Sheffield Hallam University | Sport Industry Research Centre

Active Lives Adult Survey:

Understanding Mental Wellbeing, Individual Development and Social and Community Development in the context of participation and volunteering in sport and physical activity (May 16-17)

MAIN REPORT

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CONTENTS

EXECUTIVE SUMMARY

Introduction

The Sport Industry Research Centre (SIRC) at Sheffield Hallam University was commissioned by Sport England to carry out analysis on the Active Lives adult survey data (May 16-17). The research is concerned with understanding the association between mental wellbeing, individual development and social and community development outcomes as defined in the Government strategy for sport (Sporting Future), and participation and volunteering engagement in sport and physical activity.

Approach

There were three elements to this research. The first and most substantive part of the research was secondary analysis of the Active Lives survey data using a range of simple (bivariate) and more complex (multivariate regression) statistical tests. Element 2 was a review of literature and evidence to contextualise the analysis. Element 3 was a review of other datasets to examine the potential for further analysis of engagement and the outcomes using cross-sectional and longitudinal datasets.

Summary of the findings

The key findings of our bivariate analysis are as follows:

- Being physically active is positively linked with mental wellbeing, individual development and social and community development outcomes. We found that active people achieve consistently higher mean scores than fairly active people, who in turn achieve higher scores that inactive people, suggesting that some activity is good, but more is better.

- Volunteering is also positively linked with the three outcomes, and particularly so with the outcome measures of feeling worthwhile and social trust. People who do not volunteer still record high average scores but volunteers achieve slightly elevated levels.

- The higher outcome scores for the progressively more active and volunteers are modest and in most cases these differences are often insufficient to bring about changes in the overall 'thresholds' e.g. from having medium to high life satisfaction.

- People who participate *and* volunteer in sport and physical activity have the highest outcome scores across all measures. However, this composite group only accounts for 12% of the Active Lives population.

- Participating in sport or physical activity generates positive outcome scores, but a *variety* of sport and physical activity types including fitness, active travel and walking for leisure is associated with higher positive outcome scores across all measures.

Taking into account the differences found as a result of age, gender, occupation, disability and ethnicity, our multivariate regression analysis revealed the three key points outlined below.

- Doing sport and being a member of a club means you are more likely to experience very high levels of life satisfaction. Members of a sports club are 35% more likely to achieve very high life satisfaction than those who are not members of a sports club.

- Being active, as defined by the Chief Medical Officer's recommendation of 150+ minutes of moderate intensity physical activity per week, through any type of sport and physical activity means adults are 57% more likely to experience a higher level of self-efficacy;

- People who have volunteered at least twice in the last 12 months are 29% more likely to report social trust within their local area than those that have not volunteered.

Conclusions and recommendations

We conclude that participating and volunteering in sport and physical activity is positively associated with mental wellbeing, individual development and community development. However, the contribution appears to be modest and in most cases does not bring about threshold change. While modest in its findings, this research does make a contribution to knowledge in relation to engagement in sport and physical activity. Evidence in these outcome areas is highly variable and this research adds credible cross-sectional analysis to the existing literature.

Based on our analysis of the Active Lives adult survey, the literature review and the review of other datasets, we suggest several research recommendations. In particular, we recommend further investigation of the Active Lives dataset using methods for investigating causal relationships, as well as analysis of the longitudinal components of the Taking Part Survey and Understanding Society. The latter is likely to be the most effective means of investigating whether participation and volunteering are the cause of people achieving better outcome scores, or whether people with higher outcome scores are more likely to engage in sport and physical activity.

Active Lives Adult Survey

Sport and physical activity

Physical activity has a positive effect on all outcome measures. **More activity** is better.

- Mental Wellbeing
- Individual Development
- Social & Community Development

Volunteering

Volunteering also has a positive effect on all outcome measures, notably in social and community development.

- Mental Wellbeing
- Individual Development
- Social & Community Development

Taking part and volunteering

People who **take part** and **volunteer** have even higher scores across all outcome measures.

- Mental Wellbeing
- Individual Development
- Social & Community Development

Activities

Taking part in a **variety** of sport and physical activities leads to even higher outcome scores across all measures.

- Mental Wellbeing
- Individual Development
- Social & Community Development

Life satisfaction

Sports club members are **35%** more likely to achieve very high life satisfaction than those who are not members of a club

- Mental Wellbeing

Self-efficacy

Being active through any type of sport and physical activity means adults are **57%** more likely to experience higher levels of perceived self-efficacy

- Individual Development

Social trust

People who volunteer are **29%** more likely to report social trust than those who don't volunteer

- Social & Community Development

1. INTRODUCTION

1.1 Research overview and aim

The Sport Industry Research Centre (SIRC) has been commissioned by Sport England to carry out analysis and contextualisation of the Active Lives survey outcomes' data. The research presents evidence about the association between engagement in sport and physical activity and the following outcomes within the Government Strategy for sport:

- Mental wellbeing;
- Individual development; and
- Social and community development.

The *Review of Evidence on the Outcomes of Sport and Physical Activity*[1], published by Sport England in May 2017, concluded that the evidence bases for the different outcomes varied in quality and size, with mental wellbeing explored well, individual development fairly well, and evidence on social and community development more patchy. This research aims to add useful and useable insight across all three outcome areas.

This report is the first of three outputs produced from the analysis. The second output is delivered in Excel format and consists of a spreadsheet containing data extraction from research relating to the outcomes using large datasets. The third output is a summary report of the headline findings, presented in an accessible manner for a wider audience.

1.2 The policy context

The publication of *Sporting Future*[2] in December 2015 heralded a significant national policy change towards sport. The then Prime Minister, David Cameron, endorsed the strategy in his foreword by saying 'we will be much bolder in harnessing the potential of sport for social good'. This stance represented a considerable shift from the previous policy of sport for sport's sake with its relatively narrow focus on formal sports.

In short, *Sporting Future* is concerned with value of playing sport, volunteering in sport and watching live sport to deliver against five key outcome areas: physical wellbeing, mental wellbeing, individual development, social and community development and economic development. In addition to using sport for social good, *Sporting Future* recognises the important contribution that physical activity more widely, for example walking for leisure, can make to the outcomes.

[1] https://www.sportengland.org/research/benefits-of-sport/sport-outcomes-evidence-review/
[2] HM Government (2015) Sporting Future: A New Strategy for an Active Nation, Cabinet Office, London, UK.

Sport England's response to *Sporting Future* is articulated through its strategy *Towards An Active Nation*[3] in which it commits to 'some completely new approaches', including a new portfolio of investment principles. Of particular note is a commitment to invest some £250m over the life of the strategy on tacking inactivity and in so doing, transforming the way in which sport and physical activity are delivered across the country.

The effectiveness of Sporting Future is measured through a series of key performance indicators that were refreshed in the *Sporting Future First Annual Report*[4]. For the purposes of this project, the relevant indicators are detailed in Table 1.1 below.

Table 1.1: Outline of key performance indicators for Outcome Areas 1-4

Outcome 1	Outcome 2	Outcome 3	Outcome 4
Physical Wellbeing	Mental Wellbeing	Individual Development	Social / Community Development
a) % meeting CMO physical activity guidelines (active) b) % doing less than 30 minutes physical activity each week (inactive)	% of population reporting positive subjective wellbeing	% of population reporting positive perceived self-efficacy Number of adults volunteering in sport at least twice in the last year.	% of population reporting positive levels of social trust

1.3 Active Lives

The instrument that has been employed to measure many of the key performance indicators is the Active Lives Survey conducted for Sport England by Ipsos MORI with financial contributions from Public Health England, Arts Council England, and the Department of Transport. Our analysis is based on the May 2016/17 data set which included responses from 214,284 adults, aged 16+, who took part in an online survey over a twelve month period.

The data were collected by asking respondents to identify from a list the activities in which they had participated during the last year. For all identified activities the focus was narrowed to quantify on how many days in the last 28 days respondents had done that activity along with the duration and intensity of the activity.

1.3.1 Measures of engagement

Being active is defined as meeting the Chief Medical Officer's recommendation of 150 minutes per week of moderate intensity physical activity achieved in blocks of at least 10 consecutive minutes. By contrast, being inactive is defined as doing less than 30 minutes of moderate

[3] Sport England (2016) Towards An Active Nation, Sport England, London UK.
[4] HM Government (2017) Sporting Future: First Annual Report, Cabinet Office, London, UK.

intensity physical activity per week. Between these two categories is being 'fairly active' which means 30-149 minutes of moderate intensity activity. The challenge facing the sport delivery system is to increase the proportion of people who are 'active' and also reduce the proportion of people who are 'inactive'. In the Sporting Future First Annual report the headline statistics are: 60.7% of adults are active; 25.6% are inactive; and 13.7% are fairly active.

Volunteering in sport is measured on the Active Lives Survey using two measures of commitment: first, volunteering at least twice in the last year, which is the headline key performance indicator in Sporting Future; and, second, a more intense measure of volunteering, namely at least once in the last four weeks. In the most recent Sport England[5] release on the Active Lives Survey it was found that 14.9% of adults, some 6.7 million people, volunteered in sport at least twice in the last year.

The three levels of activity and the two volunteering indicators are what we have used as variables of interest for our analysis into 'engagement' in sport for this research. In recognition of the role of physical activity within the new strategy, the Active Lives Survey analyses participation in sport and physical activity according to six broad categories of activity, namely: walking for leisure; active travel; cycling for leisure and sport; creative or artistic dance; fitness activities; and traditional sport. These six categories of sport and physical activity form our variables of interest for 'participation' and we also include a seventh variable, being a club member in a traditional sport which is a perfect subset of taking part in traditional sport.

1.3.2 Outcome related measures

Whilst there are data available on the outcome areas for participation in sport and physical activity and volunteering, to date no data have been published on the indicators for Mental Wellbeing; Individual Development; and Social and Community Development. The actual questions that have been used to operationalise these concepts are shown in Table 1.2.

The purpose of this research is to test the extent to which there is any relationship between the six new outcome questions (measures) detailed in Table 1.2 and the five categories of engagement. The actual process of how this analysis was conducted is covered in greater depth in Section 2.

[5] Sport England (2017) Active Lives Adult Survey: May 2016/17 Results, Sport England, London UK.

Table 1.2: Questions included on Active Lives Survey to measure Outcome 2-4

Outcome	Outcome 2	Outcome 3	Outcome 4
Descriptor	Mental Wellbeing	Individual Development	Social / Community Development
High level performance indicator(s)	% of population reporting positive subjective wellbeing	% of population reporting positive perceived self-efficacy Number of adults volunteering in sport at least twice in the last year.	% of population reporting positive levels of social trust
Question 1	Life Satisfaction: How satisfied with life are you these days?	Perceived Self-Efficacy: I can achieve most of the goals I set myself.	Trust: Most people in your local area can be trusted.
Question 2	Happiness: How happy did you feel yesterday?		
Question 3	Anxiety: How anxious did you feel yesterday?		
Question 4	Worthwhile: To what extent do you feel that the things you do in your life are worthwhile?		

2. APPROACH

There are three Elements to the research. The most substantial part was Element 1, analysis of Active Lives adult survey dataset. Element 2 was a review of literature, carried out to contextualise the data analysis of Active Lives in relation to the latest available evidence. Element 3, was undertaken to identify the potential for further analysis of the outcomes using longitudinal datasets, namely the Taking Part Survey (TPS) and Understanding Society (US). Table 2.1 summarises our approach.

Table 2.1: Summary of our approach

Element	Approach
Element 1: Analysis of Active Live	1. Bivariate analysis of engagement in sport and physical activity and the outcome measures 2. Multivariate analysis of selected outcome measures: life satisfaction, self-efficacy and social trust
Element 2: Literature Review	1. Revisit the Sport England *Review of Evidence on the Outcomes of Sport and Physical Activity* 2. Top-up review of recent evidence 3. Additional known sources relating to the outcome areas
Element 3: Review of other datasets	1. Audit of variables within relevant longitudinal datasets (US/TPS) 2. Matrix analysis of existing secondary analysis/literature to establish best practice and methods for further research

2.1 Element 1: Analysis of Active Lives survey data

We approached the statistical analysis of Active Lives in two ways: First, bivariate analysis was carried out to gain an overview of the associations between the various measures of engagement and mental wellbeing, individual development and social and community development. Second, multivariate regression analysis was undertaken to gain a more sophisticated insight into the factors that influence the outcome measures. For this analysis we controlled for age, gender, disability, ethnicity and occupation. Table 2.2 summarises the methods used and the rationale for these.

Table 2.2: Statistical methods

Type of analysis	Method	Rationale
Bivariate	T-test	Used to test if there is a significant difference in the mean scores for outcomes between those who volunteer in sport and those who do not.
	Analysis of Variance (ANOVA)	Used to test if there is a significant difference in the mean scores for outcomes between activity levels (active, fairly active, inactive), sport/volunteer segments and sport/activity segments.
	Correlations	Used to establish the direction (positive or negative) and strength of the association between two variables (e.g. between activity levels and grouped outcome data)
	Chi-squared	Used to test the independence between variables. This test shows if the variables are related or unrelated.
Multivariate	Logistic regression	Used to identify the factors that contribute to the outcomes. Regression allows us to control for various factors that may influence the outcomes (e.g. some demographic characteristics), and to examine the contribution of engagement in isolation.

2.1.1 Thresholds

The questions and thresholds used in Active Lives for the four mental wellbeing measures are summarised in Table 2.3. According to guidance provided by the ONS, it is legitimate to analyse all four measures based on their thresholds as well as by calculating mean scores for each measure. All of the mental wellbeing outcome measures are scored on a scale of zero (not at all) to 10 (completely). We have primarily used mean scores to analyse the outcome measures.

Table 2.3: Mental wellbeing measures and thresholds

Measure	Question	Thresholds				
		Very Low	Low	Medium	High	Very High
Life satisfaction	Overall, how satisfied are you with your life nowadays?	NA	0-4	5-6	7-8	9-10
Happiness	Overall, how happy did you feel yesterday?	NA	0-4	5-6	7-8	9-10
Worthwhile	Overall, to what extent do you feel that the things you do in life are worthwhile?	NA	0-4	5-6	7-8	9-10
Anxiety	Overall, how anxious did you feel yesterday?	0-1	2-3	4-5	6-10	NA

The questions and thresholds used for individual development (self-efficacy) and social and community trust (social trust) are shown in Table 2.4. Both measures are scored on a scale from 1 (strongly disagree) to 5 (strongly agree).

Table 2.4: Other outcome measures and thresholds

Measure	Question	Thresholds				
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Self-efficacy	*'I can achieve most of the goals I set myself'*	1	2	3	4	5
Social trust	*'Most people in our local area can be trusted'*	1	2	3	4	5

2.2 Element 2: Literature review

A pragmatic approach to searching for literature was adopted. The starting point for identifying relevant literature was the Sport England *Review of Evidence on the Outcomes of Sport and Physical Activity*. We identified all relevant papers within this document that related to the three outcome areas and to the six Active Lives measures in particular. We then conducted a 'top-up' search of relevant literature of the latest evidence published on mental

wellbeing, individual development and social and community development, published since the Sport England review was carried out (August 2016-September 2017). We used three academic databases, SPORTDiscus, Scopus and Web of Science, to search for all relevant material, using the search terms that had been used previously in the Sport England review, in order to replicate the search during the more recent time frame. Finally, we included any relevant known literature on the outcomes that was excluded from the Sport England review but which was known to either Sport England or SIRC.

A total of 125 original papers were included in our review. We also made an assessment of the quality of all material collected using a 'hierarchy of evidence' approach[6]. There was a concentration of evidence in the middle and lower areas of the hierarchy for all outcome areas, with the exception of mental wellbeing: life satisfaction, which showed more spread across the hierarchy and included four systematic reviews and included some more robust cross-sectional analysis.

2.3 Element 3: Review of other datasets

Element 3 brought together key statistical papers from the literature together with an analysis of existing datasets. Relevant papers were identified from Element 2 and information was extracted on method and key findings. In total nine papers were selected for further analysis. An audit of the variables included within TPS and US was undertaken to identify scope for further research on the outcomes. Both of these surveys were identified as having a longitudinal component and variables of interest to mental wellbeing, individual development and social and community development.

A summary of key findings from the research is presented in Section 3.

[6] The hierarchy of evidence recognises that evidence varies in quality and attempts to grade evidence according to its reliability and effectiveness. There is broad agreement that certain types of study (e.g. Randomised Controlled Trials (RCT)) are seen to rank above others due to a rigorous methodology. Generally, the higher up the hierarchy a methodology is ranked, the more robust it is assumed to be. However, the hierarchy is not absolute and a well conducted, extensive, cross-sectional study may provide more convincing evidence than a poor RCT.

3. SUMMARY OF FINDINGS

The findings presented in this section reflect a synthesis of all our analysis in relation to the research aim. They are presented and contextualised in relation to evidence found in the literature review. The full literature review can be found in Appendix 1; the full results of the bivariate analysis in Appendix 2; the multivariate regression analysis in Appendix 3 and the review of other datasets, including the matrix analysis in Appendix 4.

The findings presented in this section are primarily based on the ANOVAs, T-tests (bivariate analysis) and the logistic regression models (multivariate analysis). These were selected as they are the most appropriate statistical tools available given the nature of the data and the objectives of the research. A full analysis of all the statistical tests can be found in Appendices 2 & 3.

Where possible, we have contextualised our findings in relation to the existing evidence base derived from the literature. Our review found that the evidence base for different outcome areas varies in quantity and quality. Much of it is qualitative with some cross-sectional or cohort studies, and a small number of systematic reviews. There is limited evidence relating to causality between engagement and the outcomes, with just two of 125 studies focusing on such relationships. There is also generally a lack of clarity in the literature around the definitions and meaning of the different outcomes, with considerable cross-over in the literature. This point is particularly notable amongst the mental wellbeing measures of life satisfaction, happiness and worthwhileness, which are terms that are often used interchangeably. It is often difficult therefore to draw definitive conclusions from the evidence as to the extent of the impact of engagement in sport and physical activity on the outcome areas.

3.1 Bivariate analysis

The bivariate analysis focuses on those patterns observed at the top level, between engagement in participation and volunteering (and both activities together) and the outcomes. This section also includes analysis of engagement by activity groups/segments and their association with the outcomes. Analysis by socio-demographic groups was undertaken and is reported in Appendix 2. However, the findings are not reported here as by and large, the patterns emerging across most categories were consistent with the top level picture. Moreover, because many of the overall reported findings were small, the influence across socio-demographic categories was minimal.

