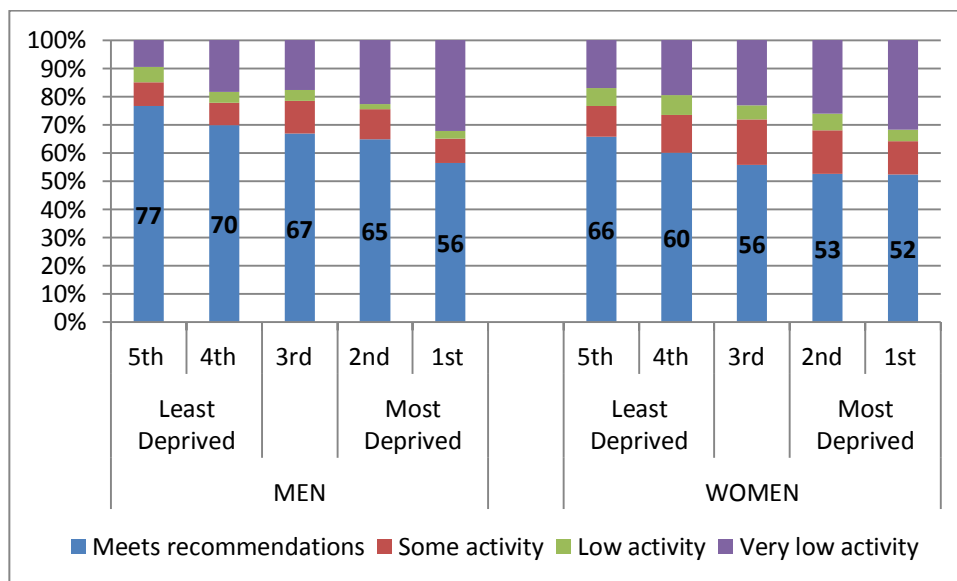


Figure 10: Proportion meeting the recommended physical activity levels by economic activity status, 2012

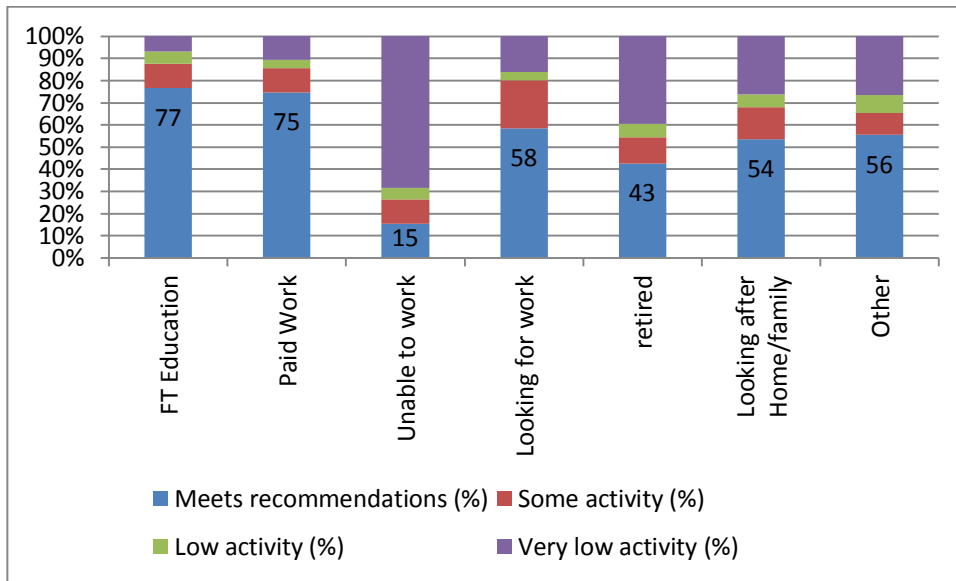
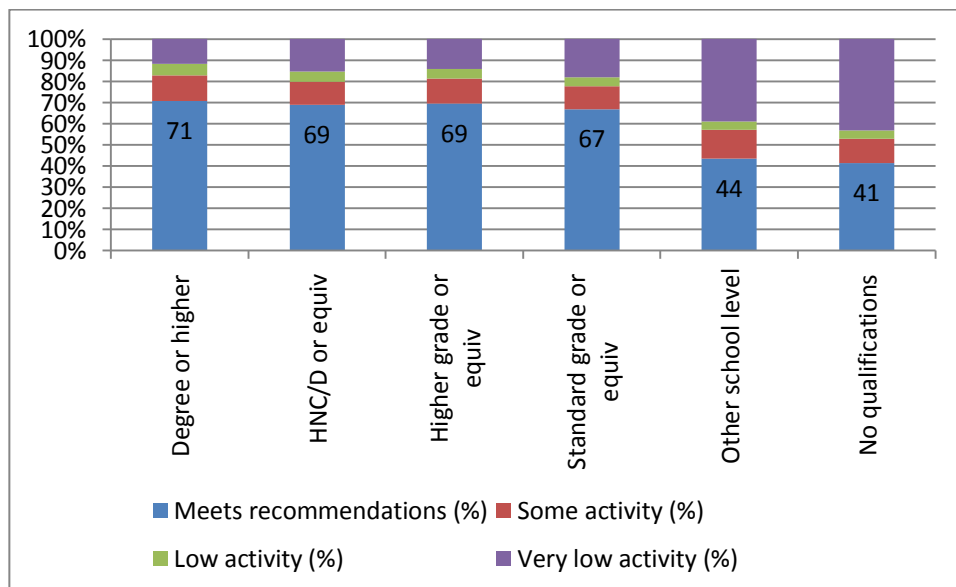


Figure 11: Proportion meeting the recommended physical activity levels by highest education qualification, 2012



Health and lifestyle factors

All health and lifestyle factors were shown to be significantly associated with physical activity in the bivariate analyses:

Self-assessed health - There is a steep and linear decline in physical activity levels as self-assessed health declines from very good to very bad. For all adults, 71% of those who reported very good or good health reached the recommended physical activity levels compared to only 20% of those reporting bad or very bad health. The pattern was similar for men and women: 76% of men and 67% of women who reported their health as very good or good reached the recommended physical activity levels, while only 19% of men and 21% women reporting bad or very bad health did so, see Figure 12.

Disability - The proportion of adults meeting the recommended physical activity guidelines decreased as self-report of long term limiting illness increased. For all adults, 74% of those with no disability reached the recommended physical activity guidelines compared to 41% of those with a long term limiting illness. A similar pattern was observed in both men and women, see Figure 13.

BMI - Adults with a high BMI (30 and over - obese) were significantly less likely to meet physical activity recommendations (54%) compared to those classified as having a normal BMI (18.5-25) or who were overweight (25-30) (69%). The pattern was more pronounced in men than women, see Figure 14.

Smoking - A significant difference was found between those who have never smoked and either ex-smokers or current smokers. A higher proportion of those who have never smoked met the physical activity recommendations (67%) compared to ex-smokers (59%) and current smokers (57%). A similar pattern was found for men and women, see Figure 15.

Mental well-being – Adults with a mean or higher WEMWBS⁴¹ score (higher mental wellbeing) were significantly more likely to meet the recommended physical activity level (67%) than those with a low WEMWBS score (37%). This pattern was similar between men and women: 73% of men and 62% of women with a high WEMWBS score reached the recommended level, while only 59% of men and 50% of women reporting a low WEMWBS did so, see Figures 16.

Life satisfaction – The analysis showed that a higher score for life satisfaction was associated with meeting the recommended physical activity levels. Of those with low life satisfaction (scores 0-7), 54% met the recommended physical activity levels compared to 70% of those reporting high life satisfaction (scores 8-10). Similar patterns were seen for men and women, see Figure 17.

Figure 12: Proportion meeting the recommended physical activity levels by sex and self-assessed health, 2012

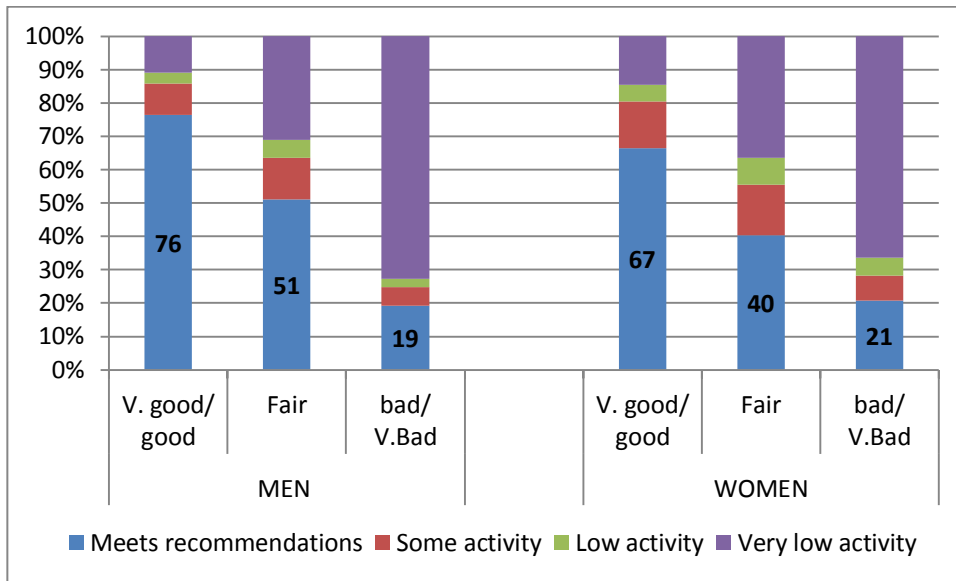


Figure 13: Proportion meeting the recommended physical activity levels by sex and disability, 2012

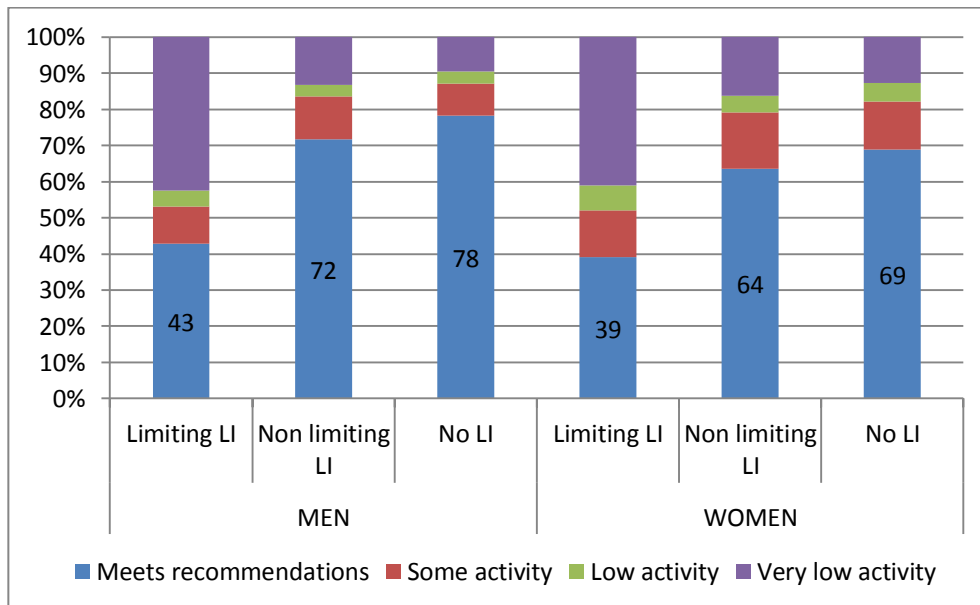


Figure 14: Proportion meeting the recommended physical activity levels by sex and BMI, 2012

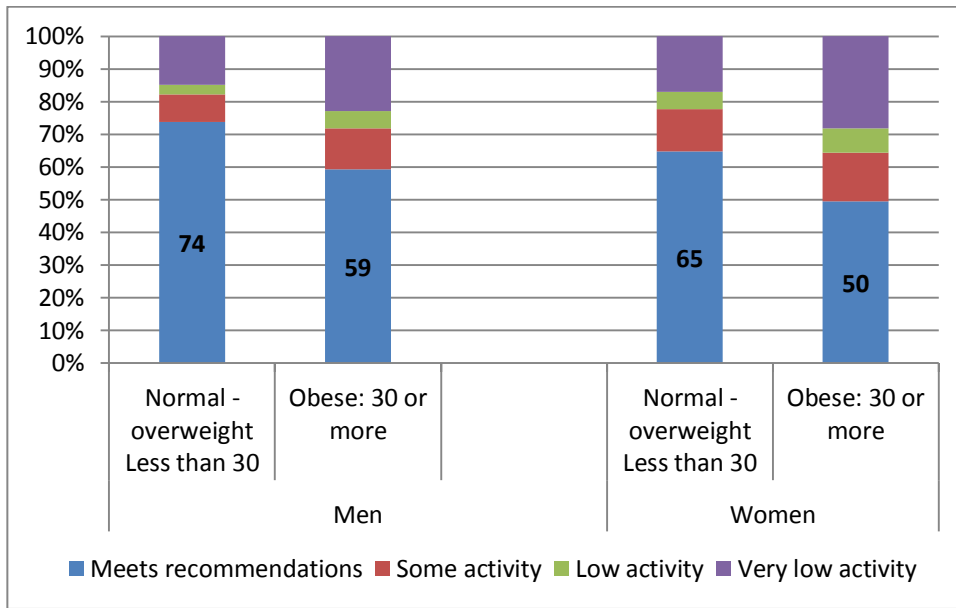


Figure 15: Proportion meeting the recommended physical activity levels by sex and cigarette smoking, 2012