3.1.1 Engagement in participation and the outcomes

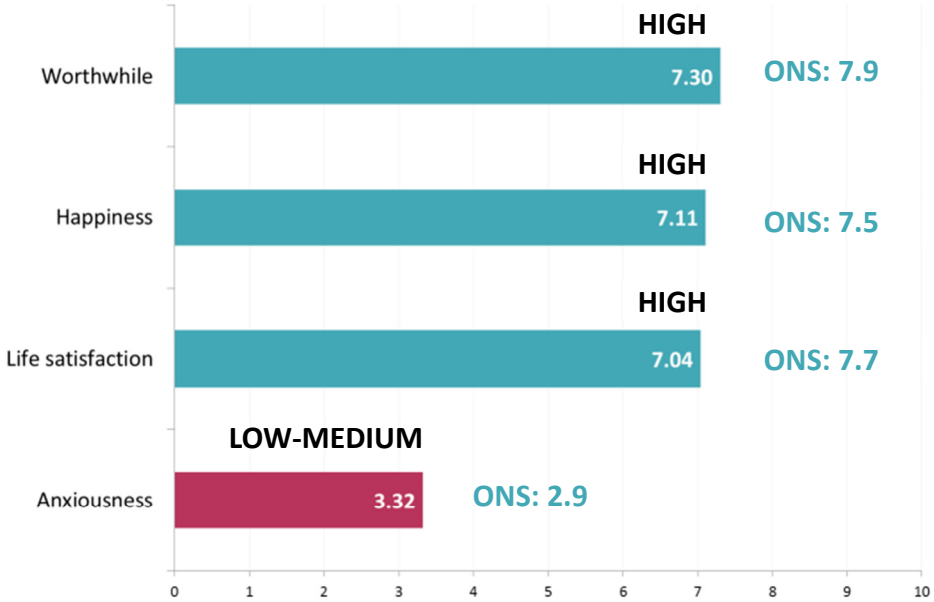
Using various bivariate methods, our research found positive associations between participation in sport and physical activity and mental wellbeing, individual development and social and community development. This section will present the average scores for each

outcome measure in Active Lives and compare them with the average measures for active, fairly active and inactive groups.

Mental wellbeing

To place the Active Lives adult survey data in the context of national wellbeing figures across the UK population in general, Figure 3.1 shows the means score for each outcome measure in Active Lives, and the average ONS score for the UK for the year ending June 2017[7]. It can be seen that the Active Lives adult survey data is broadly consistent with the ONS data, but systematically less favourable across all measures.

Figure 3.1 Comparison of mental wellbeing scores for Active Lives and ONS data



Across all mental wellbeing outcome measures we found a regular pattern whereby active participants achieve above average mean scores and that inactive participants score below average. In all cases, our ANOVA tests demonstrate that active groups have statistically significantly higher mean scores than those who are fairly active, who in turn have significantly higher scores than inactive people. While this suggests that some activity is better than none, and more activity is generally better for achieving higher wellbeing outcomes, it should be noted that in most cases the differences are modest and insufficient to bring about changes in thresholds, for example between medium and high.

Life satisfaction

We found there are disparities in the life satisfaction scores of adults based on their level of engagement with sport and physical activity. As shown in Figure 3.2, our results found that

[7]https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/bulletins/measuringnationalwellbeing/july2016tojune2017

people who are 'active' are more satisfied with their lives overall in comparison with those who are 'fairly active', who in turn have a higher mean life satisfaction score relative to the 'inactive' group. Although we found that being active is associated with higher average life satisfaction than being fairly active or inactive, the difference (0.73) in relation to the threshold categories is small. In support of our findings, The NatCen for Social Research (2017), Leadbetter and O'Connor (2013) and Schmiedeberg and Schroder (2017), Fujiwara et al (2014) and Dolan et al (2014) all found that engagement in sport and physical activity was associated with higher life satisfaction. Of these studies, only Fujiwara and Dolan et al (2014) tested for causality and the results suggest that being active increases life satisfaction, however, it should be noted that both conduct analysis of cross-sectional rather than longitudinal data.

Happiness

Our research found that active people have higher levels of happiness than fairly active and inactive participants. This is illustrated in Figure 3.3, where the average score for active participants is higher than both the fairly active and inactive categories. Several studies in the literature have examined the association of sport and physical activity with happiness. We found two studies, both using the Taking Part dataset, that similarly found participating in activity was associated with high levels of self-reported happiness (DCMS, 2014; Rascuite and Downward, 2010). Both of these studies were based on cross-sectional data but controlled for the influence of other factors.

Worthwhile

We found similar patterns to the other mental wellbeing outcomes in the scores for the worthwhile measure. Figure 3.4 demonstrates that active people have a higher mean score (7.44) than inactive people (6.94). The quantity and quality of evidence in relation to self-worth is much less than for life satisfaction and happiness, with just a small number of papers found in our literature review. Nevertheless we found some evidence of the association between self-worth and participation in the literature to support our findings. Pommier and Witt (1995) and Tester et al (1999) both carried out research with young people and found that physical activity programmes improve self-worth. McAuley et al (2000) also explored changes in self-worth following a six month exercise intervention and found some increases in self-worth with increased frequency of activity. It should be noted that this evidence, although relevant, is now quite dated.

Figure 3.2 Participation and life satisfaction

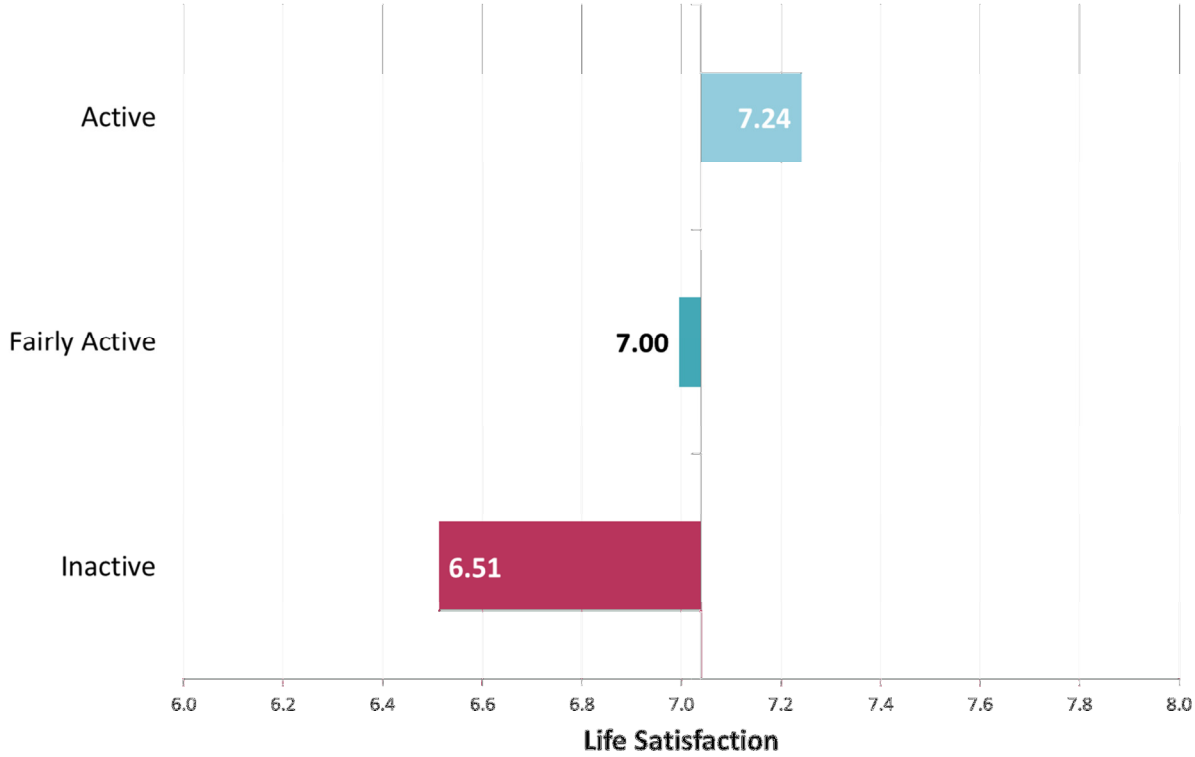


Figure 3.3 Participation and happiness

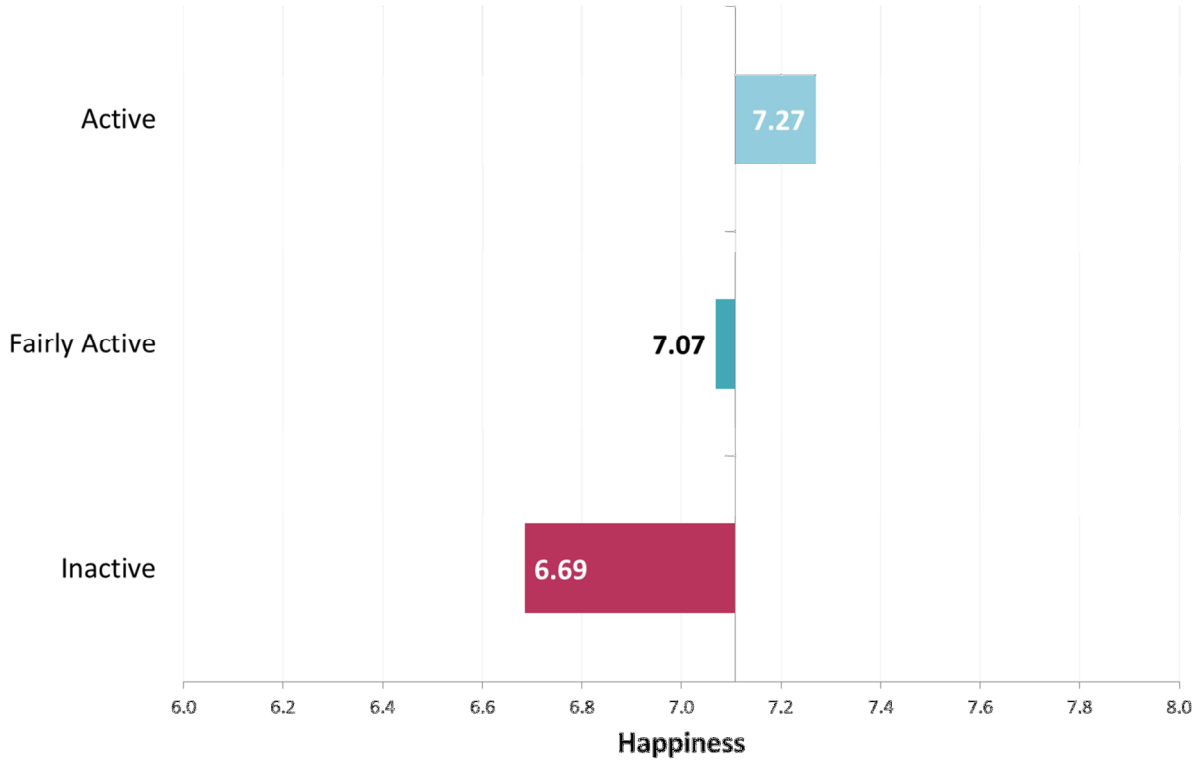


Figure 3.4 Participation and worthwhile

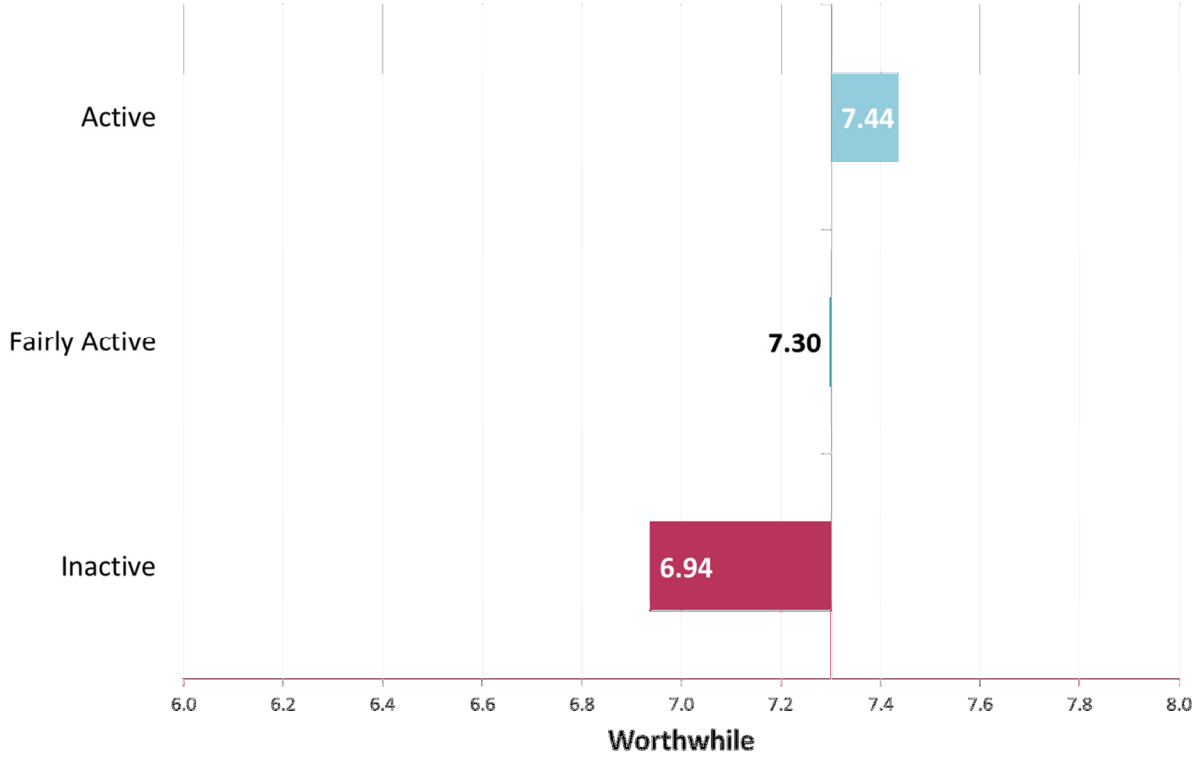
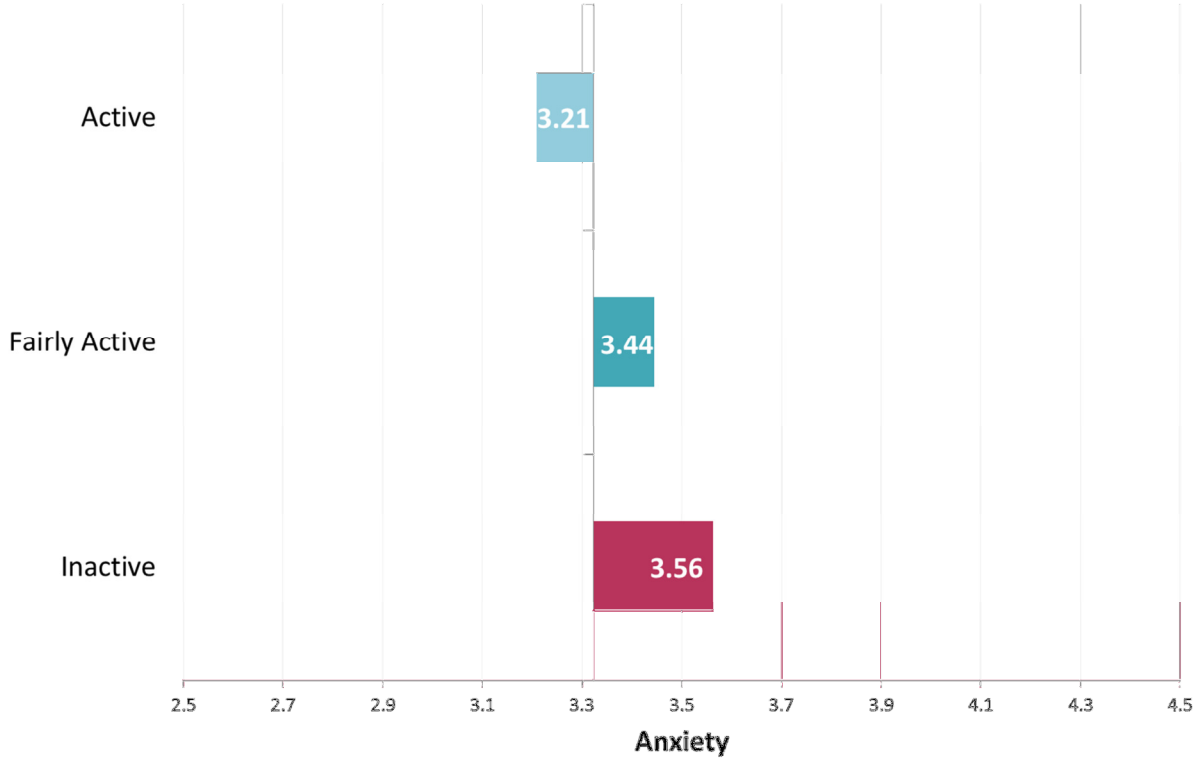


Figure 3.5 Participation and anxiety



Anxiety

Our research found that active participants had lower average scores of anxiety than inactive participants (this is a positive finding). Figure 3.5 shows that anxiety levels are significantly lower among active and fairly active adults. Although there has been literature published on participation and anxiety, it tends not to specify anxiety disorders or conditions. The literature also tends to be based on qualitative research and case studies, and is therefore less conclusive than other mental wellbeing measures. However, Fox (1999, 2000) and C3 Collaborating for Health review (2012) do provide some evidence that physical exercise improves mental wellbeing, including anxiety and depression.

Individual development / social and community development

Individual development (self-efficacy) and social and community development (social trust) were both scored on a different scale hence the mean scores for these measures are lower than for the mental wellbeing measures. In relation to both outcome measures, whilst positive the difference between active and inactive participants is again insufficient to cross a threshold category.

As shown in Figure 3.6 our findings reveal that self-efficacy scores are significantly higher among adults with higher levels of activity. Relatively speaking, there is a large amount of literature on self-efficacy but the quality of this is generally low. One rapid review of evidence with children (aged 5-11) suggests there is some evidence to support the association between physical activity and self-efficacy but this evidence also only came from a small amount of studies (Chalkley et al, 2015). There is limited quality adult evidence available in the existing literature to support our findings.

Figure 3.7 again shows that active adults exhibit more social trust relative to the inactive group. Similarly, there is limited evidence in the literature to support this finding, although there is some anecdotal evidence that club membership is associated with social trust.

Figure 3.6 Participation and self-efficacy

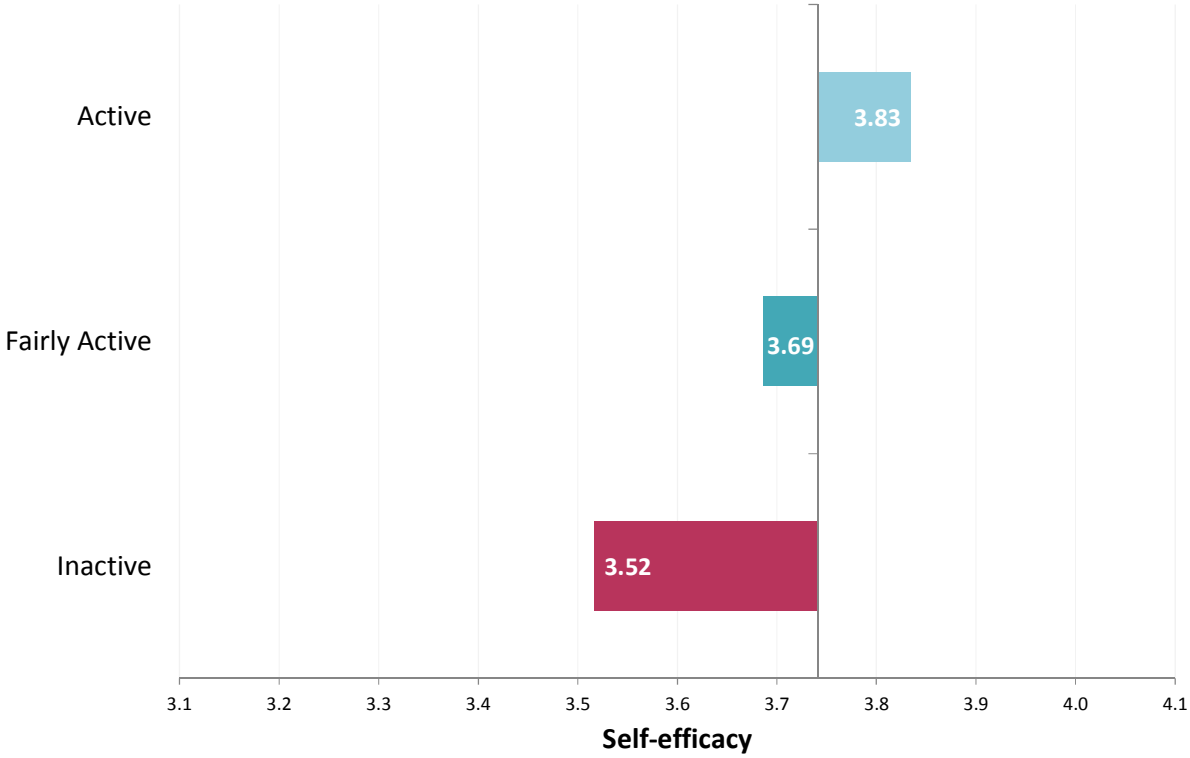
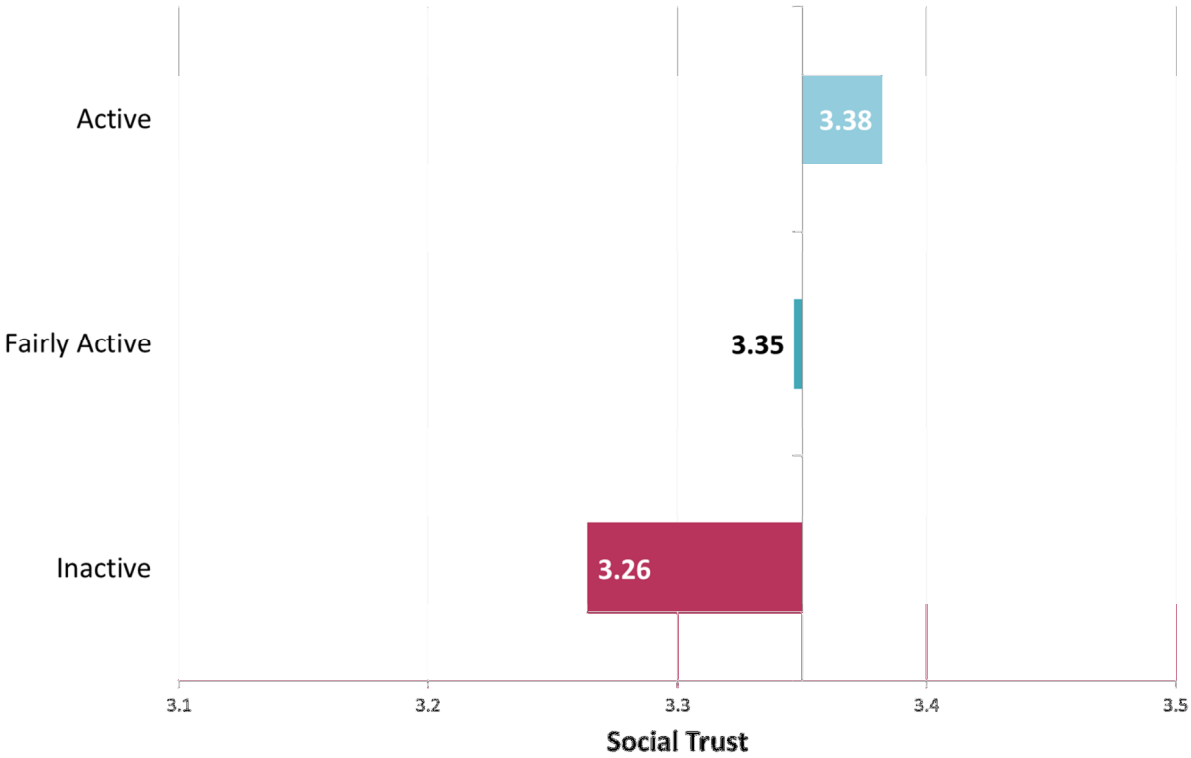


Figure 3.7 Participation and social trust



3.1.2 Engagement in volunteering and the outcomes

Our analysis also found consistent positive associations between volunteering in sport and mental wellbeing, individual development and social and community development. In all cases the average score for both measures of engagement in volunteering (at least twice in the last 12 months and at least once in the last 28 days) were higher than for people who had not volunteered at all in the last 12 months. The mean scores for the more intense measure of volunteering are slightly higher. T-tests confirm that people who volunteer at both levels of intensity have statistically significantly higher mean scores than those who do not. However, as with participation, the differences are small and in most cases not sufficiently great to move a person across a threshold category to higher or lower band.

Mental wellbeing and volunteering

Our findings reveal that volunteering is positively associated with mental wellbeing across all outcome measures, including life satisfaction, happiness, feeling worthwhile, and anxiety. These are shown in Figures 3.8-3.11. In most cases the mean scores between the two intensities of volunteering engagement are very similar. The highest mean score, for volunteering across all the mental wellbeing outcome measures, shown in Table 3.10, is for feeling worthwhile (7.78).

There is considerably less literature relating to the association between volunteering and mental wellbeing. The main evidence relating to volunteering comes from a report commissioned by Join in. Williams and Jacques (2015) reports that *'compared to non-volunteers, people who volunteer in sport are considerably higher on the measures of feeling like their life has a sense as purpose, that they are doing something important, feel a sense of pride and that their life has meaning*'. The same study found that sport volunteers have 10% higher self-esteem, emotional well-being and resilience and are 15% less likely to worry. Within their cross-sectional survey they also found significantly lower wellbeing scores in those who had never volunteered and significantly higher wellbeing in long term volunteers suggesting that longevity of volunteering is important. No evidence was found in the literature linking volunteering to anxiety.

Figure 3.8 Volunteering and life satisfaction

Figure 3.9 Volunteering and happiness

Figure 3.10 Volunteering and worthwhile

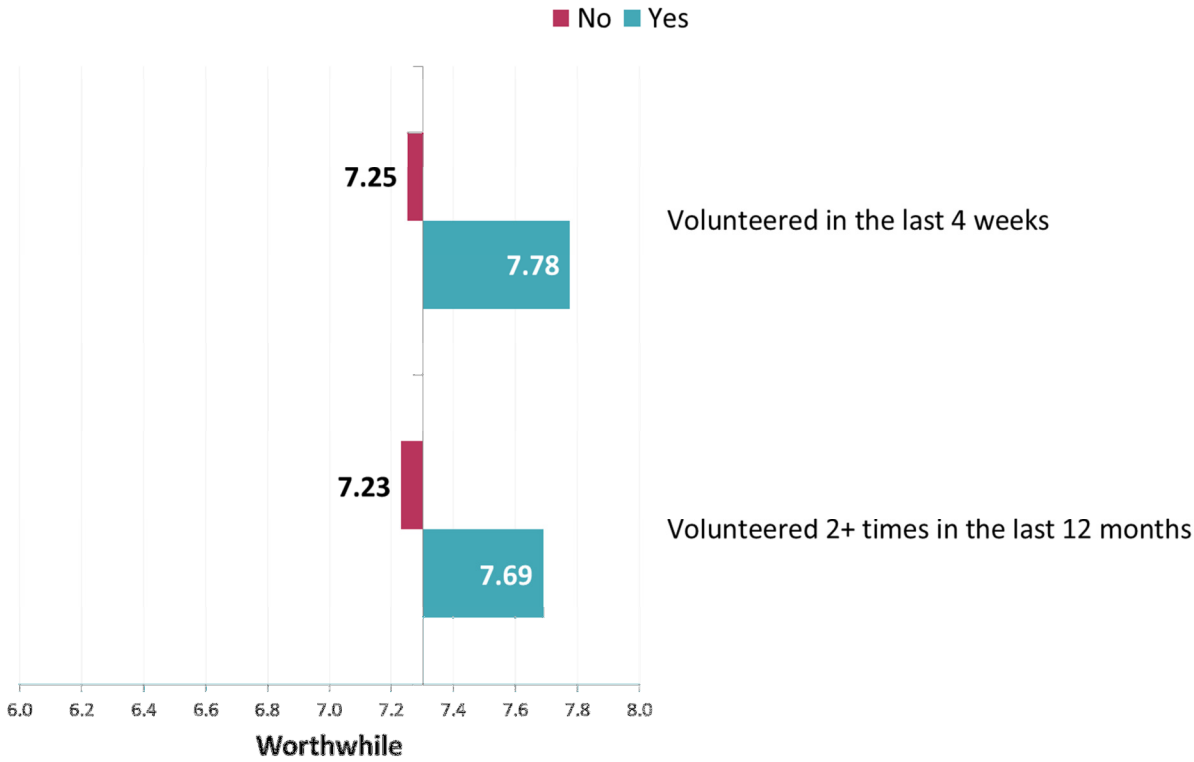
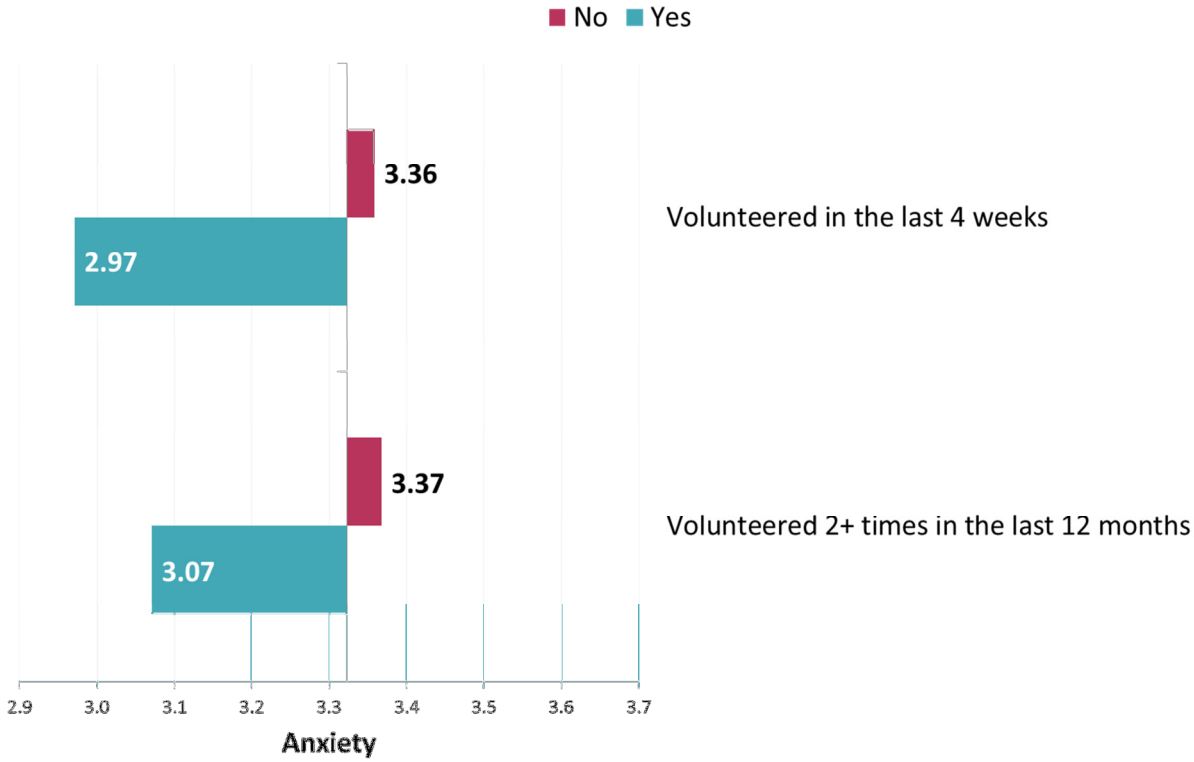


Figure 3.11 Volunteering and anxiety



Volunteering and individual development /social community development

Our bivariate analysis found that volunteering at both intensities was associated with higher scores for self-efficacy and social trust compared with those who had not volunteered in sport in the last 12 months. However, as shown in Figures 3.12 and 3.13, the effect is relatively small.

Figure 3.12 Volunteering and self-efficacy

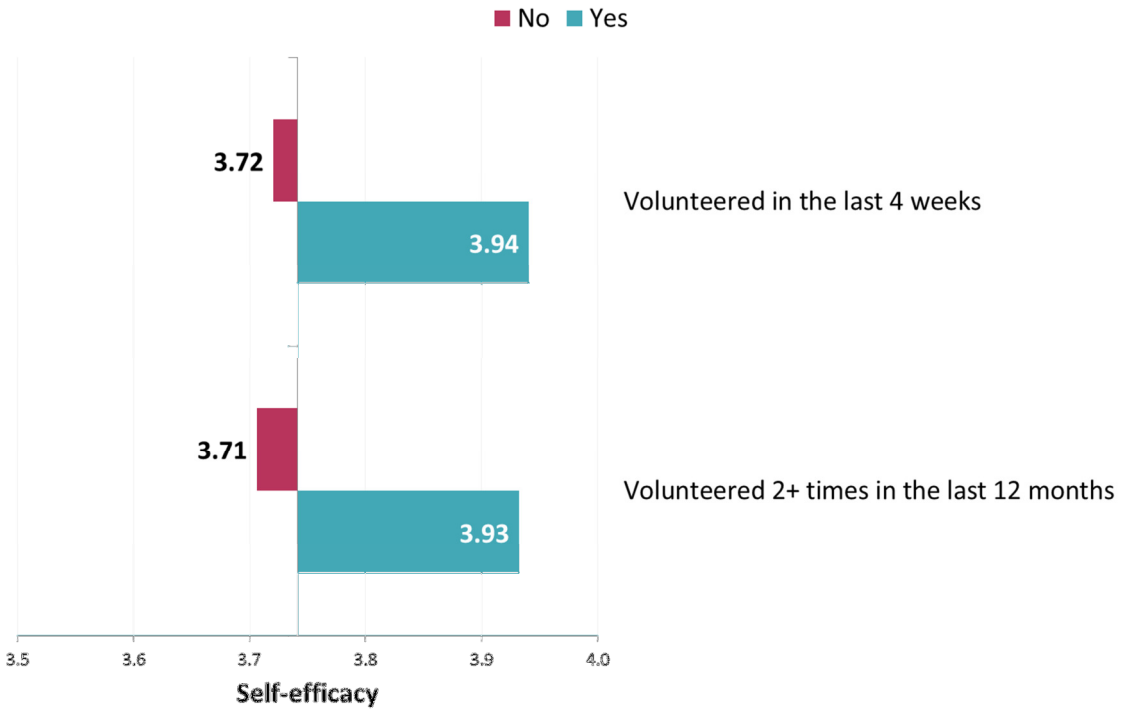
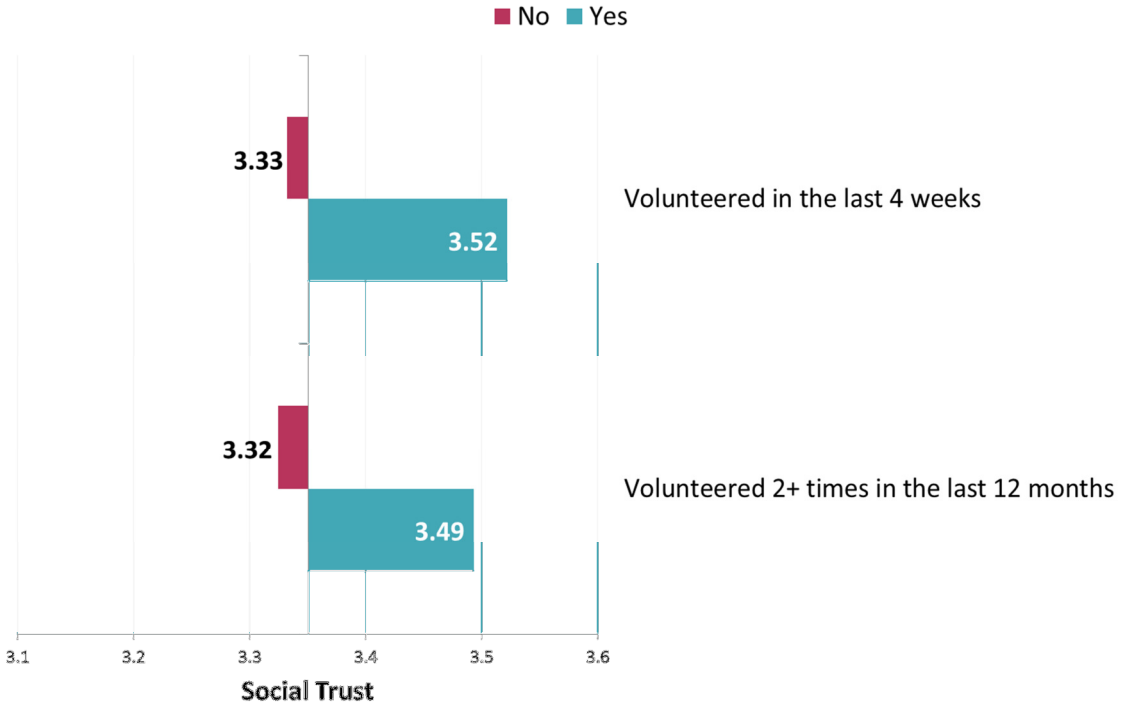


Figure 3.13 Volunteering and social trust



There is evidence in the literature to support our findings in relation to the association between volunteering and social trust. Williams and Jacques (2015) found volunteers were more likely to feel good about their community, and that compared to those who have never volunteered in sport, were four times more likely to report that they trusted others in their community.

The association between volunteering and social trust in our analysis was more prominent in the multivariate regression analysis, discussed later in this section.