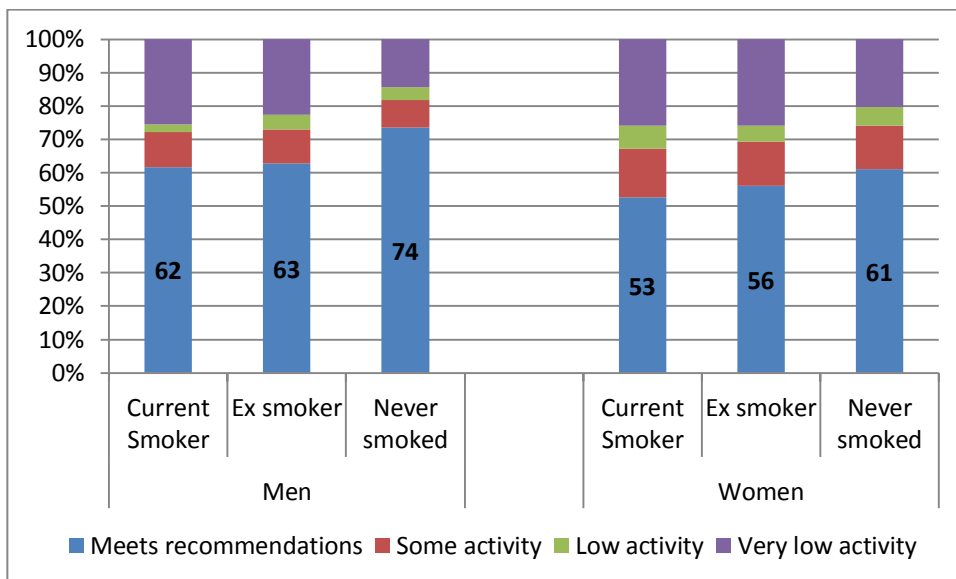


Figure 16: Proportion meeting the recommended physical activity levels by sex and mental wellbeing (WEMWBS score), 2012

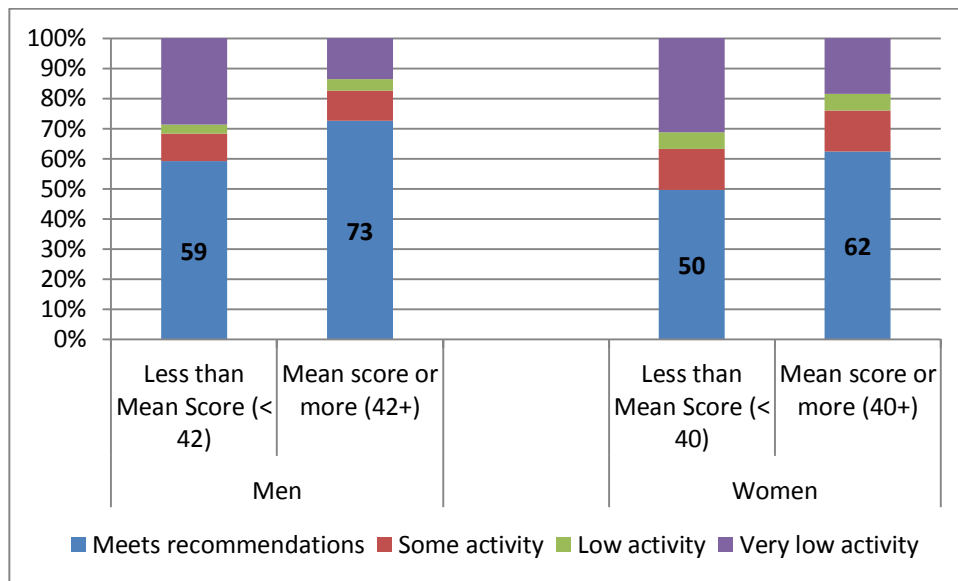
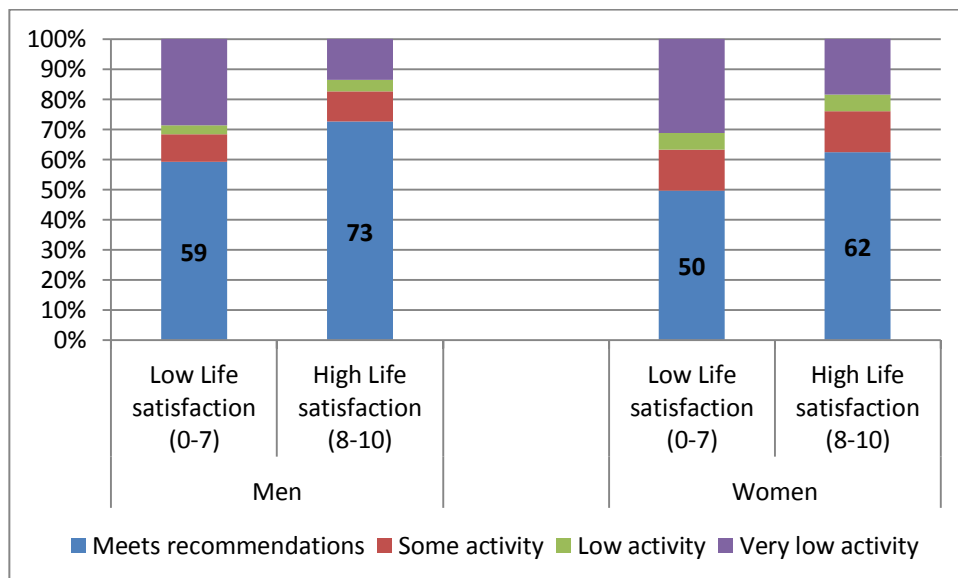


Figure 17: Proportion meeting the recommended physical activity levels by life satisfaction score, 2012



This chapter has presented the results of the bivariate analysis of factors correlated with meeting the physical activity guidelines in 2012. It is likely there are many inter-relationships between the variables above, for example, age is likely to partly explain the lower rates of married men meeting the physical activity guidelines compared to co-habiting men. The advantage of conducting logistic regression is that these inter-relationships between independent variables are accounted for, and so a more meaningful explanation of the factors that predict meeting the guidelines can be produced. The results of this logistic regression are presented in the following chapter.

**Results - Multivariate
analysis (logistic regression)
of factors associated with
physical activity levels**

Chapter 5

5. RESULTS – MULTIVARIATE ANALYSIS (LOGISTIC REGRESSION) OF FACTORS ASSOCIATED WITH PHYSICAL ACTIVITY LEVELS

5.1 Factors associated with meeting the new physical activity guidelines

Table 2 provides a list of the factors from the bivariate analysis which were entered into the logistic regression model and an indication of whether the characteristics retained significant association with meeting physical activity recommendations in final models. Results are presented for all respondents and by sex.

Table 2: Factors associated with achieving recommendations for physical activity (new guidelines), 2012

FACTOR	ALL	MEN	WOMEN
Demographic			
Sex	√	N/A	N/A
Age	√	√	√
Marital Status	ns	ns	ns
Socioeconomic			
Equivalised Income quintiles	ns	ns	ns
Deprivation - SIMD Quintiles	ns	ns	ns
Economic Activity Status (EAS)	√	√	√
Highest Education Qualification	ns	ns	ns
Health and Lifestyle			
Self-Assessed health	√	√	√
Longstanding Illness	√	√	ns
Cigarette smoking	√	ns	√
Mental wellbeing	√	√	√
life satisfaction	ns	ns	ns
BMI	√	√	√

√ = significant in final model; ns = non-significant; N/A = not applicable

For all adults, demographic and health and lifestyle factors were of primary importance associated with meeting the 2012 physical activity guidelines, whereas socioeconomic factors appeared overall less influential, with the exception of economic activity status. The factors remaining significantly associated in the logistic regression models were sex, age, economic activity status, self-assessed health, disability, cigarette smoking, mental wellbeing and BMI.

When analysis was conducted separately for men and women, the range of factors was similar except that disability was a factor for men but not women and cigarette smoking was a factor for women but not men.

Marital status, equivalised income, deprivation, educational attainment and life satisfaction were not significant in any of the models.

Sex - Women were found to be less likely to achieve recommended levels of physical activity than men. In 2012, the odds for men to achieve the physical activity guideline in comparison to women were 1.47 (CI 1.24 – 1.73).

Age – In comparison to those aged 75 or older, all the younger age categories were significantly more likely to achieve recommended physical activity levels with the greatest difference for those aged 16-24 years (OR 4.07, CI 2.20 – 7.54).

A decrease in physical activity observed with increasing age appears more marked in men than in women, with a particularly large difference between men aged 16-24 years and those aged 75 or older (OR 12.81, CI 4.81 – 34.12), however, the large confidence intervals suggest there is a large degree of variation within the age category 16-24, such that this apparent marked effect should be viewed with caution.

The bivariate analyses indicated a steady decline with increasing age in the proportion meeting physical activity guidelines, seen mainly in men. Logistic regression revealed a more complex relationship, once other factors had been controlled for. In women, likelihood of meeting the guidelines increased to age 44 and then declined to age 64. There was a slight increase again at age 65-74. In men, there was a large decrease in the likelihood of meeting the guidelines between ages 16-24 and 25-34, an increase to age 44 and then a steady decline to age 74.

Economic activity status – In comparison to those in paid work, those who were either unable to work, looking for work or retired were all less likely to meet the physical activity recommendations. Those who were unable to work had the lowest odds and were least likely to be active at the recommended level (OR 0.22, CI 0.13 – 0.36). There was no significant difference between those in paid work and those either in full-time education or looking after family/home or those who responded 'other'.

When the analysis was conducted separately for men and women, some differences were apparent. Men in full-time education were less likely to achieve recommended physical activity levels compared to those in paid work. No such difference was observed in women. Women who are retired were less likely to achieve physical activity recommendations compared to women in paid work, whereas no such effect was observed for men.

Self-assessed health – As health status improved so too did the likelihood of achieving the recommended physical activity level. Those who reported very good/good health had higher odds of achieving the recommended level of physical activity than those who rated their health as bad/very bad (OR 2.68, CI 1.81 – 3.95). Those with fair health were also more likely to be active than those with poor health (OR 1.82, CI 1.25 – 2.66).

When the analysis was conducted separately for men and women, the relationship was more marked for women than men and followed a similar pattern to that for all

adults, with increasing odds of meeting physical activity guidelines with increasing self-rated health. Women with good health had odds of 3.01 (CI 1.84 – 5.22) compared to women with poor health. For men, there was still a higher likelihood of meeting physical activity recommendations for those with good health compared to bad health (OR 2.34, CI 1.26 – 4.32), however, there was no difference between those with fair health and good health.

Disability – Having a long term limiting illness (LLI) had a negative association with achieving physical activity recommendations (OR 0.72, CI 0.57 – 0.89). There was no difference between those with a long term illness that was not limiting and those without an LLI. When the analysis was conducted separately for men and women, the relationship remained only for men (OR 0.68, CI 0.49 – 0.96).

Cigarette smoking – Compared to those who have never smoked, a current cigarette smoker was found to be significantly less likely to achieve recommended levels of physical activity (OR 0.71, CI 0.57 – 0.87). No difference was found between those who were previous smokers and those who had never smoked. Separate analysis by sex revealed that cigarette smoking was not a significant factor predicting physical activity levels for men but was for women (OR 0.67, CI 0.50 – 0.89). Women who have never smoked were more likely to achieve physical activity recommendations compared to current smokers.

Mental wellbeing – Lower than average mental wellbeing was significantly associated with a lower likelihood of achieving physical activity recommendations (OR 0.6, CI 0.46 – 0.79). This was true for both men and women.

BMI – Obesity, i.e. a BMI of 30 or more, had a negative impact on likelihood of achieving recommended levels of physical activity. Those with a BMI of less than 30 were significantly more likely to achieve the recommendations (OR 1.48, CI 1.24 – 1.77). This relationship was true for both men and women, but more marked in men (Men: OR 1.63, CI 1.24 – 2.15. Women: OR 1.42, CI 1.11 – 1.81).

Chi-square results in the logistic regression combined with odd ratios were used to identify key individual factors and the category of each relevant variable most likely to be associated with meeting the physical activity guidelines. Using this information, Figures 18 and 19 illustrate the ‘types’ of individuals (in this study) most likely to meet the recommended level of moderate to vigorous physical activity in 2012.

Figure 18: Characteristics most strongly associated with men achieving the recommended physical activity levels in 2012:



Economic activity status - Self-assessed health - Age - Mental wellbeing - BMI - Disability -	In paid work Very good or good 16-24 Average or higher Normal/overweight (not obese) No illness	
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Figure 19: Characteristics most strongly associated with women achieving the recommended physical activity levels in 2012:

Self-assessed health - Economic activity status - Age - BMI - Mental wellbeing - Smoking status -	Very good or good In paid work 35-44 and 64-75 Normal/overweight (not obese) Average or higher Never smoked	
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5.2 Comparison between meeting the old physical activity guidelines and the new guidelines

One possible impact of the removal of the stipulation that activity should be carried out regularly rather than a total given for the week, is that it affects the distribution of factors associated with meeting the physical activity guidelines in some way. To investigate this, logistic regression of the factors associated with meeting the old guidelines (30 minutes moderate or vigorous physical activity (MVPA) on at least 5 days per week) was carried out (see Table 3) using data from the 2011 SHeS, and results compared to those for the current guidelines (150 minutes MVPA per week) in 2012.