3.1.3 The combined effect of participation and volunteering

Existing literature tends to examine the associations between variables in isolation such as activity and life satisfaction and volunteering and social capital. It is however possible to combine variables to analyse, for example, the scores for people who are active and volunteer and compare them with people who are inactive and do not volunteer. As shown in Figure 3.14 the net effect is that the variance between groups increases. For example, an active volunteer has a life satisfaction score of 7.48, whereas for an inactive non-volunteer the score is 6.66. Although the gaps between groups are marginally higher than they are for participation and volunteering in isolation, they remain modest and are insufficient to position respondents in different thresholds.

We found similar findings for social and community development, with higher levels social trust. The variation between active volunteers (3.50) and inactive non-volunteers (3.28) represents a movement along a continuum of neutral (3) to agree (4) and should be regarded as a modest difference.

Figure 3.4 also suggests that for feeling worthwhile, volunteering seems to be making the most impact. While the combined effect of being active and volunteering gives the highest mean score, active volunteers and inactive volunteers have higher scores than active non-volunteers and inactive non-volunteers. Again, the variations in these scores are insufficient to bring about changes in thresholds.

Figure 3.14a Being active and volunteering (life satisfaction)

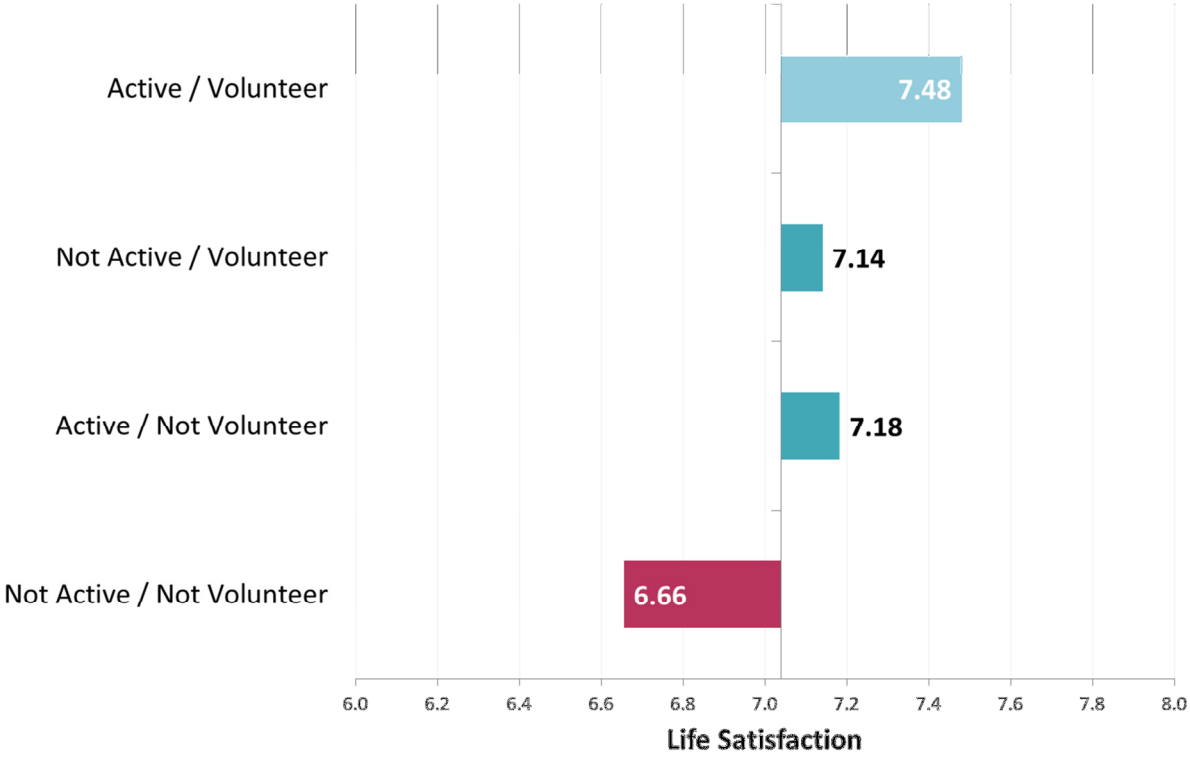


Figure 3.14b Being active and volunteering (happiness)

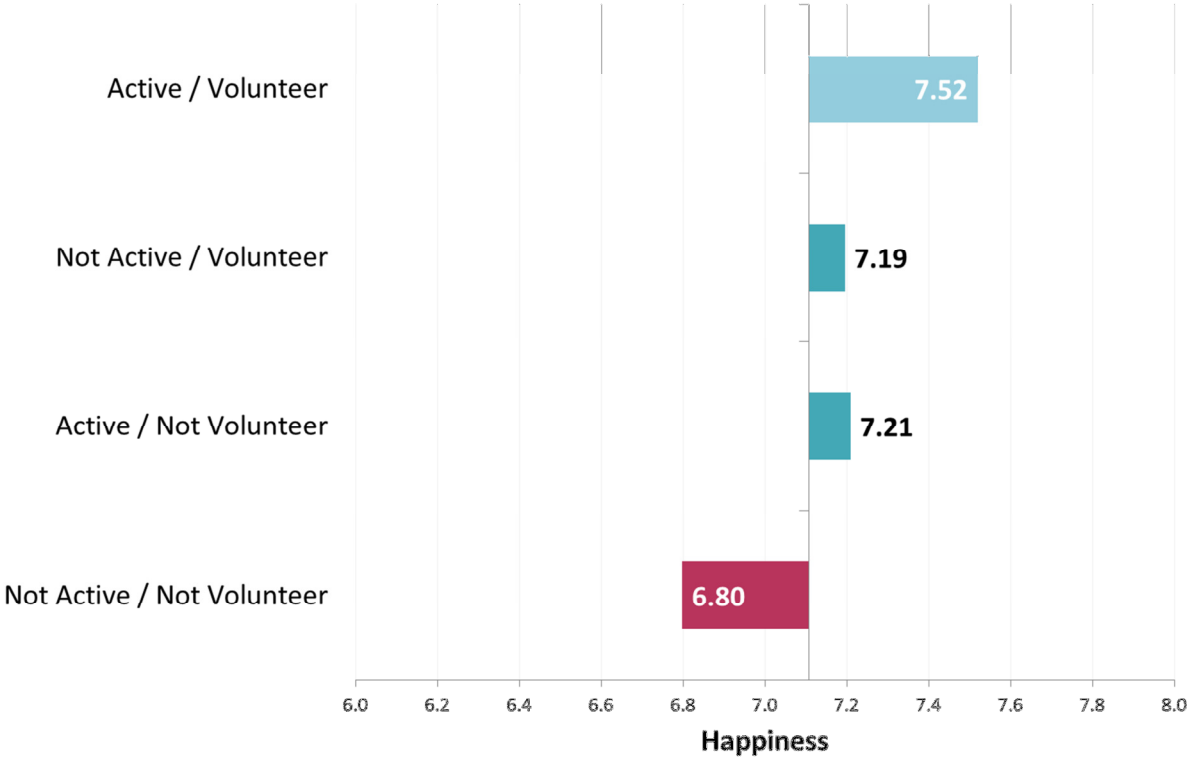


Figure 3.14c Being active and volunteering (worthwhile)

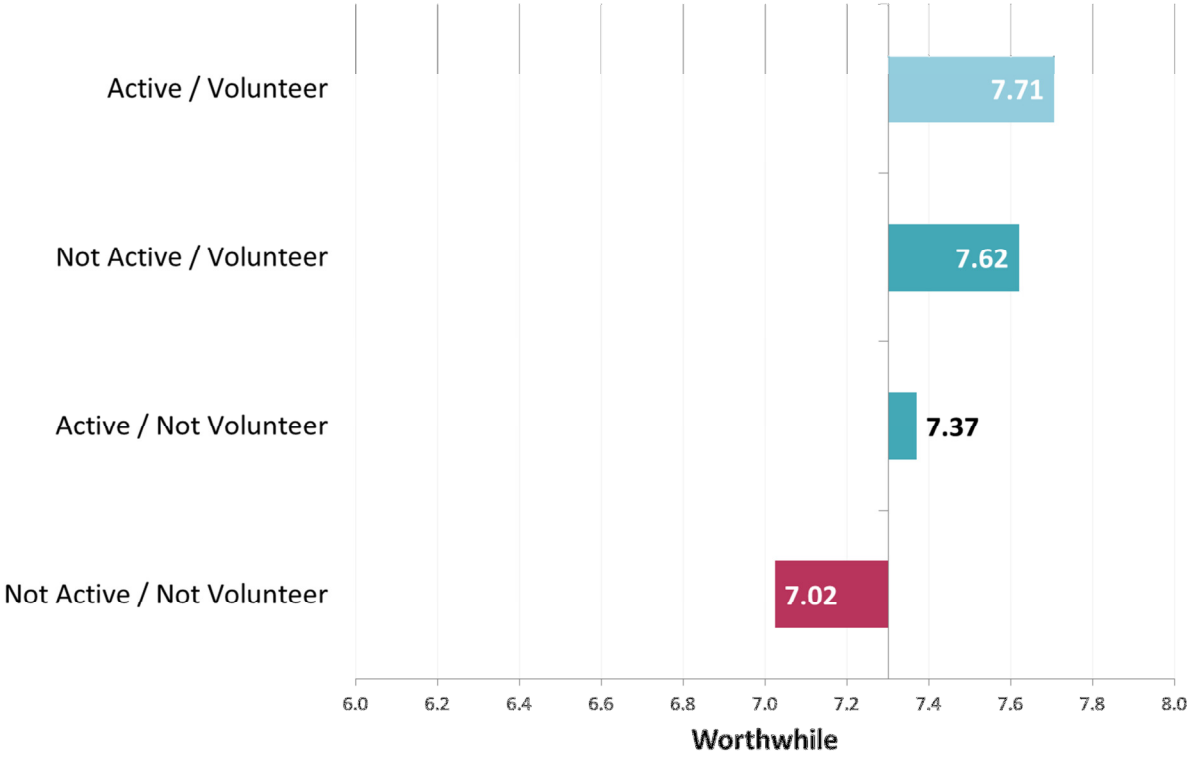
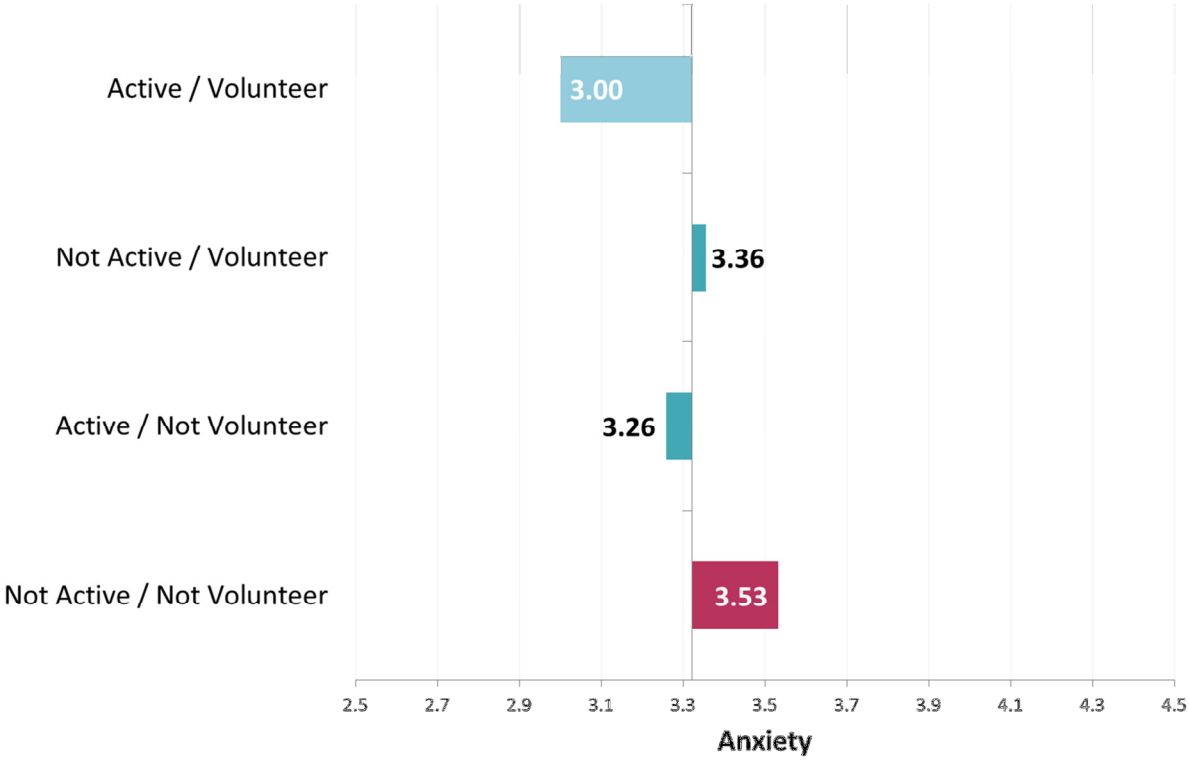


Figure 3.14d Being active and volunteering (anxiety)



3.1.4 The effect of different activities

There is some evidence to support the notion of taking part in a diverse portfolio of activities as being important to mental wellbeing outcomes. Brown et al. (2015) used data from Understanding Society to establish associations between participation in cultural leisure activities and life satisfaction, and also if there were differences in life satisfaction levels between type of leisure activity, number of activities undertaken, or frequency of participation. Results showed an independent and positive association of participation in sport, heritage and active-creative leisure activities and life satisfaction. It was found that high life satisfaction was associated with engaging in a number of different activities rather than the frequency of participation in each of them. This view is supported by our analysis of the Active Lives Survey data as shown in Figure 3.15.

In all cases we find that taking part in a variety of sport and other activities has the highest score, followed by sport only, other activities only, and finally non-participants. It is only non-participants in any of the six activities who have a score that is below the average. Most respondents, who do a variety of sport and other activities, sport only or other activities only achieve 'high' scores and the below average scores for non-participants are more than 'medium' and only marginally below 'high'.

Figure 3.15a Participation in different activities (life satisfaction)

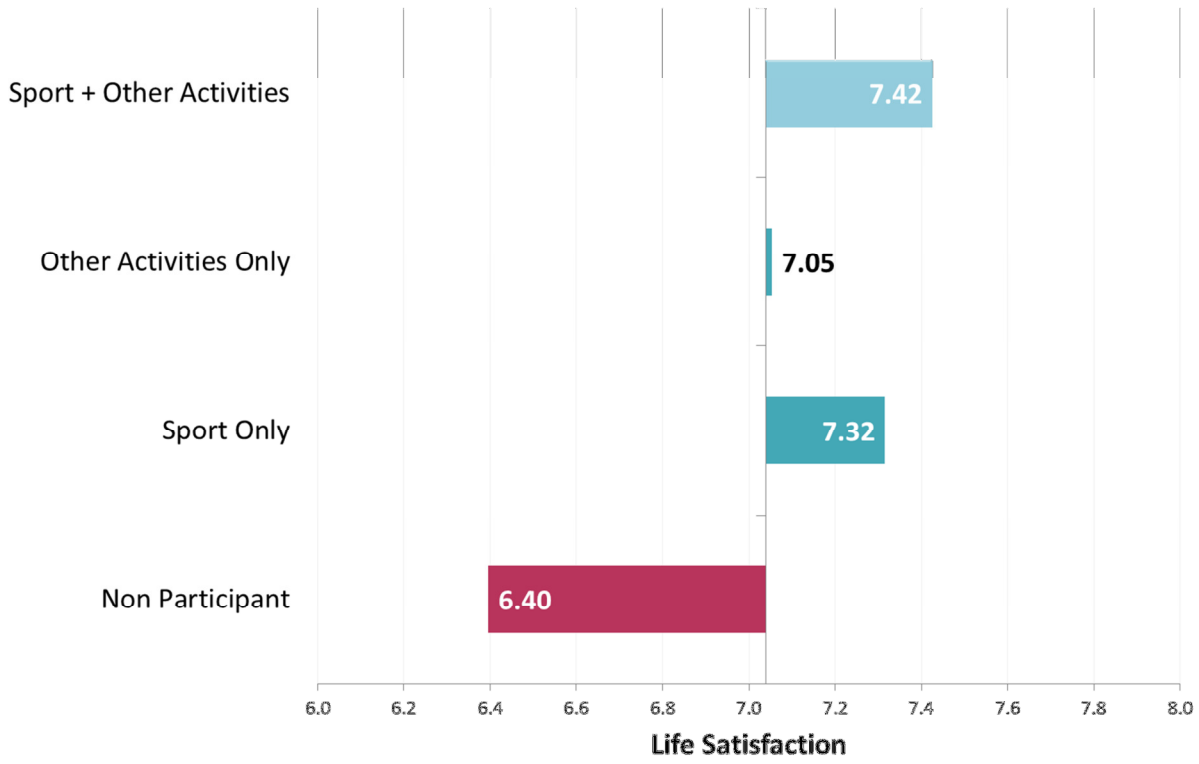


Figure 3.15b Participation in different activities (happiness)

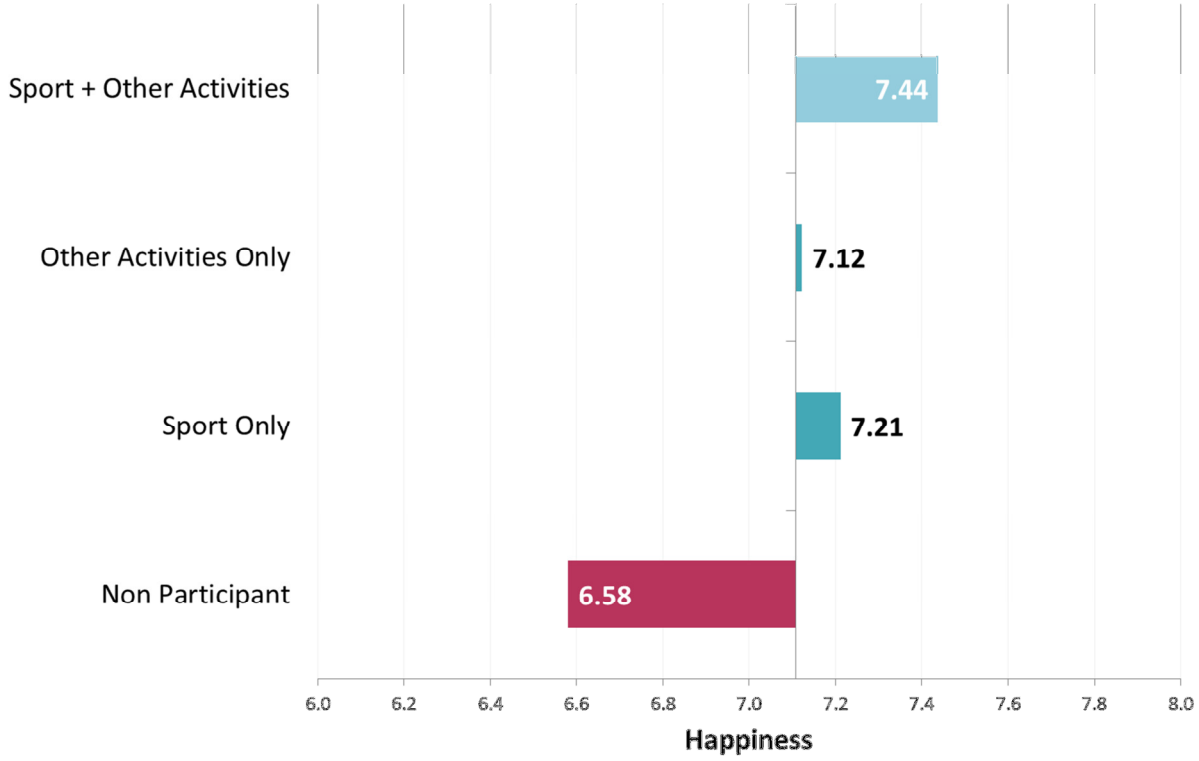


Figure 3.15c Participation in different activities (worthwhile)