For all adults, the factors remaining significantly associated with meeting the old physical activity guidelines were age, sex, economic activity status, self-assessed health, disability and BMI. A similar pattern of relationships was found also when the analysis was conducted separately for men and women. Figures 20 and 21 illustrate the ‘types’ of individuals (in this study) most likely to meet the recommended level of moderate to vigorous physical activity in 2011. Further details on the results of the analysis on the 2011 SHeS data can be found in Table 20, Annex B.

Table 3: Factors associated with achieving recommendations for physical activity (old guidelines), 2011

FACTOR	ALL	MEN	WOMEN
Demographic			
Sex	√	N/A	N/A
Age	√	√	√
Marital Status	ns	ns	ns
Socioeconomic			
Equivalised Income quintiles	ns	ns	ns
Deprivation - SIMD Quintiles	ns	ns	ns
Economic Activity Status (EAS)	√	√	√
Highest Education Qualification	ns	ns	ns
Health and Lifestyle			
Self-Assessed health	√	√	√
Longstanding Illness	√	√	√
Cigarette smoking	ns	ns	ns
Mental wellbeing	ns	ns	ns
life satisfaction	ns	ns	ns
BMI	√	√	√

√ = significant in final model; ns = non-significant; N/A = not applicable

Figure 20: Characteristics most strongly associated with men achieving the recommended physical activity levels in 2011:



Age - Self-assessed health - BMI -	25-34 Very good or good Normal/overweight (not obese)	
Economic activity status - Disability -	In paid work No limiting long term illness	

Figure 21: Characteristics most strongly associated with women achieving the recommended physical activity levels in 2011:

Economic activity status - BMI -	In paid work Normal/overweight (not obese)	
Disability -	No limiting long term illness	
Age - Self-assessed health -	25-44 Very good or good	

Overall, very little difference was found in the demographic, socioeconomic and health and lifestyle patterning of those who met the new compared to the old guidelines. The main associations in both years were found to be demographic and health and lifestyle with no significant relationships with income, deprivation or educational status.

Some differences were found between specific health and lifestyle factors:

- **Disability** – Those with a longstanding illness were less likely to meet the physical activity recommendations in both 2011 and 2012, however, in 2011 this also applied to both men and women, whereas in 2012 disability was a factor only for men.
- **Cigarette smoking** – In 2011, there was no relationship between the cigarette smoking status of a person and meeting physical activity recommendations, however, in 2012 cigarette smoking status was found to be related to all adults and women’s likelihood of achieving the recommended level of physical activity.
- **Mental wellbeing** – In 2011, there was no relationship between mental wellbeing and meeting physical activity recommendations, however, in 2012 mental wellbeing was found to be related to both men and women’s likelihood of achieving the recommended level of physical activity.

5.3 Factors associated with participation in different domains of physical activity

This sections presents the results from logistic regression of the factors associated specifically with participation across five different domains of physical activity in 2012: sport and exercise, walking, housework, manual work/gardening/DIY and activity at work (occupational physical activity).

Sport and exercise

Demographic, socioeconomic and health and lifestyle factors were all associated with whether a person was likely to report participation in sport and exercise or not, see Table 4 below and Table 21 in Appendix B.

Table 4: Significant factors associated with sport and exercise participation

FACTOR	ALL	MEN	WOMEN
Demographic			
Sex	√	N/A	N/A
Age	√	√	√
Marital Status	ns	ns	ns
Socioeconomic			
Equivalised Income quintiles	√	ns	ns
Deprivation - SIMD Quintiles	ns	√	ns
Economic Activity Status (EAS)	ns	ns	ns
Highest Education Qualification	√	√	√
Health and Lifestyle			
Self-Assessed health	√	√	√
Longstanding Illness	ns	ns	ns
Cigarette smoking	√	ns	√
Mental wellbeing	√	√	√
life satisfaction	√	√	ns
BMI	√	√	√

Men were found to be significantly more likely to participate in sport and exercise than women (OR 1.49, CI 1.26 – 1.75).

Increasing age had a negative relationship with sport and exercise participation, with those aged 16-24 found to be substantially more likely to participate in sport and exercise than those aged 75 or over (OR 7.63, CI 4.09 – 14.24). This relationship was even more marked in men than for women, however, as noted previously this should be interpreted with caution due to large confidence intervals indicating wide variation within the youngest age category.

Those in the highest equivalised income quintile were significantly more likely to participate in sport and exercise compared to those in the lowest quintile (OR 1.60, CI 1.17 – 2.17). There was no difference between other income quintiles. This was not a significant factor when analyses were conducted separately for men and women. This may be due to a small variation relative to the bands of equivalised income included in the analysis.

Better self-rated health was positively associated with participation in sport and exercise. Those reporting better health were significantly more likely to participate compared to those reporting poor health (OR 2.41, CI 1.60 – 3.65). A similar pattern was found when analyses were conducted separately for men and women.

There was a positive association between increasing level of educational attainment and participation in sport and exercise. Those with a degree or higher were more likely to participate in sport and exercise than those with no

qualifications (OR 2.67, CI 2.02 – 3.52). A similar pattern was found when analyses were conducted separately for men and women.

A lower BMI was found to be positively associated with participation in sport and exercise. This was found to be the case for both men and women. Adults with a BMI less than 30 were more likely to participate in sport and exercise than those classed as obese with a BMI of 30 or more (OR 1.53, CI 1.29 – 1.83).

A lower mental wellbeing score, as assessed by the WEMWBS measure, was associated with lower levels of participation in sport and exercise (OR 0.73, CI 0.55 – 0.96). This was the case for both men and women. In a similar vein, those with a lower life satisfaction score were less likely to report participation in sport and exercise (OR 0.82, CI 0.69 – 0.98). When analyses were conducted separately for men and women, life satisfaction remained a significant factor only for men.

For women only, cigarette smoking had a relationship with sport and exercise participation. Those who were current smokers were less likely to report participation in sport and exercise compared to those who had never smoked (OR 0.52, CI 0.39 – 0.70). Level of area deprivation was a significant factor but for men only, however it is not possible to state the direction of association.

Economic activity status had no significant relationship with participation in sport and exercise. This contrasts with the findings regarding the range of factors associated with meeting physical activity guidelines, where economic activity status was the only socioeconomic factor to remain significant in the final model.

Disability/illness and marital status were also found not to be associated with sport and exercise participation.

Walking (at least 10 minutes)

There were some notable differences between the factors associated with walking and those for meeting physical activity guidelines and participating in sport and exercise, see Table 5. In contrast to most outcomes for physical activity, women were found to be significantly more likely to participate in walking than men. Age has been consistently associated with levels of physical activity, yet it was not an influential factor for participation in walking, except in women. Once other factors were controlled for in the models, the likelihood of participating in walking tended to increase with age but was only statistically significant for the three age groups above age 45 years, see Table 22 in Appendix B.

Table 5: Significant factors associated with walking participation

FACTOR	ALL	MEN	WOMEN
Demographic			
Sex	√	N/A	N/A
Age	ns	ns	√
Marital Status	√	√	√
Socioeconomic			
Equivalised Income quintiles	ns	ns	ns
Deprivation - SIMD Quintiles	ns	ns	ns
Economic Activity Status (EAS)	√	√	ns
Highest Education Qualification	√	√	ns
Health and Lifestyle			
Self-Assessed health	√	ns	√
Longstanding Illness	√	ns	√
Cigarette smoking	√	√	ns
Mental wellbeing	ns	ns	ns
life satisfaction	ns	ns	√
BMI	ns	ns	ns

Socioeconomic factors were not relevant for women but economic activity status and highest educational qualification did demonstrate an association for men. Health factors were more relevant for women than for men.

Men – economic activity status, educational qualification, cigarette smoking and marital status were all related to participation in walking. Men who reported being unable to work were less likely to report participation in walking (OR 0.22, CI 0.09 – 0.53).

Women – self-assessed health, age, marital status, illness and life satisfaction were all found to be related to participation in walking in women. Those aged between 45 to 74 were all far more likely to report participation in walking compared to those aged 75 or more. Women with a longstanding illness were less likely to participate

in walking than those without (OR 0.44, CI 0.24 – 0.83). Those women with a lower level of life satisfaction were less likely to participate in walking than those with a life satisfaction score of 8 or more (OR 0.58, CI 0.36 – 0.96).

Housework

Sex, age, income, health, smoking and BMI were all associated with participation in heavy housework, see Table 6. Overall, age, sex and health were the key factors here with little influence exerted by socioeconomic factors. Men were less likely than women to participate in housework (OR 0.14, CI 0.10 – 0.21). There was a general trend for participation in housework to decrease with age with the exception of the youngest category (16-24) who were not significantly different to those aged 75 or older. Those with better health were more likely to participate in housework than those rating their health as poor or very poor.

Table 6: Significant factors associated with heavy housework participation

FACTOR	ALL	MEN	WOMEN
Demographic			
Sex	√	N/A	N/A
Age	√	√	√
Marital Status	ns	ns	√
Socioeconomic			
Equivalised Income quintiles	√	ns	ns
Deprivation - SIMD Quintiles	ns	ns	√
Economic Activity Status (EAS)	ns	√	ns
Highest Education Qualification	ns	ns	√
Health and Lifestyle			
Self-Assessed health	√	√	√
Longstanding Illness	ns	ns	ns
Cigarette smoking	√	ns	√
Mental wellbeing	ns	ns	ns
life satisfaction	ns	ns	ns
BMI	√	√	ns

Age and self-assessed health remained significant when analyses were conducted separately for both men and women. Mental wellbeing, long standing illness and life satisfaction were not associated in any of the housework related analyses. Other associated factors were quite different between the sexes.

Men – In addition to age and self-assessed health, BMI and economic activity status were associated with whether men participated in heavy housework. Those with a BMI less than 30 were more likely to participate in heavy housework than those who were classified as obese. Those who were retired were more likely to participate in heavy housework than those in paid work.

Women - In addition to age and self-assessed health, cigarette smoking, deprivation, educational attainment and marital status were associated with whether women participated in heavy housework, however, considerable variation within categories makes interpretation of the impact of the additional factors here difficult.

Manual work/gardening/DIY

Overall, demographic and socioeconomic factors were more influential on this domain with little influence from health and lifestyle factors, except self-assessed health, see Table 7.

Table 7: Significant factors associated with manual work/gardening/DIY participation

FACTOR	ALL	MEN	WOMEN
Demographic			
Sex	√	N/A	N/A
Age	√	√	√
Marital Status	√	√	ns
Socioeconomic			
Equivalised Income quintiles	√	√	ns
Deprivation - SIMD Quintiles	√	√	√
Economic Activity Status (EAS)	√	√	ns
Highest Education Qualification	√	√	√
Health and Lifestyle			
Self-Assessed health	√	√	√
Longstanding Illness	ns	√	ns
Cigarette smoking	ns	ns	ns
Mental wellbeing	ns	ns	ns
life satisfaction	ns	ns	ns
BMI	ns	ns	ns

Sex, age, income, marital status, deprivation, economic activity status, education and self-assessed health were all associated with participation in manual work/gardening/DIY. Age, self-assessed health, deprivation and educational attainment were also all associated with participation in manual work/gardening/DIY when analyses were conducted separately for men and women.

Men were significantly more likely to participate in manual work/gardening/DIY than women (OR 2.30, CI 1.96 – 2.69). Those aged 35 to 74 were all more likely to participate in this domain compared to those aged 75 or older and those in the youngest age category were less likely to, although this disguises some differences by age between men and women. Overall, the higher the socioeconomic indicator the higher the likelihood of participating in manual work/gardening/DIY. Decreasing

level of deprivation was generally associated with increased participation, more so for the 3rd and 4th quintile with a slight decrease in participation in quintile 5. In a similar fashion, all four higher equivalised income quintiles were associated with greater participation but there was a decreasing trend from income quintile 4 to the highest earners.

Smoking, mental wellbeing, life satisfaction and BMI were not associated factors in any of the analyses for manual work/gardening/DIY. Several differences were found to exist by gender.

Men – For men, income, marital status, economic activity status (EAS) and disability status were associated with participation in manual work/gardening/DIY in addition to age, self-assessed health, deprivation and educational attainment.

Women – For women, there were no further significant factors in addition to age, self-assessed health, deprivation and educational attainment. With respect to age, those aged 16-34 were less likely to participate in manual work/gardening/DIY than those aged 75 or older and those aged 35 to 74 were no different to the oldest age group.

Occupational physical activity

Age and socioeconomic factors income, deprivation and highest qualification level were all strongly associated with who was physically active at work. Health and lifestyle factors had very little influence, see Table 8.

Table 8: Significant factors associated with occupational physical activity participation (respondents in paid work only)

FACTOR	ALL	MEN	WOMEN
Demographic			
Sex	ns	ns	ns
Age	√	√	√
Marital Status	ns	ns	ns
Socioeconomic			
Equivalised Income quintiles	√	√	√
Deprivation - SIMD Quintiles	√	ns	√
Economic Activity Status (EAS)	n/a	n/a	n/a
Highest Education Qualification	√	√	√
Health and Lifestyle			
Self-Assessed health	ns	ns	ns
Longstanding Illness	ns	ns	ns
Cigarette smoking	ns	ns	√
Mental wellbeing	ns	ns	ns
life satisfaction	ns	ns	ns
BMI	ns	√	ns

It is notable that this is the only physical activity outcome in this study where sex was found to be non-significant.

The results indicate that those in the youngest age category are more likely to be active in their paid job than those age 75+. In general, participation in occupational physical activity increased with decreasing indicators of socioeconomic status. Those in the highest equivalised income quintile (£39520+) were less likely to be active at work than those earning less than £10672 (OR 0.53 CI 0.32 – 0.87). Adults in the most deprived quintile were more likely to be active in their paid job than adults in the other deprivation quintile groups. The higher the qualification, the less likely the respondent was of being active at work. This contrasts with the finding for participation in sport and exercise and manual work/gardening/DIY where participation tended to increase with increase in the indicators of socioeconomic status.

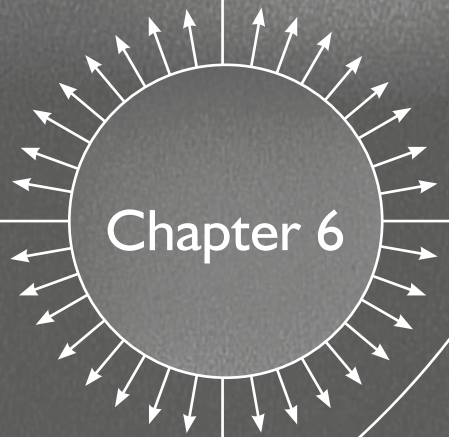
When analyses were conducted separately for men and women, all but deprivation remained significantly associated in both.

Men - Age, income and highest qualification level remained strongly associated and in addition a relationship was found to BMI. Although ORs were non-significant, the suggestion was that those with a BMI less than 30 were more likely to participate in occupational physical activity.

Women - Age, income, deprivation and highest qualification level were all strongly associated with who was physically active at work. In addition, an association was found between smoking behaviour and occupational physical activity. Current smokers were more likely to be active in their paid work than those who have never smoked.

Discussion and Conclusion

Chapter 6



6. DISCUSSION AND CONCLUSION

There is extensive evidence that physical activity contributes to health, as well as extensive evidence of persistent inequalities in health. Differentials in physical activity matter then, because they have the potential to contribute to alleviation of these persistent inequalities in health.

Logistic regression is helpful in indicating what factors are associated with and may predict meeting physical activity guidelines, i.e. the patterning of physical activity. However, as noted earlier, a limitation of this study is only being able to compare those factors for which there are variables present in the Scottish Health Survey. The factors discussed here can only explain part of the variation in physical activity. It is also important to remind ourselves that many of the factors examined in the models for this study are likely to have bidirectional relationships with physical activity. For example, having a BMI of >30+ (obese) was found to be associated with a lower likelihood of meeting physical activity guidelines. Equally, it could be said that not meeting physical activity guidelines is associated with being obese. No clear direction of causality can be claimed. The study of correlates, however, is regarded as important despite these limitations in helping to develop and improve interventions and identify priority target population groups⁴², although this type of research is just one part of a wider evidence base that should be taken into consideration.

The analysis on the 2012 SHeS found that, for all adults, demographic and health and lifestyle factors were of primary importance with meeting the 2012 physical activity guidelines, whereas socioeconomic factors were overall less influential. The exception to this was economic activity status, which showed a relatively strong influence on likelihood of meeting the guidelines. Those reporting being unable to work were much less likely to achieve recommended levels of physical activity compared to those in paid work, even after having controlled for disability or health status.

While it is clear the physical activity guideline change in 2011 (from 30 minutes of moderate physical activity on five or more days per week to accumulation of 150 minutes of moderate physical activity per week, with no stipulation on frequency) had a substantial effect on the proportion of the population who meet the guidelines, the analyses in this study suggest there was not such a dramatic effect on the distribution of characteristics of those most likely to meet the physical activity guidelines. Overall, very little difference was observed in the demographic, socioeconomic and health and lifestyle patterning of those in 2012 who met the new guidelines compared to respondents to the 2011 survey meeting the old guidelines. A very similar range of the most influential factors were observed for 2011: economic activity status, health, disability, BMI, age and sex. However, it is important to note that this study only examined the patterning in relation to this one aspect of the guidelines. Further research is required that investigates other areas of the guidelines, such as the patterning of sedentary behaviour; of those who are very low active; vigorous activity, muscle strengthening activity and looking at the different age groups.

It is recognised that there are multiple domains that contribute to accumulation of total physical activity, however, research has tended to focus primarily on leisure time physical activity. This is likely to be most representative of a combination of sport and exercise and walking for leisure. Focus on leisure time physical activity and/or total physical activity may be obscuring differences in associated characteristics for different types of physical activity. The factors that contribute to each different domain and how they compare to each other is under-researched.

The results from this study do suggest that focussing on the patterning of total physical activity can indeed disguise very different patterning in the different domains of activity that make up total physical activity. For example, a strong association of socioeconomic factors and lack of gender association was observed in relation to occupational physical activity, whereas gender is a key factor for total physical activity and socioeconomic factors were found to be less influential. Also, a reversal of the gender association was observed with walking and housework physical activity, where women were found to be more likely than men to participate. This contrasts with total physical activity or sport and exercise where men are found to be more likely to participate.

Walking was also found to increase with age in women, especially age 45 to 74 years. Age was not associated at all with walking in men and, for women, no socioeconomic factors were associated with walking. These findings add to the building evidence on the importance of walking as a leveller of inequalities in participation in physical activity.

It is important to note, that domain specific physical activity was taken to be any participation in activity in that domain. This differed from total physical activity which was calculated as a certain quantity of participation. As such, the patterning of total physical activity is not directly comparable to that of domain specific physical activity. This is an area which could benefit from future research.

Age, gender and poor health remain key factors associated with physical activity, in common with other research⁴³. Bauman *et al.* (2012) conclude that poor health is a determinant of physical activity, not just a correlate. This will inevitably be challenging to address, although evidence is promising for a number of primary care based approaches to promoting physical activity in those with health problems⁴⁴.

Despite the finding that more women participate in walking and housework, when total physical activity is calculated, the participation in these activities is not enough to counteract the overall gender effect, suggesting more action needs to be taken to encourage greater activity levels in women.

The bivariate analysis shows a decrease in meeting the physical activity recommendations with age. Recognition of the decrease in physical activity with age has tended to manifest itself as initiatives aimed at those age 60+, yet once other factors such as health and income have been controlled for, the relationship with age was found to be more complex. The likelihood of participating in walking tended to increase with age in women till age 75+. There was found to be an increase in likelihood of meeting the new physical activity guidelines in both men and women up to about age 45 years (after a sharp decrease for men between

ages 16-24 and 25-34) and then it declines. There is undoubtedly a marked difference between the youngest and oldest age categories, however, the lack of clear patterning in the other age groups in total physical activity and in the physical activity domains suggests more research to clarify the influence of age is warranted.

The socioeconomic patterning of physical activity is often cited as an important consideration, however, it is not always clear how much of an impact it has⁴⁵. Gidlow *et al.* (2006), in a systematic review of the relationship between socioeconomic factors and physical activity, concluded there was consistent (if weak) evidence for a positive association between higher levels of leisure time or moderate to vigorous intensity physical activity (MVPA) in those with higher socioeconomic status. The results from this study support this association and add to this evidence. Gidlow *et al.* however, found that the evidence was less convincing for a relationship between total physical activity (also referred to as general or habitual physical activity) and socioeconomic measures. The authors highlighted how the vast majority of the studies they encountered used self-report of physical activity and how this has been criticised for inaccurate capture of habitual/total physical activity with a bias towards recall of structured or more intense physical activity typically associated with sport and exercise and leisure time physical activity (LTPA). Thus any relationships that have been shown may actually be reflecting the relationship to LTPA or MVPA. Also, there has been limited account taken of the differences that may exist in patterning by domains of physical activity. This study has shown that there are differences in socioeconomic patterning across the different domains which may explain some of the inconsistencies encountered in the evidence base. There is an argument that higher participation in some domains of physical activity associated with lower socioeconomic groups, notably occupational physical activity, counteracts domains where higher participation rates are associated with higher socioeconomic status, such as the sport and exercise domain. This serves to weaken the relationship between socioeconomic status and meeting physical activity guidelines when looking at overall physical activity and may explain the weaker association of socioeconomic factors with meeting physical activity guidelines found in this study. This is an area that requires further research to establish more clearly the influence of socioeconomic factors and would benefit from greater use of objective measures that are better able to capture habitual/total physical activity.

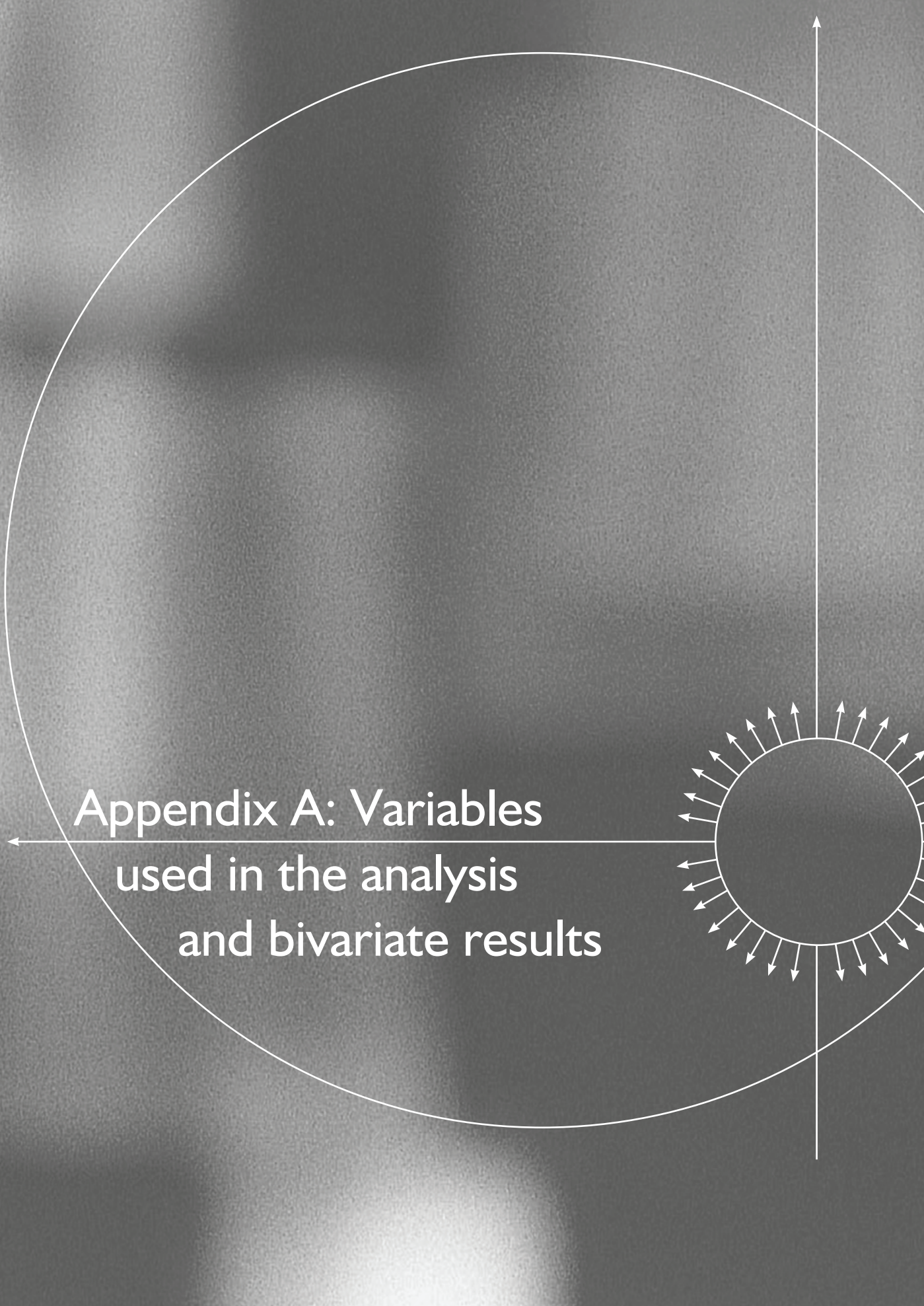
Despite the uncertainty regarding the level of influence of socioeconomic factors in overall physical activity, it is clear there are inequalities in participation in certain domains of physical activity that have important implications. Although those with lower socioeconomic status are shown here to be more likely to participate in occupation physical activity, physical activity associated with occupations has been decreasing with the increase in technology and de-industrialisation over the years^{46,47}. This means that occupational physical activity will inevitably make up less and less of total physical activity and action will need to be taken to ensure higher participation of those from lower socioeconomic groups in other domains of physical activity.

A further consideration is that many of the health and lifestyle factors found here to have a negative relationship with achieving physical activity recommendations have

been shown to be more likely to be present in those in lower socioeconomic groups, for example obesity, smoking, poor mental and physical health^{48,49}. This reinforces the message that socioeconomic factors are important within a broader perspective.

Conclusion

Our analysis has demonstrated that in 2012 multiple demographic and health factors had the strongest association with meeting the new physical activity guidelines, alongside economic activity status. The change to the physical activity guidelines in 2011 has had little substantial effect on the overall patterning of who is most likely to meet the guidelines, though the range of significant factors associated with meeting the new guidelines increased. Differential patterning by physical activity domain is important to the development of more targeted approaches to promote physical activity and the analysis highlighted how recreational physical activity is more socially patterned, compared to total physical activity. This may be a growing issue in future if longer term trends continue of decline in the manual labour sector and decreasing housework activity due to labour saving devices. The long term implication is that leisure physical activity, both sport and exercise as well as walking and other non-sport physical activity, becomes more important to total physical activity. Finally, this study adds further evidence to the importance of walking in addressing inequalities in physical activity participation and highlights the importance on the recent *Let's Get Scotland Walking – The National Walking Strategy* and the work that continues to implement this at national and local level.