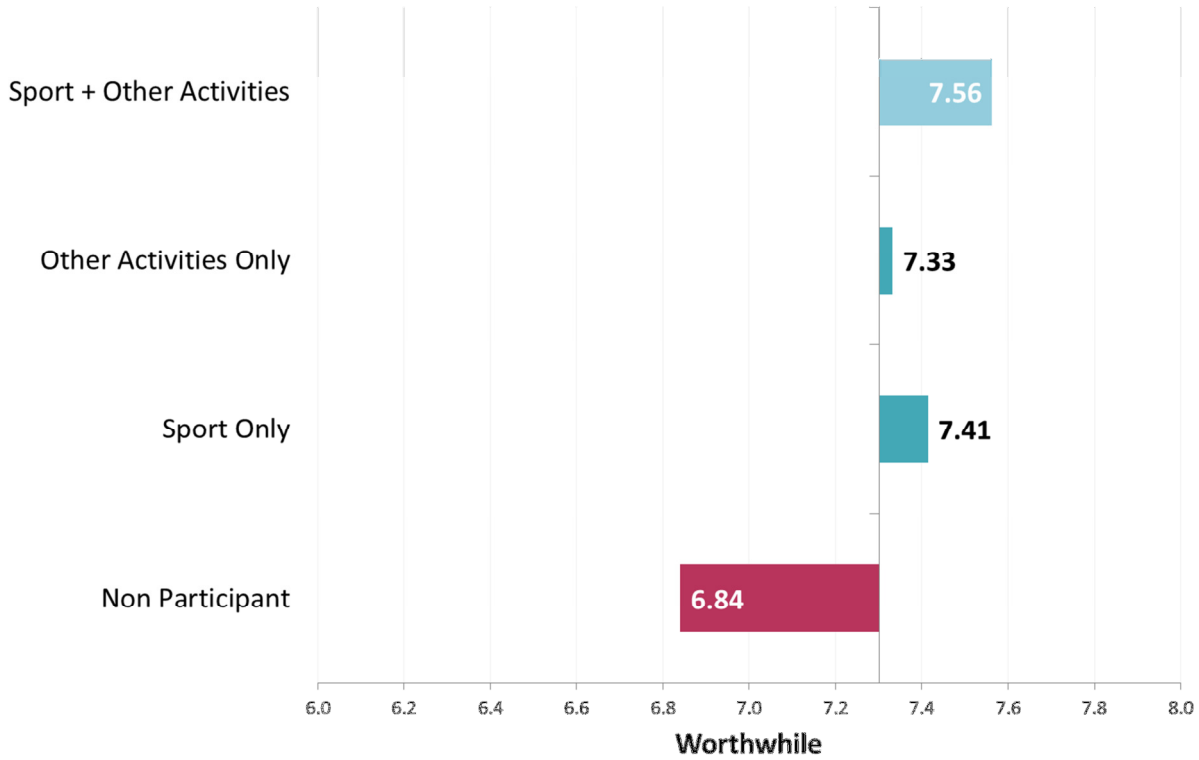
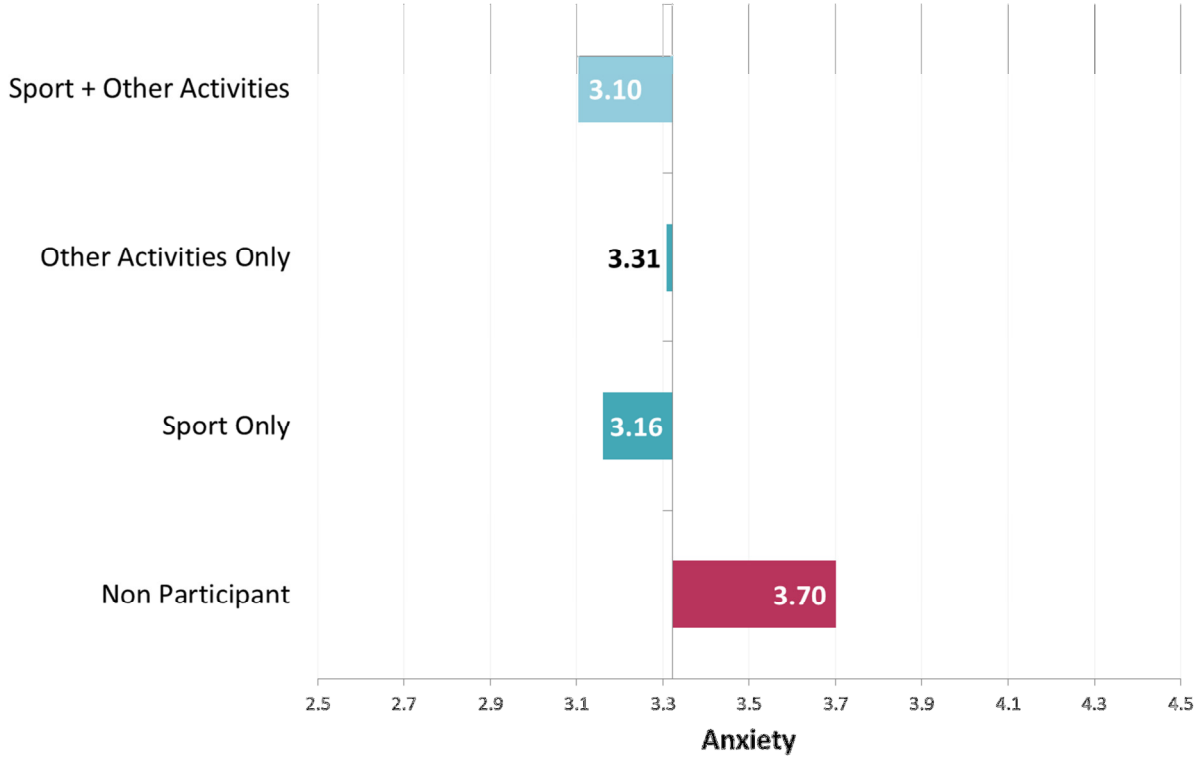


Figure 3.15d Participation in different activities (anxiety)



3.2 Regression analysis

Multivariate regression analysis was used to quantify the relationship between key predictor variables within Active Lives and a dependent (or outcome) variable. The type of regression used was logistic regression, which is used to identify factors that contribute to a result and also to give an indication of the relative strength of these factors via a measure of likelihood for each variable. An 'odds ratio' is a measure of the likelihood of an event happening to one group compared with another group.

In this study we are interested in how much more likely someone is to rate their life satisfaction, for example, as 'very high' or 'low to medium' if they are active and / or take part in various physical activities. The logistic regression examines the relationship between dependent and independent variables in isolation, and also accounts for other factors that may explain variation in scores such as demographic variables. The results therefore enable us to conclude that any relationship found is not due to other factors accounted for such as gender and age, which typically have significant impacts on the likelihood of participation. Three models were derived, one each for life satisfaction, self-efficacy and social trust as outlined below.

- **Life satisfaction**: the effect of achieving 'very high' life satisfaction against 'medium or low' (Model I); second, the effect of achieving 'high' life satisfaction against 'medium or low' (Model II); and, third; the effect of achieving 'very high' life satisfaction against 'high' (Model III).
- **Individual development (ID)**: the effect of reporting 'yes' in ID against 'no' (Model I); second, the effect of reporting 'neutral' against 'no' (Model II); and, third; the effect of reporting 'yes' against 'neutral' (Model III).
- **Social trust**: the effect of reporting 'yes' in social trust against 'no' (Model I); second, the effect of reporting 'neutral' against 'no' (Model II); and, third; the effect of reporting 'yes' against 'neutral' (Model III).

In all cases we have reported Model 1, which is the most appropriate/logical model in each case.

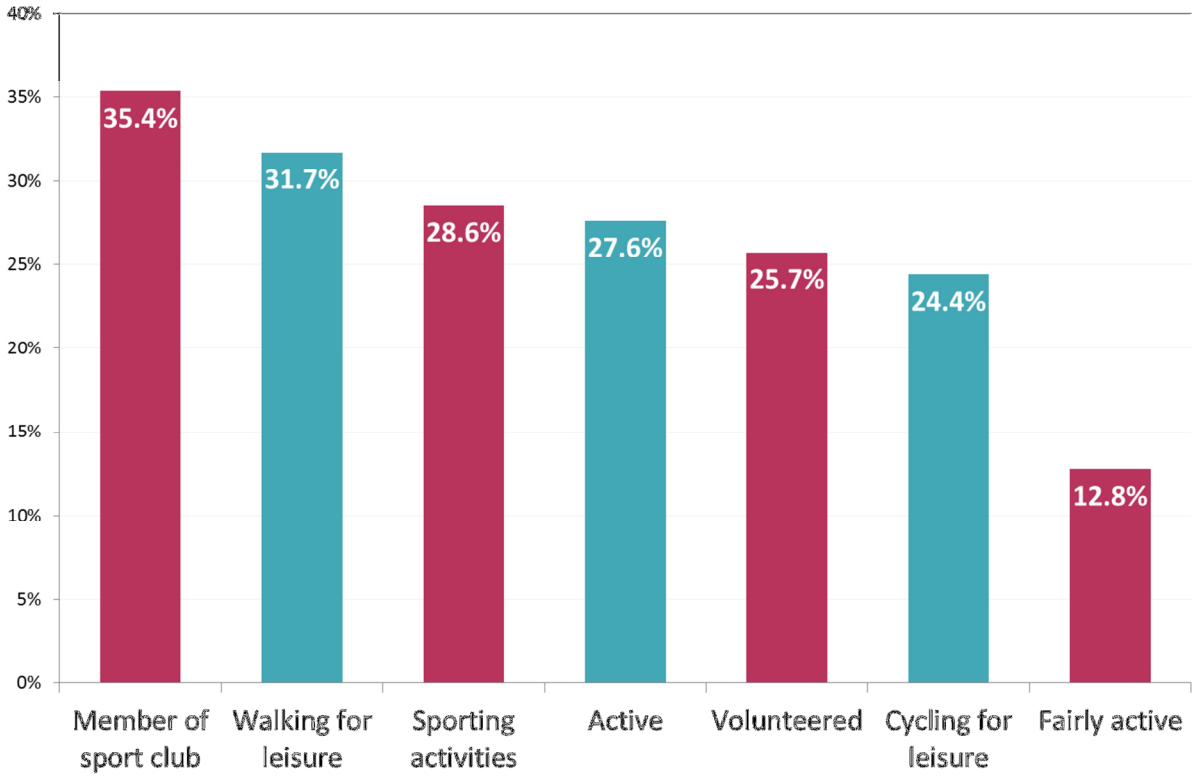
3.2.1 Model 1: Life satisfaction and club membership

The output of the life satisfaction regression is shown in Figure 3.16.

The strongest predictor of a change in life satisfaction from low or medium (0-6) to very high (9-10), was found to be being the member of a sports club. Members of a sports club were found to be 35.4% more likely to achieve very high life satisfaction than those respondents who were not members of a sports club. By contrast playing sport but not being the member of a club led to a 28.6% likelihood of achieving very high satisfaction. Other notable significant variables were: leisure walking (31.7%); being active (27.6%); and volunteering (25.7%).

The increases in likelihood of higher life satisfaction are relatively low. For example, the likelihood that the member of a sports club will not achieve a very high life satisfaction score relative to someone who is not a sports club member is around 65%. This finding reinforces the bivariate analysis which consistently showed that although there are statistically significant differences between groups, the absolute magnitude and impact in terms of changing thresholds is modest.

Figure 3.16 Engagement factors associated with having very high life satisfaction



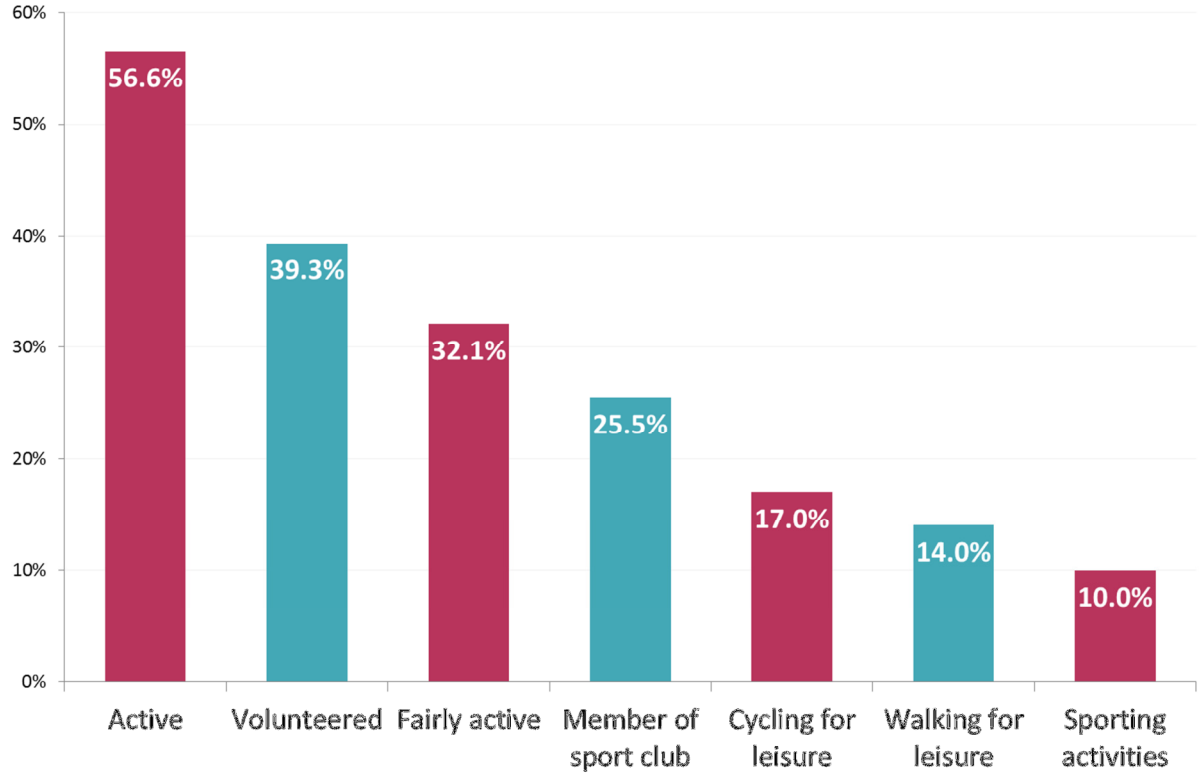
3.2.2 Model 2: Self-efficacy and sport and physical activity

The literature on the impact of sport on perceived self-efficacy is inconclusive and tends to focus on small scale interventions within the context of sport for development initiatives with disadvantaged groups. At a population level, the issues are under researched and thus our second regression model is a useful initial step in looking at the data that are available, as shown in Figure 3.17.

This was the only regression in which a predictor variable achieved a likelihood score in excess of 50% i.e. more likely than unlikely. In this case we found that being active, as defined by meeting the Chief Medical Officer's recommendation, led to a 56.6% likelihood of somebody saying they could achieve the goals they set themselves relative to somebody who was inactive. Again we need to maintain perspective on the scores. In the bivariate analysis we found that the score out of 5 for active people was 3.83 and for inactive people 3.52. In both instances the scores are between the neutral score of 3 and the agree score of

4 and therefore do not make a difference at threshold level. What this regression model is particularly useful for is reinforcing the relationship between activity and volunteering as a composite to achieve even higher perceived self-efficacy scores.

Figure 3.17 Engagement factors associated with having relatively high self-efficacy



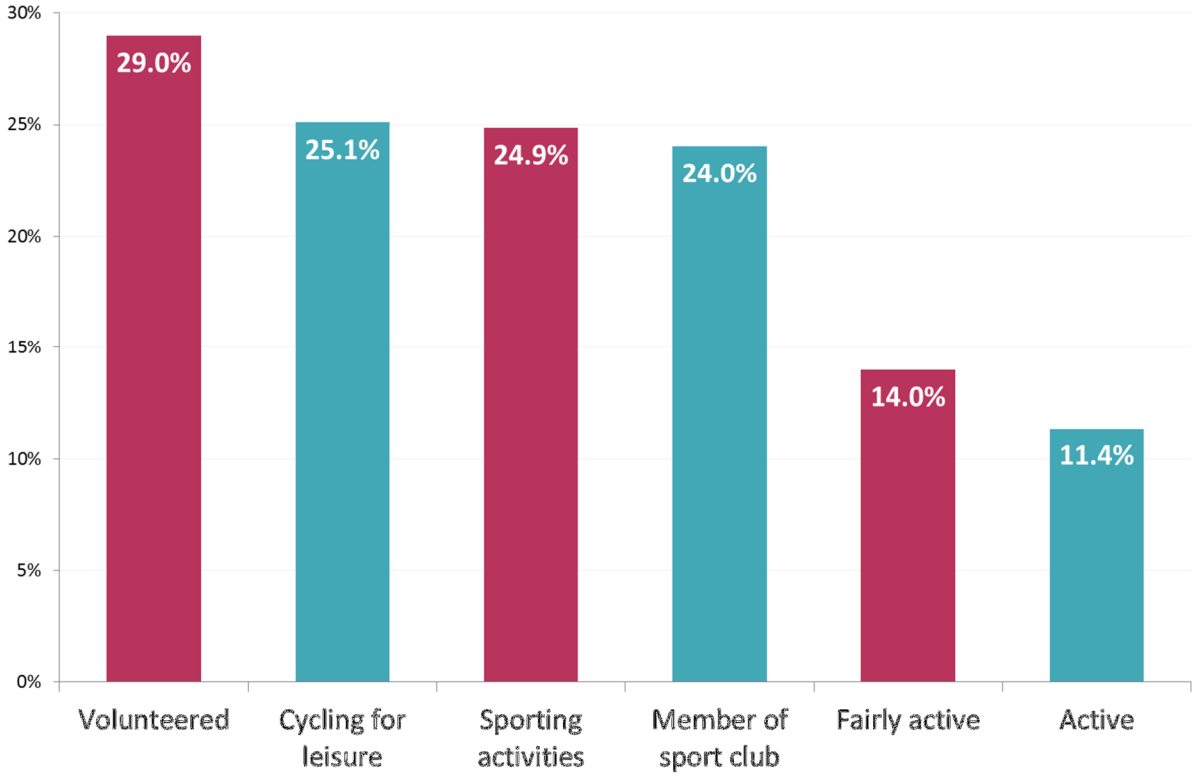
3.2.3 Model 3: Social trust and volunteering

The literature review suggested that social trust appears to be built particularly through engagement in team sports, sports events and through club membership. The literature demonstrates a potential for volunteering in sport as being important in the development of social trust, in building relationships with others, and trusting others within the community. In particular, there was some evidence that the longevity of volunteering was important, in that someone who had volunteered over a longer period of time was more likely to develop feelings of social capital due to the time needed for relationships and trust to be developed. Whilst longevity of volunteering is not included in the Active Lives Survey, using the variables that are available, we found that the strongest predictor of increasing social trust was volunteering as shown in Figure 3.18.