Appendix A: Variables
used in the analysis
and bivariate results

APPENDIX A: VARIABLES USED IN THE ANALYSIS AND BIVARIATE RESULTS

Table 9: Outcome and predictor variables

Description	Variable Name	Response
Outcome Variables		
Summary activity level - 2012 CMO time recommendations (new 65+ walk definition)	adt10gpTW ^{vi} adt10gp ^{vii}	1 Meets recommendations (150+ mins) 2 Some activity (60 to less than 150 mins) 3 Low activity (30 to less than 60 mins) 4 Very low activity (0 to less than 30)
(D) Summary activity level - 2012 CMO time recommendations (new 65+ walk definition)	adt10gpTW_2D adt10gp_2D	0 Not met recommended level (150+ mins) 1 Met recommended level (less than 150 mins)
Summary activity level - 2011 CMO time recommendations (old definition)	adt10gp	1 Meets recommendations 2 Some activity 3 Low activity 4 Very low activity
(D) Summary activity level - 2011 CMO time recommendations (old definition)	adt10gp_2D	0 Not met recommended level 1 Met recommended level
Have you participated in any sport in the last four weeks?	SportAny	1 Yes 2 No
Have you walked at least 10 mins in the last four weeks?	wlk10M	1 Yes 2 No
Have you done any housework in the last four weeks?	Housewrk	1 Yes 2 No
Have you done any manual/gardening/DIY work in the last four weeks?	Garden	1 Yes 2 No
How physically active are you in your paid job?	Active	1 very physically active 2 fairly physically active 3 not very physically active 4 not at all physically

^{vi} 2012 data - new definition, includes walking definition for those aged 65+

^{vii} 2011 data – old definition

(D) How physically active are you in your paid job? ^{viii}	Active_D	1 Very/fairly physically active 2 Not very/not at all physically active
Predictor Variables		
Gender	Sex	1 Male 2 Female
Age 16+ in ten year bands	ag16g10	1 16-24 2 25-34 3 35-44 4 45-54 5 55-64 6 65-74 7 75+.
Deprivation 2012 quintiles	SIMD5_RP	1 5th - least deprived 2 4th 3 3rd 4 2nd 5 1st - most deprived
Equivalised Income Quintiles (adjusted income to take account of the number of persons in the household)	eqv5	1 Top Quintile (\geq £39520) 2 2nd Quintile (\geq £25591 < £39520) 3 3rd Quintile (\geq £16918 < £25591) 4 4th Quintile (\geq £10672 < £16918) 5 Bottom Quintile (<£10672)
Economic activity of respondent (2012 version)	Econac12	1 In full-time education 2 In paid employment, self-employed or on gov't training 3 Permanently unable to work 4 Looking for/intending to look for paid work 5 Retired 6 Looking after home/family 7 Doing something else
Self-assessed general health	GenHelf2	1 very good/good 2 fair 3 bad/ very bad
Highest educational qualification	hedqul08	1 Degree or higher 2 HNC/D or equivalent 3 Higher grade or equivalent 4 Standard grade or equivalent 5 Other school level 6 No qualifications

^{viii} Binary variable created from response to level of activity at work (only those in paid work in past 4 weeks).

Limiting longstanding illness (LLI)	limitill	1 Limiting LI 2 Non limiting LI 3 No LI
Marital status - grouped	maritalg	1 Married/civil partnership 2 Living as married 3 Single 4 Married/civil partnership - separated 5 Divorced/dissolved civil partnership 6 Widowed/surviving civil partner
Cigarette Smoking Status	cigst3	1 Current cigarette smoker 2 Used to smoke cigarettes 3 Never smoked cigarettes at all
Life Satisfaction	lifesat2	1 0-7 2 8 3 9-10
(D) Life Satisfaction	lifesat2_D	1 0-7 2 8-10
BMI Status	bmivg4	1 Under 18.5 2 18.5 to less than 25 3 25 to less than 30 4 30 and over.
(D) BMI Status	bmivg4_D	1 Less than 30 ^{ix} 2 30 and over.
(D) Mental wellbeing (ALL)	wemwbsA_D ^x	0 less than mean score (<41) 1 mean score or more (41+)

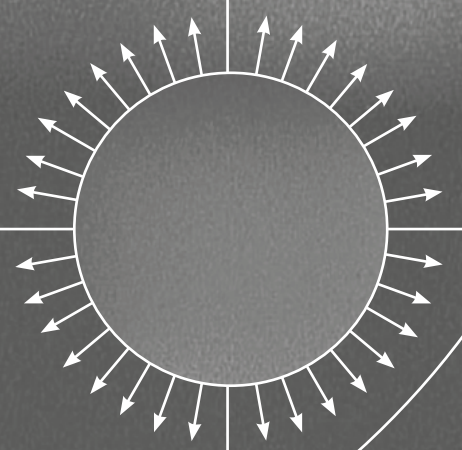
^{ix} excludes those <18.5 as there was only 4 respondents

^x The wemwbs scale comprises 14 positively worded statements with a five item scale ranging from '1 - None of the time' to '5 - All of the time'. The lowest score possible is 14 and the highest is 70. The 14 items are designed to assess positive affect (optimism, cheerfulness, relaxation); and satisfying interpersonal relationships and positive functioning (energy, clear thinking, self-acceptance, personal development, mastery and autonomy). More information is available at . www.wellscotland.info. The original SHeS variable was recalculated for men and women (wemwbsM_D and wemwbsF_D). All wemwbs variables were dichotomised using the mean minus 1 SD for the cut-off point. It was calculated by all respondents, men and women separately and by year.

Table 10: Bivariate analysis results of variables associated with physical activity level

Summary of cross tabs													
	Meets recommendations (%)			Some activity (%)			Low activity (%)			Very low activity (%)			Total N
		CI 95%			CI 95%			CI 95%			CI 95%		
All	62.4	60.6	64.2	11.7	10.5	12.9	4.6	3.9	5.3	21.3	19.8	22.8	4807
Sex													
Male	67.4	65.0	69.8	9.7	8.0	11.4	3.6	2.6	4.6	19.3	17.3	21.4	2122
Female	57.7	55.5	60.0	13.6	12.0	15.1	5.6	4.5	6.6	23.1	21.2	25.0	2685
Age													
16-24	75.4	70.7	80.2	12.0	8.2	15.7	4.0	1.9	6.0	8.6	5.5	11.8	398
25-34	69.5	65.3	73.7	13.3	9.9	16.7	5.1	2.9	7.3	12.0	8.9	15.2	557
35-44	71.2	67.4	75.0	13.2	10.4	15.9	2.8	1.7	4.0	12.8	10.1	15.5	819
45-54	66.3	62.7	69.9	9.3	7.0	11.6	4.5	2.8	6.1	19.9	16.8	23.0	907
55-64	57.2	53.2	61.2	11.3	8.5	14.0	6.2	4.3	8.1	25.3	21.5	29.1	804
65-74	54.1	50.1	58.1	12.3	9.7	14.9	4.4	2.7	6.1	29.2	25.4	33.1	771
75+	24.9	20.7	29.1	10.9	8.0	13.8	5.8	3.6	8.0	58.4	53.9	63.0	551
Deprivation - SIMD Quintiles													
5th - least deprived	70.9	67.6	74.3	9.8	7.5	12.1	5.9	4.0	7.9	13.3	11.0	15.7	986
4th	65.0	61.1	69.0	10.7	8.4	12.9	5.4	3.7	7.1	18.9	15.7	22.1	1095
3rd	61.2	57.1	65.2	14.0	11.0	16.9	4.3	2.8	5.8	20.6	17.3	23.9	1093
2nd	58.6	54.8	62.3	13.2	10.4	16.0	3.9	2.6	5.1	24.4	21.0	27.7	904
1st - most deprived	54.1	49.5	58.7	10.5	7.8	13.2	3.4	1.7	5.2	32.0	27.8	36.1	729
Income quintiles													
>=£39520	73.5	69.7	77.3	10.0	7.6	12.3	4.9	2.9	6.8	11.7	9.0	14.4	861
>=£25591 < £39520	68.3	64.5	72.2	10.5	8.2	12.9	5.5	3.3	7.6	15.7	12.4	18.9	862
>=£16918 < £25591	65.1	61.0	69.2	11.2	8.6	13.8	4.6	3.0	6.1	19.2	15.6	22.7	814
>=£10672 < £16918	60.3	56.0	64.7	10.4	7.9	12.8	4.3	2.5	6.1	25.0	21.0	29.0	820
<£10672	49.8	45.2	54.4	12.4	9.7	15.0	4.0	2.5	5.5	33.8	29.7	38.0	754
Ethnicity													
White	62.5	60.7	64.3	11.6	10.4	12.8	4.6	3.9	5.4	21.3	19.7	22.8	4734
Mixed	59.3	59.3	59.3	40.7	40.7	40.7	.	.	.	.	.	.	3
Asian	54.0	31.8	76.2	14.0	2.0	26.0	4.5	0.0	11.2	27.5	5.8	49.1	35
African	100.0	100.0	100.0	.	.	.	.	.	.	.	.	.	6
Caribbean or Black	52.7	28.1	77.4	18.1	0.0	38.2	6.7	0.0	19.6	22.4	0.0	46.1	21
other	0.0			0.0			0.0			0.0			0
Economic Activity Status													
FT Education	76.6	71.0	82.1	11.1	6.7	15.4	5.6	2.3	8.8	6.8	3.4	10.2	256
Paid Work	74.7	72.5	76.9	10.9	9.2	12.6	3.7	2.9	4.5	10.8	9.3	12.2	2407
Unable to work	15.3	10.4	20.2	11.0	6.9	15.1	5.4	2.0	8.7	68.3	61.8	74.9	265
Looking for work	58.4	49.8	66.9	21.8	14.1	29.5	3.8	0.8	6.7	16.1	10.5	21.7	189
retired	42.6	39.4	45.8	11.8	10.0	13.6	5.9	4.5	7.4	39.7	36.4	42.9	1393
Looking after Home/family	53.6	45.7	61.5	14.3	8.5	20.1	5.9	2.2	9.6	26.2	18.4	34.0	179
Other	55.5	43.2	67.9	10.0	3.1	16.9	7.9	0.0	17.9	26.6	16.3	36.8	114
Self Assessed health													
very good/good	71.3	69.3	73.3	11.8	10.4	13.2	4.2	3.3	5.0	12.8	11.4	14.1	3442
fair	45.4	41.6	49.1	13.9	11.1	16.7	6.8	4.9	8.8	33.9	30.1	37.7	915
bad/Very bad	20.0	15.8	24.2	6.7	4.2	9.2	3.9	1.9	6.0	69.4	64.3	74.4	448
Highest Education Qualification													
Degree or higher	70.8	67.7	73.8	12.1	9.8	14.5	5.2	3.6	6.8	11.9	9.9	13.9	1343
HNC/D or equiv	68.9	63.9	73.9	10.9	7.4	14.5	4.8	2.7	7.0	15.4	11.9	18.8	519
Higher grade or equiv	69.4	65.0	73.8	12.0	9.0	15.0	4.5	2.6	6.4	14.1	11.1	17.1	693
Standard grade or equiv	66.9	63.0	70.7	10.9	8.4	13.3	4.2	2.7	5.7	18.1	15.1	21.1	882
Other school level	43.6	37.3	49.8	13.4	9.1	17.8	4.1	1.5	6.8	38.9	33.0	44.8	313
No qualifications	41.3	37.6	45.0	11.5	9.1	13.8	4.0	2.7	5.3	43.2	39.5	46.9	1043
Longstanding Illness													
Limiting Long Illness	40.7	37.6	43.7	11.8	9.9	13.7	5.8	4.4	7.2	41.7	38.6	44.8	1677
Non limiting Long Illness	67.5	63.2	71.7	13.8	10.8	16.8	3.8	2.0	5.7	14.9	11.9	17.8	707
No Long Illness	73.6	71.4	75.8	11.1	9.5	12.7	4.1	3.1	5.1	11.1	9.6	12.6	2419
Marital Status													
Married/civil partnership	64.1	61.8	66.4	11.2	9.7	12.7	4.7	3.7	5.7	20.0	18.0	21.9	2536
Living as married	71.8	67.1	76.5	11.8	8.5	15.2	2.6	1.1	4.2	13.7	10.2	17.2	497
Single	66.9	63.2	70.5	12.7	9.7	15.6	5.0	3.2	6.9	15.5	12.7	18.2	888
separated	64.8	55.7	74.0	9.0	4.2	13.8	5.4	0.4	10.4	20.8	13.0	28.6	121
Divorced/dissolved	48.0	42.2	53.8	9.5	6.0	13.0	4.4	1.6	7.2	38.1	32.1	44.1	311
Widowed/surviving	31.6	26.6	36.6	14.3	10.6	18.0	5.9	3.5	8.4	48.2	43.1	53.3	453
Cigarette smoking													
Current cigarette smoker.	57.1	53.5	60.8	12.6	9.9	15.4	4.5	3.2	5.9	25.7	22.5	28.8	1103
Ex smoker	59.4	56.2	62.6	11.7	9.8	13.6	4.6	3.3	5.9	24.3	21.6	26.9	1463
Never smoked cigarettes at all	66.9	64.3	69.4	10.9	9.3	12.5	4.7	3.6	5.8	17.6	15.7	19.5	2222
Life Satisfaction													
0-7	54.3	51.2	57.3	11.4	9.5	13.3	4.4	3.2	5.6	29.9	27.1	32.7	1699
8-10	67.2	65.2	69.3	11.9	10.5	13.3	4.7	3.8	5.7	16.1	14.6	17.6	3097
BMI Status													
less than 30	69.3	67.2	71.5	10.6	9.2	12.0	4.1	3.2	4.9	15.9	14.4	17.5	2824
30 and over.	54.3	50.8	57.8	13.8	11.3	16.4	6.3	4.6	8.0	25.6	22.5	28.6	1211
Mental Wellbeing													
less than mean score	37.4	32.7	42.1	15.1	11.2	18.9	4.6	2.5	6.7	42.9	38.2	47.6	530
mean +	66.9	65.0	68.9	11.3	10.0	12.6	4.5	3.7	5.3	17.3	15.7	18.8	3805