The bivariate analysis had highlighted the relative importance of volunteering to social trust and this is confirmed in the regression with volunteering having the highest likelihood score (29%) of people having social trust relative to non-volunteers. Looking at the results from the other end of the telescope suggests that there is a 71% chance of not increasing social trust scores by virtue of being a volunteer. Thus again the figures must be treated with

caution and not be used to over claim or to create fear amongst those who do not exhibit the desirable characteristics.

Figure 3.18 Engagement factors associated with having relatively high social trust



3.3 Summary

The analysis thus far has focused mainly on presenting the results of the analysis in their own right and in relation to the existing literature. In the next section we take a more holistic view of the results in terms of what they mean; their limitations; their position in a wider context; and where the research needs to go next in order to improve our understanding of the complexities of human behaviour in relation to sport and physical activity.

4. CONCLUSIONS AND RECOMMENDATIONS

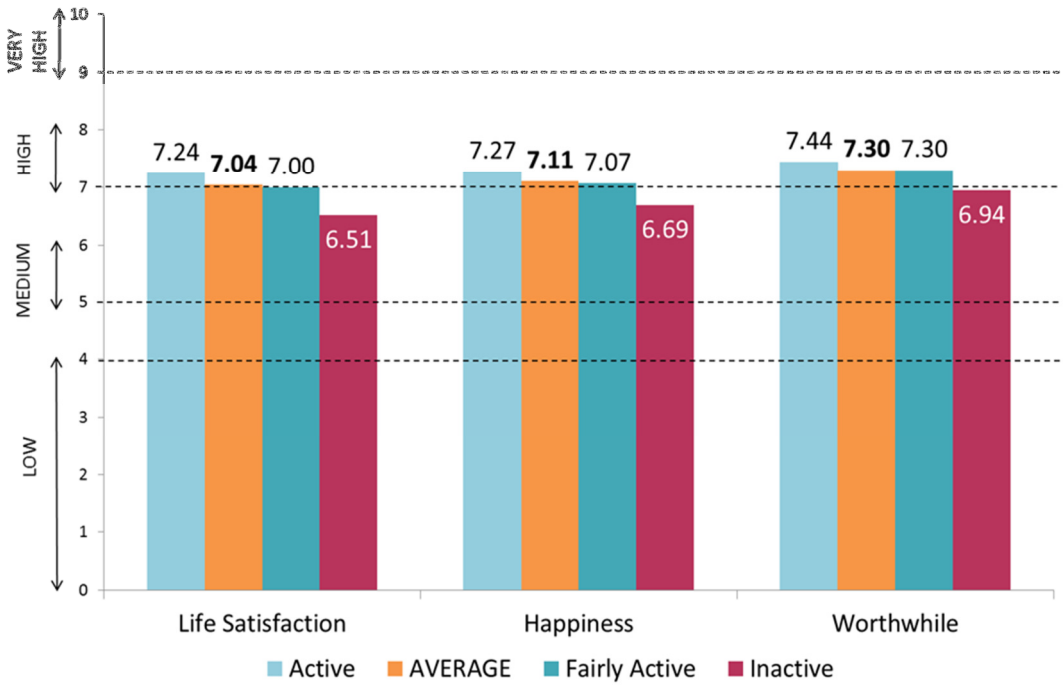
4.1 Conclusions

Our research reveals there are statistically significant associations between engagement in active participation and volunteering, and the Government strategy outcomes of mental wellbeing, individual development and social and community development. This section summarises the seven key findings from our analysis. Four of our conclusions were derived from the bivariate analysis and three from the multivariate analysis, which controlled for the influence of socio-demographic influences.

1. Being physically active is positively linked with mental wellbeing, individual development and social and community development outcomes

For those people who the Active Lives survey identifies as meeting the Chief Medical Officer's recommendation for physical activity, we find consistently higher scores than the sample average on the four mental wellbeing measures, the individual development measure, and the social and community measure. By contrast, those who are described as fairly active and inactive have scores which are below average. In all cases, our research demonstrates that there is a statistically significant difference between the scores achieved by those who are active relative to those who are fairly active; and between those who are fairly active and those who are inactive. In practical terms this means that within the thresholds of activity that we are analysing, some physical activity is good, but more is better.

Figure 4.1: Participation and mental wellbeing



Caution should however be exercised when we interpret the results, as although the differences between groups are statistically significant, it does not mean that people who are fairly active or inactive do not also score well on the various measures. In the case of life satisfaction for example, shown in Figure 4.1, the sample average is 7.04 out of 10 which meets the threshold for 'high' life satisfaction, which is 7-8. Those in the active group have a score of 7.24 which is above the average, whereas those in the fairly active and inactive groups have scores of 7.00 and 6.51 respectively. For the inactive, a score of 6.51 is below the threshold for high satisfaction and is positioned in the middle of medium 5-6 and high 7-8. The pragmatic conclusion would be that there are relative differences between the active, fairly active and inactive groups, but in most cases these differences are insufficient to bring about changes in thresholds.

2. Volunteering is also positively linked with the three outcomes areas, and particularly so with feeling worthwhile and social trust

For the 15% of the adult population who have volunteered on at least two days in the last year, we find consistently that their scores for mental wellbeing, individual development, and community development are above average. In particular, we found that volunteering has higher outcome scores for feeling that the things you do in life are worthwhile and levels of social trust. However, despite the statistically significant difference between volunteers and non-volunteers across the outcome measures, there is no difference in thresholds. People who do not volunteer still have high levels of mental wellbeing, individual development and social and community development but those who do volunteer have slightly elevated levels within the same threshold.

The findings for both participation and volunteering help us to form an objective narrative about the various measures. Adults in England generally have high levels of mental wellbeing, perceived self-efficacy and social trust. Within the notion of favourable scores across the board, the progressively more active and volunteers have slightly higher scores than the inactive and non-volunteers. However, these differences are insufficient to have an impact on overall ratings. Sport and physical activity may contribute positively to the outcome areas, but their impact should be viewed with a sense of perspective.

3. People who participate *and* volunteer in sport and physical activity generally have higher average outcome scores in all areas

Thus far we have looked at physical activity levels and volunteering in isolation. When we combine these factors to analyse the scores for people who are active and volunteer and compare them with people who are inactive and do not volunteer, we find that the differences between groups increases. For example, an active volunteer has a life satisfaction score of 7.46, whereas for an inactive non-volunteer the score is 6.56. Whilst

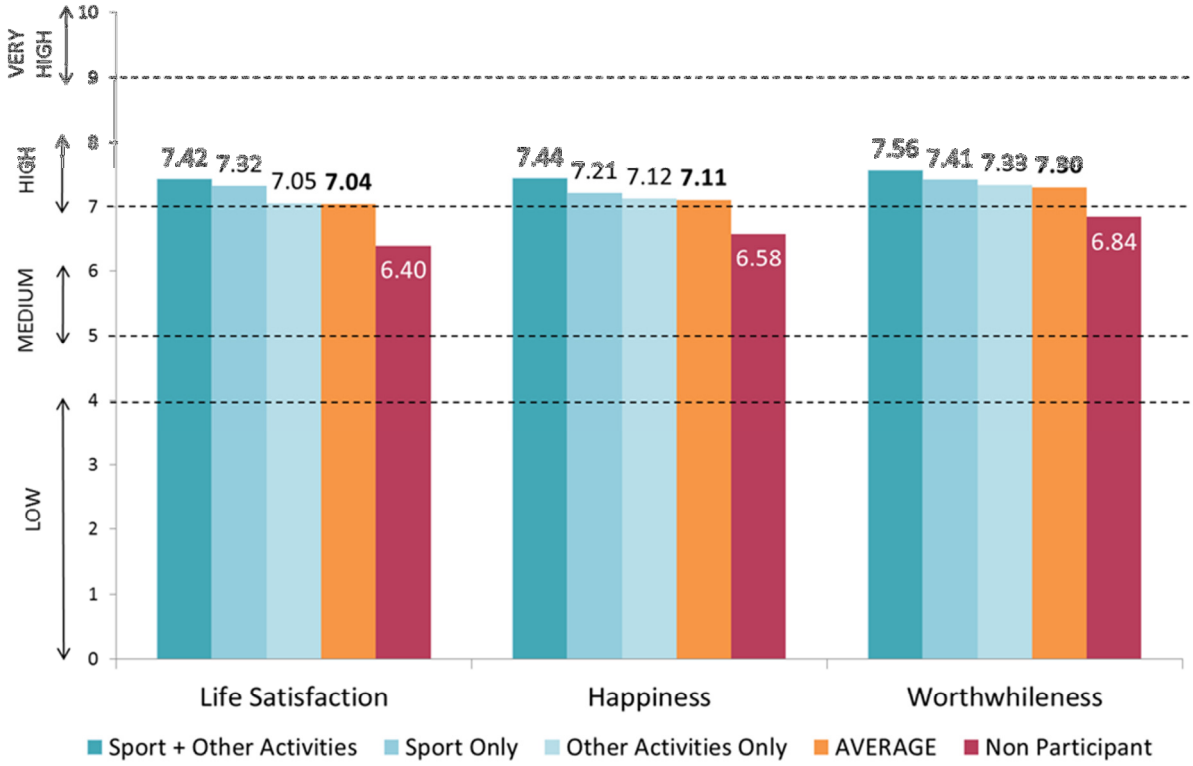
the gap between scores is 0.90, the inactive non volunteers are still closer to having high life satisfaction (7-8) than they are to having moderate life satisfaction (5-6).

The scores for these composite measures are further evidence that although activity and volunteering combined are associated with even higher scores, than inactivity and not volunteering, the differences are modest.

4. Participating in sport generates positive outcomes but a *variety* of sport and physical activities gives even higher outcome scores

The Active Lives survey collects data across six sport and physical activity types, namely: walking for leisure, active travel, sporting activities, fitness activities, cycling for leisure, and dance. We examined the relationship between different types of activities and the outcome measures. Figure 4.2 summarises the scores for the first three mental wellbeing outcomes.

Figure 4.2 Participation, mental wellbeing and activity groups



In all cases we find that taking part in a variety of sporting activities and other activities has the highest score, followed by sporting activities only, other activities only, and finally non-participants. It is only non-participants in any of the six activities who have a score that is below the average. Most respondents achieve 'high' scores and the below average scores for non-participants are more than 'medium' and only marginally below 'high'. That sporting activities plus other activities achieves the highest score enables us to conclude that whilst sporting activities and other activities on its own is good for people in the sense

that it is associated with slightly above average scores; variety, in the sense of taking part in some combination of all six sport and physical activity types is associated with even higher scores. However, again we need to note that the contrasts we are describing are variations within 'high' scores and, at the most extreme, variations between 'high' scores and 'medium' to 'high' scores.

5. Doing sport and being a member of a club means you are more likely to experience very high levels of life satisfaction

When we controlled for the influence of socio-demographic characteristics and looked at the impact of different factors in our regression analysis, our first model found that the strongest predictor of a change in life satisfaction from low or medium (0-6) to very high (9-10), was being the member of a sports club. Members of a sports club were found to be 35% more likely to report very high life satisfaction than those respondents who were not members of a sports club. By contrast playing sport but not being the member of a club led to a 29% increase in the likelihood of reporting very high life satisfaction. Other notable significant variables were: leisure walking (32%); being active (28%); and volunteering (26%).

6. Being active through sport and physical activity means you are more likely to experience a higher level of self-efficacy

Our second regression model looked at the individual development goal of 'being able to achieve most of the goals I set myself' (perceived self-efficacy). This was the only regression in which a predictor variable achieved a likelihood score in excess of 50% i.e. more likely than unlikely. In this case we found that being active, as defined by meeting the Chief Medical Officer's recommendation, led to a 57% likelihood of somebody saying they could achieve the goals they set themselves relative to somebody who was inactive. Again we need to maintain perspective on the scores. In the bivariate analysis we found that the score out of 5 for active people was 3.83 and for inactive people 3.52. In both instances the scores are between the neutral score of 3 and the agree score of 4 and therefore do not make a difference at threshold level. Other notable influences found by the regression include: volunteering (39%); being fairly active (32%); and being a member of a sports club (25%). What this regression model is particularly useful for, is reinforcing the relationship between activity and volunteering as a composite to achieve even higher perceived self-efficacy scores.

7. Volunteering contributes positively to social trust

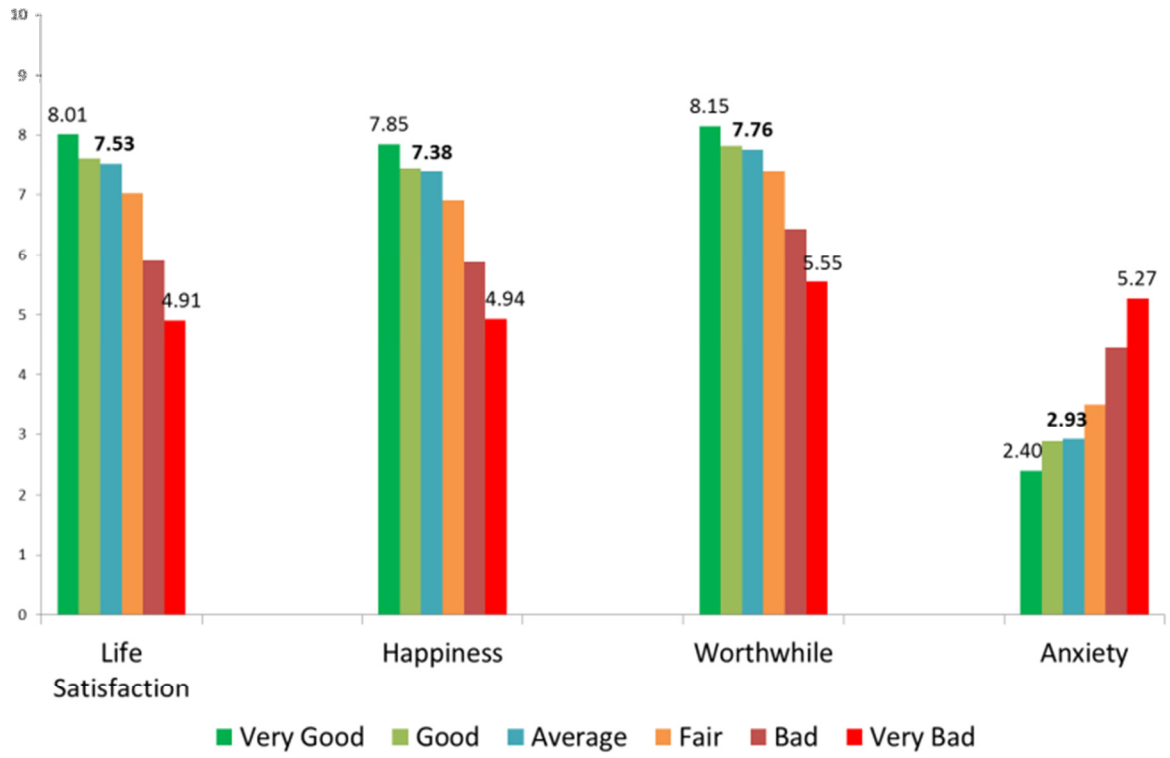
The final regression model looked at the relationship between social trust and the various types of participation and engagement. The bivariate analysis had highlighted the relative importance of volunteering to social trust and this is confirmed in the regression with volunteering having the highest likelihood score (29%) of people having social trust relative

to non-volunteers. Taking part in leisure cycling and traditional sport have likelihood ratios of 25% relative to non-participants in these activities; whereas being the member of a sports club has a likelihood of 24%.

Being pragmatic, the best conclusions we draw from this research are that participation and volunteering in sport and physical activity may be contributory factors to mental wellbeing, individual development and community development. However, the contribution appears to be modest in that it does not bring about threshold changes. Furthermore, we have only worked with the variables included within the dataset. There may well be other more important variables that contribute to the outcomes.

To put these findings into context and illustrate the point above, we looked at Office for National Statistics data via the Annual Population Survey which has been asking the four mental wellbeing questions since 2011. For the most part we found little variation in scores when broken down by demographic variables. For example, for life satisfaction the greatest variation by age was 0.64 between people aged 16-19 (7.85) and people aged 50-54 (7.21). Both of these scores be would be classified as high life satisfaction. Where we did find large differences in scores that led to threshold changes, was on a question concerned with self-reported health as shown in Figure 4.3.

Figure 4.3 Mental wellbeing and self-reported health



For a respondent who described their heath as being 'very good' there was a life satisfaction score of 8.01 which is the top end of 'high'. By contrast, somebody with self-reported health rated as 'very bad' the life satisfaction score was 4.91 which is between low (0-4) and medium (5-6). Thus people with very poor health even though they are 3.10 points lower than those with very good health, still have (to all intents and purposes) medium life satisfaction. This finding helps to put the previous findings about being active and taking part in a variety of physical activities compared with being inactive and a non-participant into a wider perspective.

4.2 Research recommendations

While modest in its findings, this research does make a contribution to knowledge in relation to engagement in sport and physical activity. As the literature has shown, evidence on mental wellbeing, individual development and social and community development is highly variable, and much of it is qualitative. This research adds credible cross-sectional analysis to the research literature and provides an informed basis from which to develop further research. Despite the modest contribution outlined above, our analysis is limited to investigating associations between engagement and mental wellbeing, individual development and social and community development, rather than causality. In order to develop the research further we make two operational and two strategic recommendations as outlined below.