Appendix B: Logistic
regression results



APPENDIX B: LOGISTIC REGRESSION RESULTS

Table 11: R² values from each model

Model	R- square		
	ALL	MEN	WOMEN
Reaching recommended physical activity levels, SHeS 2012	0.17	0.21	0.15
Reaching recommended physical activity levels, SHeS 2011	0.14	0.17	0.12
Participation in sport and exercise, 2012	0.21	0.23	0.20
Participation in walking, 2012	0.06	0.08	0.07
Participation in heavy housework, 2012	0.10	0.09	0.07
Participation in manual work/gardening/DIY, 2012	0.15	0.21	0.10
Participation in physical activity in paid work, 2012	0.17	0.25	0.17

Table 12: Stepwise summary of factors associated with reaching recommended physical activity levels, SHeS 2012^{vi}

ALL			MEN			WOMEN		
	Chi-Squared Score	P-value		Chi-Squared Score	P-value		Chi-Squared Score	P-value
EAS	374.61	***	EAS	228.79	***	Health	159.34	***
Health	114.13	***	health	43.38	***	EAS	69.45	***
Age	50.33	***	age	46.18	***	age	22.16	**
Sex	25.35	***	Mental wellbeing	20.52	***	BMI	8.60	**
Mental wellbeing	21.64	***	BMI	10.34	**	Mental wellbeing	8.05	**
BMI	18.04	***	illness	7.59	*	smoking	9.21	**
Smoking	12.50	**	marital status	8.39	NS	illness	3.75	NS
Illness	10.87	**	qualification	7.66	NS	income	5.96	NS
Life Satisfaction	0.97	NS	smoking	2.07	NS	life satisfaction	0.86	NS
Income	3.67	NS	Income	4.14	NS	marital status	2.23	NS
Qualification	3.95	NS	life satisfaction	0.10	NS	qualification	2.34	NS
Marital status	1.59	NS	deprivation	1.01	NS	deprivation	0.99	NS
Deprivation	0.71	NS						

P- value: *** <0.0001, ** <0.001, * <0.05

^{vi} the variable with the highest significant chi-squared value is entered into each step. It may not be significant at the end of the model due to latter variables being included.

Table 13: Stepwise summary of factors associated with reaching recommended physical activity levels, SHeS 2011

ALL			MEN			WOMEN		
	Chi-Squared Score	P-value		Chi-Squared Score	P-value		Chi-Squared Score	P-value
EAS	412.20	***	age	239.54	***	EAS	184.83	***
Illness	90.28	***	health	65.60	***	BMI	45.61	***
BMI	61.19	***	BMI	20.03	***	Illness	30.70	***
Sex	57.50	***	EAS	29.38	***	Age	22.09	**
Age	68.75	***	illness	12.93	**	Health	10.12	**
Health	19.19	***	deprivation	8.76	NS	life satisfaction	1.34	NS
life satisfaction	3.56	NS	Income	10.10	NS	Income	4.24	NS
Mental wellbeing	1.70	NS	life satisfaction	2.58	NS	qualification	5.91	NS
Income	6.08	NS	Mental wellbeing	1.78	NS	Mental wellbeing	0.40	NS
Deprivation	6.29	NS	Marital status	4.29	NS	deprivation	2.84	NS
Marital status	6.13	NS	qualification	2.98	NS	marital status	3.44	NS
Qualification	4.02	NS	smoking	0.38	NS	smoking	1.15	NS
Smoking	0.87	NS						

P- value: *** <0.0001, ** <0.001, * <0.05

Table 14: Stepwise summary of factors associated with sports participation

ALL			MEN			WOMEN		
	Chi-Squared Score	P-value		Chi-Squared Score	P-value		Chi-Squared Score	P-value
Qualification	349.23	***	Qualification	175.46	***	Qualification	175.59	***
Health	152.05	***	Health	86.76	***	Health	66.31	***
Age	121.75	***	Age	67.64	***	Age	58.27	***
Smoking	38.65	***	Mental wellbeing	13.23	***	Smoking	36.78	***
Sex	27.74	***	Deprivation	18.48	***	BMI	20.44	***
BMI	26.61	***	BMI	5.89	*	Mental wellbeing	7.37	**
Mental wellbeing	10.81	***	Life Satisfaction	4.53	*	EAS	10.97	NS
Income	13.63	**	Illness	5.65	NS	Illness	2.90	NS
Life Satisfaction	4.24	*	Smoking	4.63	NS	Life Satisfaction	1.27	NS
Deprivation	8.80	NS	Income	6.64	NS	Income	4.54	NS
EAS	8.19	NS	EAS	4.26	NS	Marital status	1.90	NS
Illness	2.55	NS	Marital status	3.35	NS	Deprivation	1.11	NS
Marital status	1.37	NS						

P- value: *** <0.0001, ** <0.001, * <0.05

Table 15: Stepwise summary of factors associated with walking participation

ALL			MEN			WOMEN		
	Chi-Squared Score	P-value		Chi-Squared Score	P-value		Chi-Squared Score	P-value
Health	106.72	***	EAS	75.01	***	Health	70.10	***
EAS	28.73	***	Qualification	16.61	**	Age	21.78	**
Sex	8.95	**	Smoking	7.69	*	Marital status	19.55	**
Qualification	17.88	**	Marital status	13.43	*	Illness	10.15	**
Marital status	17.35	**	Illness	4.56	NS	Life Satisfaction	4.84	*
Illness	8.88	*	Income	6.73	NS	Smoking	4.69	NS
Smoking	6.26	*	BMI	1.62	NS	EAS	10.13	NS
Life Satisfaction	2.99	NS	Deprivation	5.31	NS	BMI	1.16	NS
Age	8.41	NS	Health	1.69	NS	Qualification	4.85	NS
Deprivation	4.73	NS	Age	6.51	NS	Mental wellbeing	0.13	NS
Mental wellbeing	0.79	NS	Life Satisfaction	0.10	NS	Deprivation	1.84	NS
Income	2.26	NS	Mental wellbeing	0.00	NS	Income	0.96	NS
BMI	0.01	NS						

P- value: *** <0.0001, ** <0.001, * <0.05

Table 16: Stepwise summary of factors associated with heavy housework participation

ALL			MEN			WOMEN		
	Chi-Squared Score	P-value		Chi-Squared Score	P-value		Chi-Squared Score	P-value
Sex	136.15	***	age	58.91	***	age	51.73	***
age	88.43	***	Health	38.90	***	Health	40.95	***
Health	64.66	***	BMI	10.97	***	Smoking	16.47	***
BMI	11.39	***	Income	8.76	NS	Deprivation	12.61	*
Income	12.05	*	EAS	12.99	*	Qualification	15.07	*
Smoking	6.34	*	Life Satisfaction	2.11	NS	Marital Status	11.19	*
EAS	12.54	*	Marital Status	7.61	NS	EAS	11.68	NS
Qualification	10.74	NS	Qualification	5.90	NS	BMI	2.50	NS
Marital Status	5.14	NS	Smoking	1.29	NS	Life Satisfaction	2.78	NS
Life Satisfaction	0.40	NS	Illness	1.09	NS	Income	0.26	NS
Deprivation	2.71	NS	Mental wellbeing	0.17	NS	Mental wellbeing	0.15	NS
Mental wellbeing	0.29	NS	Deprivation	0.62	NS	Illness	0.36	NS
Illness	0.60	NS						

P- value: *** <0.0001, ** <0.001, * <0.05

Table 17: Stepwise summary of factors associated with manual work/gardening/DIY participation

ALL			MEN			WOMEN		
	Chi-Squared Score	P-value		Chi-Squared Score	P-value		Chi-Squared Score	P-value
Age	154.98	***	Marital Status	151.30	***	Age	70.99	***
Sex	114.09	***	Income	65.17	***	Health	42.60	***
health	92.77	***	Deprivation	42.79	***	Qualification	23.04	***
Deprivation	67.37	***	Health	24.88	***	deprivation	10.41	*
Income	39.47	***	Age	22.93	***	Smoking	4.73	NS
Qualification	32.68	***	Qualification	22.44	***	EAS	9.87	NS
Marital Status	18.82	**	EAS	17.12	**	Marital status	7.85	NS
EAS	17.38	**	Illness	6.47	*	BMI	1.78	NS
Life Satisfaction	2.26	NS	Life Satisfaction	2.92	NS	Mental wellbeing	0.99	NS
Illness	2.75	NS	Mental wellbeing	1.78	NS	Income	4.38	NS
BMI	0.83	NS	Smoking	0.45	NS	Life Satisfaction	0.56	NS
Smoking	1.52	NS	BMI	0.03	NS	Illness	0.06	NS
Mental wellbeing	0.06	NS						

P- value: *** <0.0001, ** <0.001, * <0.05

Table 18: Stepwise summary of factors associated with occupational physical activity

ALL			MEN			WOMEN		
	Chi-Squared Score	P-value		Chi-Squared Score	P-value		Chi-Squared Score	P-value
Qualification	201.85	***	Qualification	184.63	***	Income	69.289	***
Income	55.22	***	Income	23.56	***	Qualification	42.338	***
Age	41.82	***	Age	20.01	***	Deprivation	20.087	***
Deprivation	21.62	***	BMI	4.36	*	Age	19.664	***
BMI	3.81	NS	Deprivation	8.09	NS	Smoking	7.1151	*
Sex	3.41	NS	Mental wellbeing	1.88	NS	Illness	5.0003	NS
Marital Status	6.14	NS	Marital Status	7.42	NS	Marital Status	8.1503	NS
Smoking	2.61	NS	Illness	3.10	NS	Life Satisfaction	0.9941	NS
Mental wellbeing	0.58	NS	Life Satisfaction	2.16	NS	BMI	0.8823	NS
Illness	1.10	NS	Health	2.27	NS	Mental wellbeing	0.113	NS
Health	0.46	NS	Smoking	0.71	NS	Health	0.1316	NS
Life Satisfaction	0.00	NS						

P- value: *** <0.0001, ** <0.001, * <0.05

Table 19: Odds ratios for physical activity logistic regression model, SHEs 2012

Effect	2012	ALL			MEN			WOMEN		
		Odds Ratio	95% Wald Confidence Limits		Odds Ratio	95% Wald Confidence Limits		Odds Ratio	95% Wald Confidence Limits	
Sex		(p<0.0001)								
Male	1.466	1.241	1.731							
Female	1	[ref]								
Age		(p<0.0001)			(p<0.0001)			(p=0.0011)		
16-24	4.067	2.195	7.536	12.659	4.774	33.564	2.081	0.899	4.819	
25-34	2.787	1.621	4.792	3.966	1.752	8.978	2.285	1.074	4.859	
35-44	3.785	2.231	6.422	5.368	2.412	11.946	2.992	1.437	6.233	
45-54	3.217	1.928	5.369	4.762	2.2	10.309	2.57	1.262	5.233	
55-64	2.53	1.606	3.986	3.76	1.84	7.686	2.066	1.116	3.824	
65-74	2.752	1.882	4.024	2.668	1.525	4.667	3.009	1.777	5.096	
75+	1	[ref]		1	[ref]		1	[ref]		
SIMD		NS			NS			NS		
5th - least deprived										
4th										
3rd										
2nd										
1st										
Income		NS			NS			NS		
>=£39520										
>=£25591 < £39520										
>=£16918 < £25591										
>=£10672 < £16918										
<£10672										
Self-rated Health		(p<0.0001)			(p<0.0001)			(p<0.0001)		
very good/good	2.677	1.812	3.953	2.403	1.301	4.436	3.106	1.847	5.223	
fair	1.821	1.245	2.664	1.715	0.938	3.136	1.946	1.178	3.214	
bad/Very bad	1	[ref]		1	[ref]		1	[ref]		
Highest Qualification		NS			NS			NS		
Degree or higher										
HNC/D or equiv										
Higher grade or equiv										
Standard grade or equiv										
Other school level										
None										
Disability/illness		(p=0.0044)			(p=0.0223)			NS		
Limiting Long Illness	0.715	0.573	0.892	0.692	0.491	0.974				
Non limiting Long Illness	1.006	0.794	1.276	1.153	0.798	1.667				
No Illness	1	[ref]		1	[ref]					
Marital Status		NS			NS			NS		
Married/civil partnership										
Living as married										
separated										
Divorced/dissolved										
Widowed/surviving										
Single										
Cigarette Smoking		(p=0.0019)			NS			(p=0.0109)		
Current cigarette smoker	0.705	0.57	0.873				0.671	0.503	0.895	
Used to smoke cigarettes	0.953	0.783	1.159				1.014	0.776	1.324	
Never smoked	1	[ref]					1	[ref]		
Life Satisfaction										
Low (0-7)										
High (8-10)										
BMI		(p<0.0001)			(p=0.0016)			(p=0.0038)		
less than 30	1.482	1.239	1.773	1.615	1.226	2.129	1.423	1.115	1.817	
30 and over	1	[ref]		1	[ref]		1	[ref]		
wemwbs score		(p<0.0001)			(p=0.0003)			(p=0.0027)		
< mean	0.604	0.462	0.79	0.564	0.374	0.85	0.639	0.444	0.922	
mean or more	1	[ref]		1	[ref]		1	[ref]		
Economic Activity Status		(p<0.0001)			(p<0.0001)			(p<0.0001)		
FT Education	0.734	0.501	1.074	0.328	0.185	0.579	1.431	0.81	2.526	
Unable to work	0.22	0.133	0.363	0.139	0.063	0.305	0.337	0.173	0.654	
Looking for work	0.615	0.413	0.916	0.554	0.311	0.986	0.614	0.34	1.107	
retired	0.65	0.451	0.935	1.097	0.623	1.932	0.446	0.269	0.737	
Looking after Home/family	0.689	0.438	1.083	0.541	0.118	2.481	0.679	0.417	1.104	
other	1.04	0.603	1.793	1.073	0.417	2.766	1.042	0.53	2.047	
Paid work	1	[ref]		1	[ref]		1	[ref]		

Table 20: Odds ratios for physical activity logistic regression model, SHeS 2011

Effect	ALL			MEN			WOMEN		
	Odds Ratio	95% Wald Confidence Limits		Odds Ratio	95% Wald Confidence Limits		Odds Ratio	95% Wald Confidence Limits	
Sex	(p<0.0001)								
Male	1.65	1.451	1.876						
Female	1	[ref]							
Age	(p<0.0001)			(p<0.0001)			(p=0.0012)		
16-24	4.956	2.878	8.535	6.402	2.921	14.028	3.58	1.662	7.709
25-34	5.245	3.147	8.74	6.558	3.143	13.682	4.077	1.984	8.378
35-44	4.353	2.643	7.169	4.596	2.251	9.386	4.077	2.009	8.273
45-54	3.685	2.25	6.035	3.649	1.802	7.388	3.611	1.795	7.264
55-64	2.589	1.632	4.108	2.392	1.224	4.674	2.866	1.5	5.473
65-74	2.311	1.512	3.534	2.103	1.165	3.794	2.609	1.409	4.83
75+	1	[ref]		1	[ref]		1	[ref]	
SIMD	NS			NS			NS		
5th - least deprived									
4th									
3rd									
2nd									
1st									
Income	NS			NS			NS		
>=£39520									
>=£25591 < £39520									
>=£16918 < £25591									
>=£10672 < £16918									
<£10672									
Self-rated Health	(p<0.0001)			(p<0.0001)			(p=0.0064)		
very good/good	2.1	1.34	3.293	2.421	1.227	4.774	1.783	0.975	3.26
fair	1.565	1.001	2.446	1.989	1.017	3.889	1.182	0.646	2.163
bad/Very bad	1	[ref]		1	[ref]		1	[ref]	
Highest Qualification	NS			NS			NS		
Degree or higher									
HNC/D or equiv									
Higher grade or equiv									
Standard grade or equiv									
Other school level									
None									
Disability/illness	(p<0.0001)			(p=0.0016)			(p<0.0001)		
Limiting Long Illness	0.649	0.534	0.787	0.633	0.48	0.835	0.674	0.511	0.89
Non limiting Long Illness	0.872	0.738	1.03	0.811	0.643	1.023	0.926	0.727	1.18
No Illness	1	[ref]		1	[ref]		1	[ref]	
Marital Status	NS			NS			NS		
Married/civil partnership									
Living as married									
separated									
Divorced/dissolved									
Widowed/surviving									
Single									
Cigarette Smoking	NS			NS			NS		
Current cigarette smoker									
Used to smoke cigarettes									
Never smoked									
Life Satisfaction	NS			NS			NS		
Low (0-7)									
High (8-10)									
BMI	(p<0.0001)			(p<0.0001)			(p<0.0001)		
less than 30	1.699	1.468	1.966	1.549	1.266	1.895	1.891	1.521	2.351
30 and over	1	[ref]		1	[ref]		1	[ref]	
wemwbs score									
< mean									
mean or more									
Economic Activity Status	(p<0.0001)			(p<0.0001)			(p<0.0001)		
FT Education	0.716	0.533	0.96	0.814	0.523	1.265	0.69	0.456	1.045
Unable to work	0.332	0.196	0.564	0.434	0.222	0.85	0.24	0.094	0.611
Looking for work	0.431	0.303	0.612	0.494	0.321	0.76	0.299	0.144	0.622
retired	0.511	0.376	0.694	0.562	0.353	0.896	0.46	0.306	0.693
Looking after Home/family	0.795	0.593	1.065	0.801	0.382	1.681	0.799	0.576	1.109
other	0.64	0.343	1.191	0.742	0.252	2.185	0.632	0.291	1.374
Paid work	1	[ref]		1	[ref]		1	[ref]	

Table 21: Odds ratios for sports participation logistic regression model

Sport	ALL			MEN			WOMEN		
	Odds Ratio	95% Wald Confidence Limits		Odds Ratio	95% Wald Confidence Limits		Odds Ratio	95% Wald Confidence Limits	
Sex	(p<0.0001)								
Male	1.487	1.264	1.749						
Female	1	[ref]							
Age	(p<0.0001)								
16-24	7.627	4.085	14.241	13.818	5.277	36.178	4.643	1.962	10.986
25-34	4.11	2.379	7.1	4.172	1.871	9.302	4.063	1.874	8.808
35-44	3.836	2.261	6.508	3.483	1.603	7.564	4.024	1.903	8.508
45-54	2.633	1.572	4.41	3.152	1.477	6.727	2.123	1.025	4.398
55-64	1.993	1.248	3.184	1.894	0.933	3.845	2.136	1.12	4.071
65-74	1.916	1.286	2.855	1.899	1.067	3.381	1.941	1.103	3.416
75+	1	[ref]		1	[ref]		1	[ref]	
SIMD	NS			(p=0.008)			NS		
5th - least deprived				1.402	0.913	2.152			
4th				0.826	0.555	1.23			
3rd				1.262	0.85	1.873			
2nd				0.834	0.571	1.218			
1st				1	[ref]				
Income	(p=0.0086)			NS			NS		
>=£39520	1.595	1.171	2.171						
>=£25591< £39520	1.249	0.934	1.67						
>=£16918 < £25591	1.23	0.932	1.622						
>=£10672< £16918	1.122	0.858	1.468						
<£10672	1	[ref]							
Self-rated Health	(p<0.0001)			(p<0.0001)			(p<0.0001)		
very good/good	2.411	1.595	3.645	2.277	1.232	4.206	2.587	1.462	4.581
fair	1.857	1.237	2.788	1.804	0.986	3.303	1.973	1.126	3.457
bad/Very bad	1	[ref]		1	[ref]		1	[ref]	
Highest Qualification	(p<0.0001)			(p<0.0001)			(p<0.0001)		
Degree or higher	2.669	2.024	3.519	3.136	2.107	4.667	2.359	1.586	3.51
HNC/D or equiv	2.535	1.845	3.482	3.076	1.954	4.842	2.28	1.437	3.617
Higher grade or equiv	2.281	1.695	3.068	2.528	1.668	3.83	2.077	1.342	3.216
Standard grade or equiv	1.884	1.435	2.475	2.435	1.648	3.597	1.505	1.015	2.233
Other school level	1.207	0.811	1.797	1.264	0.69	2.314	1.121	0.653	1.925
None	1	[ref]		1	[ref]		1	[ref]	
Disability/illness	NS			(p=0.0445)			NS		
Limiting Long Illness				0.72	0.52	0.998			
Non limiting Long Illness				0.972	0.694	1.361			
No Illness									
Marital Status	NS			NS			NS		
Married/civil partnership									
Living as married									
separated									
Divorced/dissolved									
Widowed/surviving									
Single									
Cigarette Smoking	(p<0.0001)			NS			(p<0.0001)		
Current cigarette smoker	0.609	0.495	0.75				0.524	0.391	0.703
Used to smoke cigarettes	1.067	0.883	1.29				1.275	0.977	1.663
Never smoked	1	[ref]					1	[ref]	
Life Satisfaction	(p=0.0395)			(p=0.0044)			NS		
Low (0-7)	0.824	0.689	0.984	0.756	0.583	0.981			
High (8-10)	1	[ref]		1	[ref]				
BMI	(p<0.0001)			(p=0.0116)			(p<0.0001)		
less than 30	1.533	1.287	1.826	1.403	1.083	1.818	1.743	1.361	2.232
30 and over	1	[ref]		1	[ref]		1	[ref]	
wemwbs score	(p=0.001)			NS			(p=0.0145)		
< mean	0.73	0.554	0.961				0.716	0.485	1.058
mean or more	1	[ref]					1	[ref]	
Economic Activity Status	NS			NS			NS		
FT Education									
Unable to work									
Looking for work									
retired									
Looking after Home/family									
other									
Paid work									

Table 22: Odds ratios for walking participation logistic regression model

Walking	ALL			MEN			WOMEN		
	Odds Ratio	95% Wald Confidence Limits		Odds Ratio	95% Wald Confidence Limits		Odds Ratio	95% Wald Confidence Limits	
Sex	(p=0.0028)								
Male	0.581	0.431	0.783						
Female	1	[ref]							
Age	NS			NS			(p=0.0013)		
16-24							1.397	0.264	7.393
25-34							1.901	0.433	8.341
35-44							2.697	0.655	11.11
45-54							4.312	1.065	17.453
55-64							6.433	2.011	20.582
65-74							3.292	1.404	7.722
75+							1	[ref]	
SIMD	NS			NS			NS		
5th - least deprived									
4th									
3rd									
2nd									
1st									
Income	NS			NS			NS		
>=£39520									
>=£25591 < £39520									
>=£16918 < £25591									
>=£10672 < £16918									
<£10672									
Self-rated Health	(p<0.0001)			NS			(p<0.0001)		
very good/good	1.859	1.067	3.237				2	0.916	4.369
fair	1.59	0.955	2.649				1.476	0.727	2.998
bad/Very bad	1	[ref]					1	[ref]	
Highest Qualification	(p=0.0031)			(p=0.0053)			NS		
Degree or higher	1.763	1.076	2.889	1.863	0.948	3.661			
HNC/D or equiv	1.503	0.847	2.667	1.395	0.666	2.921			
Higher grade or equiv	0.839	0.525	1.338	0.596	0.323	1.1			
Standard grade or equiv	1.192	0.755	1.882	1.427	0.754	2.699			
Other school level	0.799	0.438	1.455	0.932	0.36	2.412			
None	1	[ref]		1	[ref]				
Disability/illness	(p=0.0118)			NS			(p=0.0063)		
Limiting Long Illness	0.577	0.388	0.856				0.443	0.238	0.825
Non limiting Long Illness	0.657	0.429	1.005				0.491	0.244	0.989
No Illness	1	[ref]					1	[ref]	
Marital Status	(p=0.0028)			(p=0.0196)			(p=0.0015)		
Married/civil partnership	0.573	0.343	0.956	0.555	0.282	1.091	0.566	0.245	1.309
Living as married	0.428	0.25	0.733	0.427	0.208	0.875	0.483	0.202	1.157
separated	0.395	0.168	0.929	1.484	0.296	7.435	0.22	0.07	0.693
Divorced/dissolved	0.35	0.178	0.69	0.618	0.207	1.841	0.233	0.088	0.62
Widowed/surviving	0.537	0.253	1.142	0.308	0.093	1.019	0.77	0.265	2.231
Single	1	[ref]		1	[ref]		1	[ref]	
Cigarette Smoking	(p=0.0438)			(p=0.0214)			NS		
Current cigarette smoker	0.706	0.493	1.012	0.795	0.494	1.279			
Used to smoke cigarettes	1.067	0.746	1.526	1.668	1.009	2.758			
Never smoked	1	[ref]		1	[ref]				
Life Satisfaction	NS			NS			(p=0.0279)		
Low (0-7)							0.584	0.356	0.959
High (8-10)							1	[ref]	
BMI	NS			NS			NS		
less than 30									
30 and over									
wemwbs score	NS			NS			NS		
< mean									
mean or more									
Economic Activity Status	(p<0.0001)			(p<0.0001)			NS		
FT Education	0.989	0.471	2.074	0.511	0.201	1.298			
Unable to work	0.407	0.223	0.742	0.217	0.089	0.533			
Looking for work	2.777	1.024	7.532	2.209	0.577	8.457			
retired	0.757	0.379	1.511	0.659	0.264	1.646			
Looking after Home/family	1.458	0.541	3.927	0.295	0.046	1.907			
other	0.929	0.381	2.269	0.916	0.237	3.535			
Paid work	1	[ref]		1	[ref]				

Table 23: Odds ratios for heavy housework participation logistic regression model