4.2.1 Operational research recommendations

1. A self-reported health question consistent with that used by ONS should be included on the Active Lives Survey as it will enable further insight into the relationship between being active and Outcome 1 (physical wellbeing). Furthermore, it will be possible to assess the mediating effect of (self-reported) health on the other four Outcome areas.
2. Further analysis should be conducted on the activity levels to test if the 'some is good, more is better' relationship continues at higher levels of activity. It should be possible to increase the analysis in blocks of say 30 minutes per week. We might find for example, that in order to get to very high life satisfaction (9-10) it might be necessary to be doing 300 minutes of physical activity. Alternatively, it may be the case that no matter how much physical activity people undertake, life satisfaction scores do not exceed 8 (high). Allied to this analysis then, is the notion of diminishing returns and the point at which mental wellbeing begins to fall due to factors such as exercise addiction and predisposition to injury.

4.2.2 Strategic research recommendations

1. Further analysis of the Active Lives dataset using methods for investigating causal relationships. The matrix analysis of literature, which investigated the methodologies used to investigate other datasets, revealed that it is possible to use statistical methods to investigate causality using an 'Instrumental Variables' (IV) approach. Dolan et al (2014) and Fujiwara et al (2014) are examples of such studies that have used these methods to examine causality between participation with happiness and life satisfaction data. We recommend that similar methods are used to interrogate the Active Lives data further.
2. Analysis of longitudinal or panel data relating to the outcomes. Through our review of other datasets and audit of the variables, we know that the Taking Part Survey (post 2013) and Understanding Society (Wave 2 and Wave 5) both include relevant questions, which have been repeatedly asked to the same cohort of respondents. These data are likely to provide the best and most effective means of investigating whether participation and volunteering are the cause of people achieving better outcome scores across mental wellbeing, individual development and social and community development, or whether people with higher outcome scores are more likely to engage in sport and physical activity.

Larissa Davies, Simon Shibli, Themis Kokolakakis, Kerry Griffiths and Girish Ramchandani
13th December 2017

APPENDICES

A1: APPENDIX 1 - LITERATURE REVIEW

A1.1 Introduction

In the following sections we present the approach to and the findings of the literature review. The purpose of the literature review was to identify the current evidence available to demonstrate the association between engagement in sport and physical activity and the outcomes of mental wellbeing, individual development and social and community development, specifically in relation to the six measures of interest in Active Lives, but also including other material and discussion around the more general themes found in the literature focused on the three outcome areas. This review builds on the Sport England *Review of Evidence on the Outcomes of Sport and Physical Activity*, to include more recent material plus other material that did not feature in this review but which we deemed to be of relevance.

A1.2 Method

A pragmatic approach to searching for literature was adopted, which involved the following steps:

1. The starting point for identifying relevant literature was the Sport England review. We identified all papers included within this document that related to the three outcome areas and to the six Active Lives measures in particular.

2. A 'top-up' search of relevant literature of the latest evidence published on mental wellbeing, individual development and social and community development was conducted, published since the Sport England review was carried out (including all material published from August 2016-September 2017). We used three academic databases, SPORTDiscus, Scopus and Web of Science, to search for all relevant material, using the search terms that had been used previously in the Sport England review, in order to replicate the search during the more recent time frame.

3. In addition, any relevant literature on the outcomes that was excluded from the Sport England review, but known to Sport England or SIRC was also included. For example, in 2016 SIRC conducted a review of golf's contribution to the outcome areas on behalf of Sport England and the England Golf Partnership, and in addition, reviews undertaken by SIRC in 2017 on behalf of the Rugby Football Union and Badminton England also identified new sources of evidence that complement the Sport England review.

4. When reading the literature that was found, we scanned the bibliographies of all papers for any additional relevant literature that may have been missed in any of the above searches.

The Sport England review included papers published between 2011 and 2016. Our review has also focused predominantly on those papers published from 2011 onwards, although as part of our pragmatic approach, for the purposes of this review we have included some papers published prior to 2011 that we felt were of key importance and should not be excluded.

The following table shows the total number of papers included for each outcome area, and highlights how many of these papers were taken from the Sport England review, and how many were additional papers found through the approaches taken in steps 2-4 above. A total of 125 original papers were included across the six areas (eight papers covered more than one of the outcome areas).

Variable	Number of papers from the *Review of Evidence on the Outcomes of Sport and Physical Activity*	Additional papers	Total number of papers
Mental Wellbeing: Life Satisfaction	15	13	28
Mental Wellbeing: Happiness	2	12	14
Mental Wellbeing: Anxiety	10	11	21
Mental Wellbeing: Worthwhileness	3	8	11
Individual Development: Self-Efficacy	19	29	48
Social and Community Development: Social Trust	4	10	14

All literature to be included was collated and stored in a specially designed database. We then read all of the literature, identified the key themes within each outcome area, key demographic groups that the research related to, particular types of sport or physical activities that were referred to, and methods of engagement, i.e. participation or volunteering.

We also made an assessment of the quality of all material collected using a 'hierarchy of evidence' approach. The hierarchy of evidence recognises that evidence varies in quality and attempts to grade evidence according to its reliability and effectiveness. There is broad agreement that certain types of study (e.g. Randomised Controlled Trials (RCT)) are seen to rank above others due to a rigorous methodology. Generally, the higher up the hierarchy a methodology is ranked, the more robust it is assumed to be. However, the hierarchy is not absolute and a well conducted, extensive, cross-sectional study may provide more convincing evidence than a poor RCT. For the purposes of the review, evidence was graded as outlined in the table below, which shows the number of papers that were found within each area.

Methodology	Mental Wellbeing: Life Satisfaction	Mental Wellbeing: Happiness	Mental Wellbeing: Anxiety	Mental Wellbeing: Worthwhileness	Individual Development: Self-Efficacy	Social and Community Development: Social Trust
Systematic reviews / meta-analyses: Reviews of data that use transparent and rigorous methodology. Meta-analysis includes statistical analysis of results.	**4**	**1**	**1**	**1**	**3**	
Randomised controlled trials (RCTs): Clinical trials with clear methodology. They use randomised participants and control groups.						
Cohort study: A form of longitudinal study. Follows a group of people with a common or defined characteristic. Can be prospective or retrospective.	**1**					
Time-series study: A form of longitudinal study (not panel). Revisits a cross-sectional study or similar after a period of time has elapsed and compares the data.	**2**					
Case-control: Studies that do not use randomised participants but compare two existing groups (one is a control group).	**5**			**3**	**4**	
Cross-sectional study: Provides data on entire populations based on a sample. Collects data at a defined time.	**6**	**6**	**5**	**4**	**15**	**4**
Case study / programme / qualitative evaluations: Intensive analysis of an individual or group, or intervention. No case control. Descriptive or explanatory.	**3**	**5**	**7**	**1**	**10**	**5**
Narrative reviews: Review of literature that does not follow a clearly defined methodology.	**7**	**2**	**8**	**2**	**14**	**5**
Policy brief / expert opinion / scientific statement: Including opinions from well-respected authorities, descriptive statistics, and guidelines based on evidence.					**2**	
TOTAL No of papers	**28**	**14**	**21**	**11**	**48**	**14**

As can be seen from the table above, there was a concentration of evidence in the middle and lower areas of the hierarchy for all outcome areas, with the exception of mental wellbeing: life satisfaction, which showed more spread across the hierarchy and included four systematic reviews. The volume of evidence found is small in most areas, although much higher for individual development: self-efficacy. The findings of the literature review are summarised in the following three sections, in which we take each outcome area in turn and describe the key themes that arise in the literature.

A1.3 Mental wellbeing

For the outcome area of mental wellbeing, our literature search has focused on the following four areas measured by Active Lives:

- Life satisfaction: *'How satisfied are you with your life nowadays?'*
- Happiness: *'How happy did you feel yesterday?'*
- Anxiety: *'How anxious did you feel yesterday?'*
- Worthwhileness: *'To what extent are the things you do in your life worthwhile?'*

Before discussing the findings of our literature review, it is important to situate our findings in the context of mental wellbeing figures across the population in general. The Office for National Statistics (ONS) has recently published their latest data on personal wellbeing in the UK, for the period July 2016 to June 2017 (ONS, 2017). This data shows estimates of personal wellbeing for the UK and the countries of the UK, using all four of the above measurements. The data shows that between June 2016 to June 2017 there were statistically significant improvements in average ratings of life satisfaction, happiness, and feeling the things done in life were worthwhile, and these average ratings were at their highest level since the ONS began measuring personal wellbeing in 2011. For anxiety, however, there was no change during this period in average ratings. The average (mean) ratings across the four measures of personal wellbeing were:

- Life satisfaction: 7.7 out of 10;
- Happiness: 7.5 out of 10;
- Worthwhileness 7.9 out of 10; and
- Anxiety: 2.9 out of 10.

The report states that a number of factors may influence personal wellbeing, including employment and job satisfaction, health, the quality of relationships and financial situations. Over time, changes and differences in the four measures could be related to these factors. It was suggested that the increases in wellbeing rates may be explained through improvement in certain economic indicators, for example, the employment rate is at its highest level since comparable records began in 1971 and unemployment is at its lowest since 1975. There were also improvements in both gross domestic product per head and net national disposable income per head. However the report also notes that political uncertainty during the period studied as well as several terror attacks mean that it may come as a surprise that levels of personal wellbeing are increasing. However, it is important to note these figures are only reported at a country and national level, and are presented over the year. It is therefore possible that any sudden or individual change in personal wellbeing may not be seen in the data.

Notwithstanding the potential factors discussed by the ONS that may have an impact upon mental wellbeing, anecdotally, it is widely believed that participation in sport and physical activity can improve people's mental wellbeing, and the focus on mental wellbeing in *Sporting Futures* demonstrates the Government's recognition of the potential positive impact of sport and physical activity. In the sections below, we examine the existing evidence base around the potential influence of participation in sport and physical activity across all four of these wellbeing measures. We should note that we found a lot of crossover between these areas, and many papers which covered more than one of the measures, for example life satisfaction, happiness and worthwhileness are often grouped together in discussions. In addition, most papers do not just focus on these measures alone, and other aspects of mental wellbeing also come up in the literature, for example factors such as stress, depression, self-esteem, confidence, although there is clearly a weight of evidence in the four Active Lives measures. The Sport England review noted that there was a need to improve and standardise the definitions used within mental wellbeing and the specific outcomes being measured.

A1.3.1 Life Satisfaction

Life satisfaction is often described in the literature as one of the key determinants of subjective wellbeing, although it is not clearly defined within much of the literature that we found and, as described above, life satisfaction is often linked with happiness and worthwhileness, and these terms are often used interchangeably in the literature, in particular life satisfaction and happiness. An evidence review by Taylor et al. (2015), funded from the Culture and Sport Evidence (CASE) programme, reviewed the evidence base on the social impacts of sport and culture. The review describes that definitions of wellbeing across academic literature and public policy are wide ranging, yet within sport and exercise literature wellbeing is usually discussed in relation to individual subjective wellbeing as a key theme, and the authors describe that in economics subjective wellbeing is defined as individual life satisfaction or happiness. The studies reviewed by Taylor et al. used happiness or life satisfaction as a proxy to measure subjective wellbeing. It was noted that the quality of evidence for wellbeing in relation to other outcome areas was relatively weak with the strong use of narrative and anecdotal evidence, with the subjective perceptions of individuals playing a key role. Similarly, the results of our review as depicted in this section found a large number of papers based upon self-perceptions of life satisfaction, however we found that the quality of the evidence reviewed was mixed across the hierarchy of evidence, including six studies from narrative reviews at the bottom end of the hierarchy, to six reviews using cross sectional analysis of national data sets, two longitudinal studies, and four systematic reviews at the top end of the hierarchy. The review found 28 papers in total relating to the impact of sport and physical activity participation on life satisfaction, and we discuss the key themes in the following sections.

Life satisfaction and activity type

The Understanding Society Adult Survey (findings reported by the National Centre for Social Research – forthcoming 2017), examines a range of health and wellbeing measures, including life satisfaction. Life satisfaction is a self-rated scale in which people are asked how satisfied they are with their life overall, from 1 (completely dissatisfied) to 7 (completely satisfied). Engagement in moderate to high intensity sports showed a strong relationship with all the indicators of health and wellbeing examined and in particular the proportion of people with high life satisfaction rose from 48% to 61%.

Our review found three papers which compared the impact of sport with other types of leisure and cultural activities on life satisfaction. Leadbetter and O'Connor (2013) present an analysis of the relationship between cultural and sporting activities and quality of life measures in Scotland, looking at the Scottish Household Survey. They conclude that there is consistent evidence that people who participate in culture and sport or attend cultural places or events are more likely to report that their health is good, and they are more satisfied with their life than those who do not participate. When other factors are accounted for (such as age, economic status, income, education , disability or long standing illness), the analysis shows that participation in culture and sport remains independently and significantly associated with good health and high life satisfaction. An analysis of secondary data by Brown et al. (2015) used data from the Understanding Society Survey to establish associations between participation in cultural leisure activities and life satisfaction, and also if there were differences in life satisfaction levels between type of leisure activity, number of activities undertaken, or frequency of participation. Results showed an independent and positive association of participation in sport, heritage and active-creative leisure activities and life satisfaction but not for participation in popular entertainment, theatre hobbies and museum/galleries. The association of reading hobbies and sedentary-creative activities and life satisfaction was negative. It was found that high life satisfaction was associated with engaging in a number of different activities rather than the frequency of participation in each of them.

Finally, Schmiedeberg and Schroder (2017) also use secondary data analysis to examine the association between five different leisure activities (sports, holidays, meeting with friends, internet use, and TV viewing) and life satisfaction, using longitudinal data from three waves of the German Family Panel survey. The results indicate that meeting with friends, doing sports, and going on holiday all contribute positively to life satisfaction, whereas internet use and TV viewing were negatively related to life satisfaction.

Gender

The review found two papers which examined the differences in life satisfaction amongst men and women participating in sport and physical activity (Dolan et al., 2014; Huang and Humphries, 2012), both of which report that being active increases life satisfaction for both men and women, although found that the impact is greater for men. Dolan et al.'s (2014) study examined data from the Eurobarometer survey (2004), a public opinion survey carried out in European nations on behalf of the European Commission, in which approximately 1,000 individuals in each of 25 countries were asked to report their life satisfaction on a 1–4 scale by answering the question *'On the whole, are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with the life you lead?'* The results showed a positive correlation between participation in sport and exercise and the impact on life satisfaction for both men and women, but this was greatest for men. This was suggested to be potentially explained by lower female participation rates and popular perceptions and stereotypes around being 'sporty' for women. The second study we found around gender differences was that by Huang and Humphreys (2012), who, using the Behavioural Risk Factor Surveillance System data (BRFSS), found a positive relationship between participation in physical activity and self-reported life satisfaction. According to their results, this effect is partially mediated by an improvement in health and the overall impact is greater for men.

Age

There was a particular focus on the impact of physical activity participation on the life satisfaction of certain age groups, with the review finding four papers examining older adults, and one paper which looked at students. It should be noted that the studies found did not compare different age ranges, but offered cross-sectional analysis with participants of a certain age range. Kim et al. (2017) examine the effects of physical activity amongst older adults suffering from loneliness. Using data from the Health and Retirement Study in 2008, this study investigated how participation leads to a range of wellbeing impacts and demonstrated that physical activity involvement was a significant predictor of optimism, life satisfaction, positive affect, and psychological well-being for older adults with a high level of loneliness. The possible explanation for the results was suggested to be that participation can provide opportunities for older adults who experience loneliness to have positive and meaningful social relationships with other participants, developing emotional support and personal attachment. Similarly, Kim et al.'s earlier paper (2016) reports on the same dataset but with a focus on elderly immigrants. A total of 1708 individuals who immigrated to the US were extracted from the data for analysis, and the results showed that involvement in physical activities also impacted positively for older adult immigrants on the same four areas of optimism, life satisfaction, positive affect, and psychological well-being, as they did for the general older adult population reported in their 2017 paper. The third paper examining physical activity and wellbeing for older adults was that by Ku et al. (2017) which examined data from the 1999, 2003, and 2007 phases of the Survey of Health and Living Status of the Elderly conducted by the Taiwan Ministry of Health and Welfare on a sample of older

Taiwanese participants. Subjective wellbeing was assessed using the Life Satisfaction Index A, and which demonstrated positive effects on a variety of aspects of mental health for older adults.

Cruz Ferreira et al. (2015) evaluated the effects of creative dance on physical fitness and life satisfaction in older women. A total of 57 women, aged between 65 and 80 years old, were recruited from a health centre in Portugal and were randomized to either an experimental group or a control group. The experimental group participated in a supervised creative dance program for 24 weeks in which they did three 50 minute creative dance classes per week. Physical fitness and life satisfaction were assessed before the intervention, at 12 weeks and at the end of the 24 week intervention. At baseline before the intervention, the analysis showed no significant differences between the intervention group and the control group with regard to either physical health or life satisfaction. However after the intervention, the group participating in the intervention showed significantly better physical fitness and life satisfaction when compared with the control group. Thus it was concluded that creative dance has a positive effect on different dimensions of functioning and has the potential to contribute to healthy ageing.

In comparison to the four papers found focusing on older adults, the review found just one paper with a focus on young people (Kvintova et al., 2016), which examined the current level of life satisfaction amongst two groups of Czech University students, with the first group having an active lifestyle and the second group having a non-active lifestyle. The Life Satisfaction Questionnaire was used to determine the level of life satisfaction. The active lifestyle was represented by the level of regular physical activity that was determined using the General Physical Activity Questionnaire. Students with an active lifestyle showed a significantly higher level of overall life satisfaction when compared to students with a non-active lifestyle. This study sees life satisfaction as a multifaceted dimension, in which people may have different levels of satisfaction with different aspects of their life. Current students with an active lifestyle have a significantly higher score in most components of life satisfaction that were tested (such as satisfaction with work and employment, finance, leisure time, oneself and sexuality) than students with a non-active lifestyle, but it should be noted that no significant differences were found with satisfaction in relationships, friends and housing.

Mental illness

A literature review examining the effect of physical exercise interventions on the mental health and quality of life of people with severe mental illness (Alexandratos et al., 2012) found 16 articles depicting quantitative and qualitative research and which showed that exercise can contribute to improvements in symptoms, including mood, alertness, concentration, sleep patterns and psychotic symptoms. Exercise can also contribute to improved quality of life through social interaction, meaningful use of time, purposeful

activity and empowerment. It was suggested that future research is warranted to describe the ways in which exercise can meet the needs of this population. The review discussed two papers in particular which described specifically that there were life satisfaction impacts from exercise participation amongst people with severe mental illness. Firstly, Melamed et al. (2008), through a control group study in which participants taking part in the intervention took part in a variety of activities for a period of three months plus a review 12 months following the completion of the study. Activities included 30 minute walks five times per week with aerobic exercise via video when the weather prevented walking outdoors, as well as weekly structured nutrition counselling in small groups and group-based behaviour therapy. The results of the Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q) were compared with those of a control group and significantly better quality of life scores were found for the study group than the control group post-intervention. A smaller-scale qualitative study by Carless and Douglass (2008) involved case study research over a period of 18 months with two patients at a rehabilitation day centre in which the two patients took part in a number of group sport and exercise sessions including football, swimming, cycling, badminton, and a walking group. They found that the following outcomes were reported: patients had a sense of achievement and satisfaction; exercise provided social support networks; increased level of control over own life; improvements in interpersonal skills; constructive use of time; satisfaction from contributing to a 'team'; and mental health professionals believed that exercise contributed to recovery.