HOUSEWORK	ALL			MEN			WOMEN		
	Odds Ratio	95% Wald Confidence Limits		Odds Ratio	95% Wald Confidence Limits		Odds Ratio	95% Wald Confidence Limits	
Sex	(p<0.0001)								
Male	0.14	0.096	0.206						
Female	1	[ref]							
Age	(p<0.0001)			(p<0.0001)			(p<0.0001)		
16-24	0.759	0.255	2.258	1.061	0.318	3.538	0.031	0.001	0.938
25-34	7.016	2.373	20.743	7.441	2.304	24.031	0.687	0.023	20.244
35-44	5.387	1.97	14.731	5.832	1.949	17.446	1.577	0.072	34.531
45-54	3.039	1.179	7.831	2.758	0.989	7.691	7.73	0.309	193.413
55-64	2.175	0.896	5.279	2.207	0.835	5.838	1.17	0.096	14.325
65-74	2.673	1.326	5.387	2.41	1.121	5.184	4.724	0.379	58.926
75+	1	[ref]		1	[ref]		1	[ref]	
SIMD	NS			NS			(p=0.0134)		
5th - least deprived							1.103	0.174	7.016
4th							0.391	0.078	1.962
3rd							0.13	0.034	0.495
2nd							0.295	0.075	1.17
1st							1	[ref]	
Income	(p=0.017)			NS			NS		
>=£39520	1.662	0.944	2.926						
>=£25591 < £39520	1.367	0.815	2.294						
>=£16918 < £25591	0.807	0.513	1.27						
>=£10672 < £16918	1.185	0.739	1.899						
<£10672	1	[ref]							
Self-rated Health	(p<0.0001)			(p<0.0001)			(p<0.0001)		
very good/good	5.396	2.927	9.947	6.008	2.942	12.267	11.926	2.13	66.764
fair	7.119	3.863	13.118	8.347	4.055	17.185	7.71	1.783	33.337
bad/Very bad	1	[ref]		1	[ref]		1	[ref]	
Highest Qualification	NS			NS			(p=0.0101)		
Degree or higher							2.346	0.545	10.107
HNC/D or equiv							7.177	0.881	58.482
Higher grade or equiv							69.348	6.402	751.248
Standard grade or equiv							4.332	0.919	20.417
Other school level							1.874	0.3	11.693
None							1	[ref]	
Disability/illness	NS			NS			NS		
Limiting Long Illness									
Non limiting Long Illness									
No Illness									
Marital Status	NS			NS			(p=0.0478)		
Married/civil partnership							3.207	0.679	15.159
Living as married							17.191	1.75	168.841
separated							0.349	0.046	2.639
Divorced/dissolved							2.837	0.335	24.047
Widowed/surviving							1.999	0.212	18.805
Single							1	[ref]	
Cigarette Smoking	(p=0.0421)			NS			(p=0.0003)		
Current cigarette smoker	1.21	0.814	1.797				1.819	0.536	6.169
Used to smoke cigarettes	0.69	0.489	0.973				0.37	0.142	0.964
Never smoked	1	[ref]					1	[ref]	
Life Satisfaction									
Low (0-7)									
High (8-10)									
BMI	(p=0.0003)			(p=0.0009)			NS		
less than 30	1.659	1.205	2.285	1.788	1.26	2.538			
30 and over	1	[ref]		1	[ref]				
wemwbs score									
< mean									
mean or more									
Economic Activity Status	NS			(p=0.0433)			NS		
FT Education				1.101	0.599	2.023			
Unable to work				2.256	0.94	5.414			
Looking for work				2.259	0.904	5.65			
retired				3.043	1.368	6.768			
Looking after Home/family				0.997	0.16	6.21			
other				2.696	0.58	12.523			
Paid work				1	[ref]				

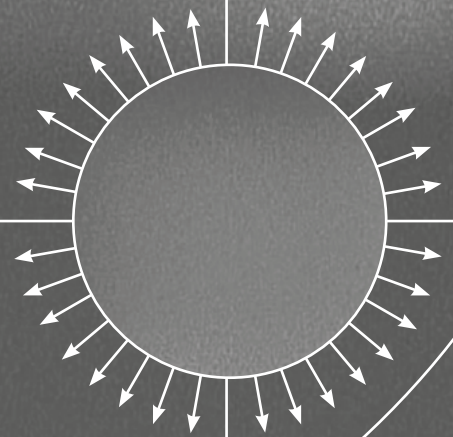
Table 24: Odds ratios for manual work/gardening/DIY participation logistic regression model

GARDENING/MANUAL/DIY	ALL			MEN			WOMEN		
	Odds Ratio	95% Wald Confidence Limits		Odds Ratio	95% Wald Confidence Limits		Odds Ratio	95% Wald Confidence Limits	
Sex	(p<0.0001)								
Male	2.297	1.964	2.685						
Female	1	[ref]							
Age	(p<0.0001)			(p=0.0008)			(p<0.0001)		
16-24	0.376	0.207	0.686	1.421	0.573	3.528	0.132	0.055	0.316
25-34	0.689	0.407	1.167	1.87	0.832	4.202	0.364	0.174	0.761
35-44	1.343	0.806	2.238	2.758	1.246	6.104	0.87	0.431	1.756
45-54	1.447	0.879	2.383	3.403	1.566	7.394	0.89	0.449	1.766
55-64	1.813	1.154	2.848	3.532	1.691	7.376	1.309	0.717	2.391
65-74	1.687	1.157	2.461	2.322	1.311	4.111	1.421	0.85	2.377
75+	1	[ref]		1	[ref]		1	[ref]	
SIMD	(p<0.0001)			(p<0.0001)			(p=0.0034)		
5th - least deprived	1.357	1.035	1.779	1.388	0.934	2.062	1.306	0.89	1.915
4th	1.825	1.405	2.37	2.471	1.676	3.644	1.439	0.993	2.087
3rd	1.835	1.418	2.374	2.011	1.38	2.93	1.684	1.166	2.433
2nd	1.04	0.806	1.342	0.995	0.69	1.434	1.09	0.756	1.573
1st	1	[ref]		1	[ref]		1	[ref]	
Income	(p<0.0001)			(p<0.0001)			NS		
>=£39520	1.478	1.096	1.992	1.938	1.242	3.024			
>=£25591< £39520	1.552	1.167	2.063	2.093	1.376	3.184			
>=£16918 < £25591	1.668	1.268	2.195	2.043	1.361	3.068			
>=£10672< £16918	1.904	1.458	2.486	2.85	1.897	4.281			
<£10672	1	[ref]		1	[ref]				
Self-rated Health	(p<0.0001)			(p<0.0001)			(p<0.0001)		
very good/good	2.094	1.411	3.108	3.006	1.606	5.625	1.683	0.999	2.834
fair	1.724	1.175	2.53	2.857	1.558	5.239	1.16	0.698	1.927
bad/Very bad	1	[ref]		1	[ref]		1	[ref]	
Highest Qualification	(p<0.0001)			(p=0.0004)			(p=0.0003)		
Degree or higher	1.736	1.325	2.274	1.633	1.1	2.423	1.856	1.257	2.74
HNC/D or equiv	1.718	1.259	2.344	1.739	1.109	2.726	1.743	1.104	2.751
Higher grade or equiv	1.884	1.406	2.524	1.85	1.221	2.804	1.936	1.254	2.988
Standard grade or equiv	1.818	1.384	2.386	2.219	1.488	3.31	1.539	1.039	2.281
Other school level	0.942	0.64	1.388	0.719	0.392	1.321	1.118	0.672	1.862
None	1	[ref]		1	[ref]		1	[ref]	
Disability/illness	NS			(p=0.0394)			NS		
Limiting Long Illness				1.146	0.817	1.608			
Non limiting Long Illness				0.69	0.498	0.956			
No Illness				1	[ref]				
Marital Status	(p=0.0021)			(p<0.0001)			NS		
Married/civil partnership	1.554	1.202	2.009	2.871	1.985	4.152			
Living as married	1.651	1.238	2.2	2.131	1.424	3.19			
separated	1.626	0.961	2.75	1.536	0.661	3.568			
Divorced/dissolved	1.644	1.095	2.468	2.114	1.053	4.241			
Widowed/surviving	1.589	1.042	2.422	1.826	0.878	3.799			
Single	1	[ref]		1	[ref]				
Cigarette Smoking	NS			NS			NS		
Current cigarette smoker									
Used to smoke cigarettes									
Never smoked									
Life Satisfaction	NS			NS			NS		
Low (0-7)									
High (8-10)									
BMI	NS			NS			NS		
less than 30									
30 and over									
wemwbs score	NS			NS			NS		
< mean									
mean or more									
Economic Activity Status	(p=0.0008)			(p=0.0088)			NS		
FT Education	1.03	0.719	1.476	0.845	0.519	1.376			
Unable to work	0.406	0.247	0.669	0.456	0.22	0.944			
Looking for work	0.969	0.644	1.459	0.668	0.38	1.174			
retired	1.112	0.779	1.588	2.061	1.15	3.694			
Looking after Home/family	0.937	0.59	1.486	0.93	0.222	3.893			
other	1.448	0.866	2.422	1.721	0.716	4.137			
Paid work	1	[ref]		1	[ref]				

Table 25: Odds ratios for occupational physical activity participation logistic regression model

PHYSICAL ACTIVITY AT WORK	ALL			MEN			WOMEN		
	Odds Ratio	95% Wald Confidence Limits		Odds Ratio	95% Wald Confidence Limits		Odds Ratio	95% Wald Confidence Limits	
Sex	NS								
Male									
Female									
Age	(p<0.0001)			(p=0.0028)			(p=0.0014)		
16-24	75.597	1.364	>999.999	102.438	1.664	>999.999	5.797	1.309	25.67
25-34	32.61	0.6	>999.999	36.39	0.623	>999.999	2.875	0.707	11.687
35-44	28.972	0.535	>999.999	34.97	0.602	>999.999	2.161	0.539	8.658
45-54	31.014	0.574	>999.999	40.939	0.707	>999.999	2.268	0.574	8.968
55-64	44.208	0.817	>999.999	48.422	0.839	>999.999	3.682	0.932	14.541
65-74	21.452	0.378	>999.999	43.983	0.694	>999.999	1	[ref]	
75+	1	[ref]		1	[ref]		-	-	-
SIMD	(p=0.0002)			NS			(p=0.0005)		
5th - least deprived	0.422	0.286	0.623				0.316	0.18	0.556
4th	0.566	0.383	0.837				0.427	0.243	0.751
3rd	0.473	0.32	0.699				0.386	0.219	0.682
2nd	0.532	0.359	0.789				0.576	0.321	1.032
1st	1	[ref]							
Income	(p<0.0001)			(p<0.0001)			(p<0.0001)		
>=£39520	0.531	0.323	0.871	0.349	0.161	0.756	0.555	0.277	1.114
>=£25591 < £39520	0.837	0.514	1.364	0.607	0.283	1.301	0.851	0.432	1.678
>=£16918 < £25591	1.078	0.65	1.787	0.631	0.29	1.376	1.483	0.727	3.024
>=£10672 < £16918	1.344	0.784	2.304	1.022	0.44	2.376	1.474	0.7	3.103
<£10672	1	[ref]		1	[ref]				
Self-rated Health	NS								
very good/good									
fair									
bad/Very bad									
Highest Qualification	(p<0.0001)			(p<0.0001)			(p<0.0001)		
Degree or higher	0.229	0.14	0.373	0.213	0.117	0.389	0.142	0.052	0.39
HNC/D or equiv	0.347	0.206	0.584	0.52	0.271	0.998	0.132	0.046	0.374
Higher grade or equiv	0.366	0.219	0.611	0.981	0.507	1.899	0.089	0.032	0.25
Standard grade or equiv	0.95	0.561	1.609	1.883	0.958	3.7	0.274	0.097	0.78
Other school level	0.436	0.191	0.996	0.546	0.186	1.608	0.206	0.048	0.875
None	1	[ref]		1	[ref]				
Disability/illness	NS								
Limiting Long Illness									
Non limiting Long Illness									
No Illness									
Marital Status	NS								
Married/civil partnership									
Living as married									
separated									
Divorced/dissolved									
Widowed/surviving									
Single									
Cigarette Smoking	NS			NS			(p=0.0285)		
Current cigarette smoker							1.791	1.181	2.717
Used to smoke cigarettes							1.169	0.816	1.676
Never smoked							1	[ref]	
Life Satisfaction	NS			NS			NS		
Low (0-7)									
High (8-10)									
BMI	NS			(p=0.0367)			NS		
less than 30				1.402	0.992	1.98			
30 and over				1	[ref]				
wemwbs score	NS			NS			NS		
< mean									
mean or more									

Notes and References



NOTES AND REFERENCES

- ¹ Initial findings from this analysis have previously been referred to in The Legacy Evaluation Pre Games Report (2014).
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- ¹⁶ Scottish Intercollegiate Guidelines Network (2010) Non-pharmaceutical management of depression. A national clinical guideline. SIGN guideline no. 114.
- ¹⁷ See also relevant NICE guidance on treatment for mild to moderate depression: <https://www.nice.org.uk/guidance/cg90/ifp/chapter/treatments-for-mild-to-moderate-depression>
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- ³⁸ Entry of variables into the model is usually set at 5% and once the model has rejected its first variable that doesn't meet the criteria, the process stops regardless

of how many variables are still to be tested in the model. Therefore, no entry level was set in the analysis for this study, allowing observation of which variables had the greatest effect on the variables already in the model.

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⁴¹ The Warwick-Edinburgh Mental Well-being Scale (WEMWBS) is a measurement of mental well-being of adults. Further information is available in Annex A.

⁴² Bauman, AE, Reis, RS, Sallis JF *et al.* (2012) Correlates of physical activity: why are some people physically active and others not? *Lancet* 380:9838, p258–271

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How to access background or source data

The data for this statistical report:

- will be made available via the UK Data Service
- may be made available on request, subject to consideration of legal and ethical factors. Please contact niamh.o'connor@scotland.gsi.gov.uk for further information.

Further breakdowns of the data:

- are available via the Scottish Health Survey website
<http://www.scotland.gov.uk/Topics/Statistics/Browse/Health/scottish-health-survey>

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