Volunteering

The review found some evidence around the links between volunteering and life satisfaction. An evidence review by Ockenden et al. (2014) brings together existing evidence on the outcomes of youth volunteering, social action and leadership and was produced to inform the evaluation and wider roll out of the 'Asda Active Sports Leaders' programme, funded by the Spirit of 2012 and Asda, which aimed to increase the numbers of teenagers getting involved as sports leaders and in volunteering to help build confidence, skills and interest in social action. Amongst other research questions, Ockenden et al.'s review sought to answer 'What are the key outcomes of participation in volunteering, social action and leadership roles for young people?' The findings highlighted the link between volunteering in sport and positive changes in wellbeing, for example citing papers such as Williams and Jacques (2015) which reports that *'compared to non-volunteers, people who volunteer in sport are considerably higher on the measures of feeling like their life has a sense as purpose, that they are doing something important, feel a sense of pride and that their life has meaning*'. The same study found that sport volunteers have 10% higher self-esteem, emotional well-being and resilience and are 15% less likely to worry.

A1.3.2 Happiness

As described earlier, we found that happiness and life satisfaction were often terms used interchangeably in the literature around wellbeing. The difference between life satisfaction

and happiness is suggested by Lera-López et al. (2017) to be that one may be satisfied with their life (for example in terms of their employment, education, housing), but this does not necessarily mean that they are happy. In the DCMS Taking Part Survey, happiness is measured through the question *'Taking all things together, how happy would you say you are?'* where 1 is 'extremely unhappy' and 10 is 'extremely happy'. Happiness is said to capture momentary wellbeing and mood and is regarded as a different measure of wellbeing to evaluative wellbeing measures, such as life satisfaction which includes a cognitive evaluation of how their life is going compared to other people, goals and previous experiences. However we found relatively few papers, in comparison to life satisfaction, which specifically had a focus on the impact of sport and physical activity participation on happiness. The review found 14 papers referring to happiness, and not only was there a smaller amount of evidence in this area in comparison to life satisfaction, but the quality of evidence was also lower, with less spread across the hierarchy of evidence, and a large concentration of papers that were either based on cross-sectional research or qualitative case study research with small numbers of people. The following sections outline the major themes found in this area.

Happiness and performance

There was some evidence in the literature around happiness as being affected by perceived performance in sport (for example, when someone performs well, wins a competition or has a good game, happiness may rate as higher, and vice versa, especially if research participants are questioned immediately following participation). SIRC's review of literature on behalf of the England Golf Partnership (2016), examined the extent of existing evidence around the impact of golf in all five of the Sport England outcome areas, and uncovered three papers which referred to the capacity of golf to impact upon mood and facilitate happiness and enjoyment. Through qualitative research involving focus groups with male and female golfers, Stenner et al., (2016) found that golf had a positive impact upon mood both during and after playing; regardless of how well or poorly someone may have played. Golf was identified as generally contributing to positive emotions and experiences. In contrast, Lane and Jarrett (2004) conducted a study with a group of 34 golfers aged over 60, and measured mood on a 32 item scale based on *The Brunel Mood Scale* and *Profile of Mood States*. Unlike Stenner et al., the results showed inconsistency of mood, with some negative mood states (anger, depression and fatigue) reported, dependent upon performance. However, golf was overall more likely to be associated with positive mood states, including happiness. Social support from peers when playing was seen as important to reducing negative moods. It should be noted that measures of mood were taken pre and post-round, and the authors point out that mood changes may occur during a round of golf, from hole to hole, dependent upon performance.

Dewar and Kavussanu (2001), consider how a person's motivations and goals may influence their emotions and consequently have an influence on mood changes. Their study involved surveying 200 male golfers to examine whether the achievement goals they set themselves were able to predict positive and negative emotions in golf. 'Achievement Goal Theory' is the theoretical framework that the authors used to understand motivation in golf. This is based on two approaches, firstly 'task involvement', in which the individual's goal is to demonstrate mastery of a task and personal improvement; and secondly, 'ego involvement', in which the individual's goal is to demonstrate ability relative to that of others. In terms of mental wellbeing, the report recommended that people follow a task orientated approach, as this may have a direct or indirect positive relationship through perceived performance, by aiming to improve or master a task when competing in sport. Thus, being in a state of task involvement while playing golf may lead one to feel happy and excited during the competition; this motivational state is also likely to lead golfers to experience less dejection during the competition. This is opposed to ego-involved athletes whose experience may depend on how they perceive their performance relative to competition.

Happiness and activity type

Two reports conducting secondary analysis of Taking Part data investigate specific activity types and the links with happiness. A DCMS report (2014) presents results of an internal analysis of Taking Part, investigating the impact of engagement with different types of sport and culture on happiness. The research shows evidence that people who:

- Have attended arts events in the last 12 months are significantly happier than those who have not, even when other factors influencing happiness are controlled for;
- Have participated in moderate intensity sport in the last 4 weeks are significantly happier than those who have not, even when other factors are controlled for; and
- Have visited a heritage site in the last 12 months are significantly happier than those who had not, even when other factors are controlled for.

In contrast, those who have visited a library in the last 12 months are significantly less happy than those who have not, even when other factors are controlled for. The reasons underlying this finding are not clear and the report calls for further research to understand this. Although it is not possible to demonstrate causality from the current analysis, the report concludes that this analysis goes a long way to making a case for the association between engagement in culture and sport and an individual’s happiness, beyond the impact of other factors.

Rascuite and Downward (2010) described that there are gaps in previous literature around the links between physical activity and active travel and the impacts upon self-reported states of subjective wellbeing, whereas in comparison the links with physical health are well

documented. To address these issues, Rascuite and Downward's analysis of Taking Part explored different types of physical activity and active travel particularly examining the impact upon health and self-reported happiness. It was found that while cycling appeared to involve some diverse effects, participation in any other type of sport, as well as walking for the purpose of health or recreation and general walking have a statistically significant and positive effect on both individual health and happiness. The authors suggest that the contrast between cycling and walking as modes of active travel may be connected with the convenience of walking. The paper suggests that if cycling is to enhance wellbeing fully, this requires further investigation of this context and possible policy to target the problems.

Age

Our review found four papers with a concentration on the impact of sport and exercise on happiness in certain age groups, two with regard to older adults, and two relating to young people. Similar to the papers described earlier in relation to age and life satisfaction, these papers do not compare different age groups, and it is therefore not possible to conclude whether certain age groups are more likely than others to experience happiness through sports participation. Based on a sample of Spanish adults between the ages of 50 and 70 years, Lera-López et al. (2017), aimed to establish the extent to which physical activity is linked to individual wellbeing through its link to perceived health. It was found that the level of total physical activity has a positive relationship with levels of happiness, and that perceived health was determined by participation in physical activity, and in turn had an impact on happiness. The results did show that this relationship varies depending on when physical activity is undertaken and the domain in which it occurs. In particular, physical activity undertaken during leisure time has a significant relationship with individual happiness. The overall results were robust to the inclusion of a range of demographic variables as control variables in the model, however it was pointed out that a more detailed analysis by different age intervals could potentially reveal differences in the mediating role played by perceived health.

Stenner et al., (2016), as discussed previously, examined reasons for and perceived benefits of golf in older adults. Focus group research with groups of regular golfers from golf clubs in Australia, aged between 55 and 74 years, showed that reasons viewed as unique to golf included a relatively low physical demand allowing play into older age, providing an opportunity to compete (due to the handicap system providing a level playing field) and providing opportunity to exercise without it feeling like exercise, pointing to the fun and enjoyment aspect. Reasons for participation were opportunities for social and community engagement, time for self and time spent with others, and benefits for physical, cognitive, and mental health. A further finding of this study was that whilst the general themes were the same, some differences in emphasis were reported by male and female participants. For the male participants, reasons related to physical fitness, competition and ‘mate-ship’ were

more highly emphasised as reasons for participation, yet for female participants although all of these aspects were important, supporting others and having a sense of belonging were emphasised more highly.

One study (Vierimaa et al., 2017) examined basketball coaches' perceptions with regard to the ways in which positive youth development is achieved through participation in a local basketball league. 12 volunteer basketball coaches from one basketball league were interviewed, for which the league's slogan was *'just for the fun of it'*. The research identified that there were a variety of outcomes of participation for young people including immediate outcomes (enjoyment), short-term outcomes (such as competence, confidence, connection, and character), and long-term developmental outcomes (for example, contribution), as well as social and contextual processes (such as activities, social relationships, and settings) which underpin these outcomes. An emphasis was made by the coaches on the importance of ensuring that youth have enjoyable, positive immediate experiences in sport, and that accumulated positive experiences result, over time, in lasting effects on athletes' development. The authors therefore argue that community sport programmes should aim to nurture competition by downplaying the outcome of sport (winning and losing) and emphasising the process of competing as a means of fostering enjoyment and building of character.

A systematic review of sport and dance participation in healthy young people (between 15 and 24 years) (Mansfield et al., 2017, on behalf of the What Works Centre for Wellbeing), examined the evidence base around the impact of sport and dance upon subjective wellbeing, finding eight relevant papers in total. It was found that depending on activity type and delivery mode, taking part is associated with wellbeing improvements connected to social connectedness, pleasure, sense of purpose, confidence, interpersonal skills, happiness, relaxation, creative skills and expression, aspiration and ambition. Taking part was also associated with negative wellbeing connected to concerns about competency and capability. In particular, evidence was found to suggest that yoga-type activities have the potential to improve subjective wellbeing, and that group-based and peer supported sport and dance programmes may promote wellbeing enhancement in youth groups. However, overall it was noted that whilst some positive findings were identified, there was a lack of evidence available. Thus whilst this does not necessarily mean that wellbeing benefits are not accrued from taking part in sport and dance, it suggests that further research is needed in order to strengthen this evidence base.

Volunteering

The 'Join In' report (Williams and Jacques, 2015) examines the social value of sports volunteering in the UK, focusing on the different benefits of volunteering to both the

volunteers themselves and to their communities that result from volunteers giving their time. An online survey was sent to three different audiences:

1. Volunteers in sport;
2. People who play sport at volunteer-run clubs, and are therefore beneficiaries of the time put in by volunteers; and
3. A control group of people who have never volunteered or been a member of a sports club.

A number of different social and economic outcomes were measured through this survey, using a range of validated instruments. Using the New Philanthropy Capital's framework to explore happiness, the results showed that, in comparison to those that have never volunteered, people who have volunteered in sport are more likely to be happy, feel that their life has a sense of purpose, that they are doing something important, feel a sense of pride, and that their life has meaning. The survey found significantly lower wellbeing scores in those who have never volunteered, and significantly higher wellbeing in long-term volunteers suggesting that duration of volunteering is important. People who have never volunteered in sport were found to be more likely to be unhappy, sad or depressed.

A1.3.3 Anxiety

As shown in the ONS data discussed earlier, for the population generally average anxiety levels have stayed consistent over the last few years with no significant change. A number of different factors may contribute to anxiety and it can manifest in different ways, and according to the NHS, *'Anxiety is a feeling of unease, such as worry or fear, that can be mild or severe'*. Anxiety is the main symptom of several conditions, including panic disorder, phobias, post-traumatic stress disorder, social anxiety disorder, and generalised anxiety disorder (GAD). GAD is a common condition, with symptoms of restlessness, worry, sleeplessness, dizziness, heart palpitations, and is estimated to affect up to 5% of the UK population (NHS, 2017).

Our review uncovered 21 papers relating to the impact of sport and physical activity participation on anxiety levels, and which mostly describe a positive impact of being active on reducing anxiety. These papers do not, however, tend to specify the type of anxiety disorder or condition, so it is not conclusive as to whether sport and physical activity has an impact on all anxiety disorders, or more mild symptoms of anxiety. The papers found in this section tend to be based on case study or qualitative research, or narrative literature reviews, thus the quality of evidence available is towards the bottom end of the hierarchy of evidence, and in addition, several of the papers found suggest that the existing evidence is inconclusive or has some methodological weaknesses. Thus although we have found some evidence to suggest a positive link between being active and reducing anxiety, this existing

evidence is not of sufficient rigour to make clear conclusions, and further research is needed to strengthen the evidence base in this area.

The evidence around anxiety

The majority of evidence found in this review relates to the potential for sport and physical activity to either reduce or cure symptoms of anxiety, as opposed to its' role in the prevention of anxiety in the first place. This does not necessarily mean that being active does not prevent anxiety, but rather that the focus of the research to date has tended to focus on those people who are already suffering from different forms of anxiety. Thus, whilst the evidence suggests that physical activity may be a way in which to treat anxiety, whether or not it can prevent anxiety is unclear.

Our review found a number of papers depicting literature reviews which found evidence to suggest a positive impact on levels of anxiety or anxiety disorders, yet some of which also highlight a lack of sufficient evidence available, in terms of either the volume of evidence or the methodological quality of the existing evidence. Stonerock et al. (2015), through a review of previous RCTs, found RCTs that suggested the benefits of physical activity for those suffering with anxiety, yet reported that many of these studies had methodological limitations including small sample sizes and inadequate assessment of fitness levels. Thus the authors conclude that exercise may be a useful treatment for anxiety, but lack of data from rigorous, methodologically sound research precludes any definitive conclusions about its effectiveness. Also, Dale et al. (2014) found that health behaviour change interventions, particularly those which focus on exercise and diet, have positive impacts on mental health and wellbeing. However it is pointed out that it is not clear which specific components of interventions are necessary or essential for improvements in mental health and wellbeing.

The C3 Collaborating for Health review (2012) which examines existing evidence on the benefits of physical activity on health and wellbeing, found that the evidence on the mental health benefits of physical activity is less well documented than for the physical health effects, however the report points out that the body of evidence is growing fast, with many studies and clinical trials having shown specific benefits including improved mood, reducing symptoms of stress, anger, depression, job burnout and alleviating anxiety. Much of the research has focused on adults, but there is evidence that among adolescents increased leisure-time physical activity (i.e. outside structured school programmes) is significantly associated with fewer depressive symptoms.

Other papers found by this review do provide some evidence around the links between being active and reduction in anxiety symptoms. Research Scotland (2017) describes that participation in one-off sessions of physical activity can result in a reduction in anxiety levels and feelings of increased wellbeing, and sport and exercise in an organised context can also

provide a social element which can help tackle feelings of isolation, often associated with poor mental health. Carless and Douglas (2008), through a qualitative study with a small sample of men accessing care at a rehabilitation centre, examined the impact of involvement in a variety of activities provided at the centre, including golf, football, badminton, tennis, swimming, walking groups, gardening, gym-based exercise, and running. The research found that the social support gained through being involved in these activities was important for people experiencing serious mental illness, and that not only do people with mental health problems benefit from receiving social support but they also can benefit from giving social support to others through shared membership of an exercise or sport group. This sharing process may be a valuable way of rebuilding a sense of community amongst people who are living with and recovering from serious mental health difficulties. Research by Mazzer and Rickwood (2015) highlights the role of coaches in providing support for young people's mental health by way of identifying concerns, facilitating help-seeking behaviour and promoting engagement in sports. Thus these papers indicate that the social support offered by both other participants and by coaches may be an important factor in addressing anxiety and other mental health problems, through reducing isolation and loneliness, and building a sense of belonging.

An evidence review conducted by the Sport and Recreation Alliance (Cox, 2012) described positive physical and mental health benefits of physical activity and in particular described evidence that physical activity is *'…a viable way to treat moderate depression and anxiety.'* The report describes physical activity as being a neglected intervention, and that there is there is currently little precedent amongst GPs and healthcare professionals to prescribe this form of treatment. A number of papers are cited which describe the positive impact of physical activity, including that of Fox (1999; 2000), who performed a review of several hundred studies on the influence of physical activity on mental wellbeing, and concluded that moderate, regular exercise is a viable way to treat depression and anxiety, and to improve mental wellbeing generally via improved mood and enhanced self-perception. He proposes four ways in which physical activity can do this:

- As a form of treatment for a mental illness or disorder;
- As a means of prevention against mental illness or disorder;
- To improve the mood of those with a mental illness; and
- To improve mood within the general population.

Papers focusing upon the ways in which physical activity and sport can treat specific forms of anxiety include a literature review by Caddick and Smith (2014) which focuses upon the subjective wellbeing of combat veterans in the aftermath of physical or psychological combat trauma. In particular, combat veterans may suffer from Post-traumatic Stress Disorder (PTSD) and Caddick and Smith found three studies which describe the impact of

various physical activities upon the symptoms of PTSD, in which two describe positive effects of physical activities (Otter and Currie, 2004; Dustin et al., 2011), yet one study (Hyer et al., 1996) showed no impact. Through a qualitative study involving focus groups with 14 male veterans, Otter and Currie (2004) found that participation in a veterans-only exercise programme once a week for 40 weeks helped them to feel more in control and to be less dependent on medication to manage symptoms. In addition, Dustin et al. (2011), through a small scale observational study with 13 veterans taking part in a four day kayaking trip, found that the trip reduced symptoms of PTSD. In particular, this was through veterans feeling engaged in a pleasant and positive activity, experiencing a 'greater engagement with the here and now', and achieving a sense of peace and relaxation; all of which led to reductions in symptoms of hyper-arousal and reliving of trauma through nightmares. In contrast, however, Hyer et al.'s (1996) analysis of the impact of a five day outward bound experience in which participants were involved in a number of outdoor activities, found no clear impact on PTSD symptoms and concluded that it performed no differently to standard clinical treatments for PTSD when symptom reduction was taken as the primary outcome of interest.

Other long-term health conditions

Our review found two papers which specifically addressed the ways in which sport and physical activity might impact upon anxiety symptoms in individuals suffering with, or recovering from, different physical health conditions. Mishra et al. (2014), through an evaluation of exercise interventions on the overall health related quality of life of cancer survivors, described that exercise programs have a beneficial effect on quality of life and most of its domains and should be integrated into the management plans for cancer survivors who have completed treatment. It was noted, however, that further research is needed to help understand the specific attributes of exercise programs that are beneficial for improving health related quality of life within and across different types of cancer. Veldhuijzen van Zanten et al. (2015) examined the barriers, facilitators and perceived benefits of regular physical activity and exercise in patients with Rheumatoid Arthritis. Whilst the primary focus of the paper is on factors influencing motivation to exercise, the review does suggest that physical activity is perceived to have a positive mental wellbeing impact for people with Rheumatoid Arthritis.

A1.3.4 Worthwhileness

The final mental wellbeing outcome area examined in this review is that of feelings of worthwhileness. As described earlier, much of the literature found in this review often grouped together the terms life satisfaction, worthwhileness and happiness, and as a result some of the papers found in this area are papers that also came up in our searches in these other two areas. We found 11 papers in total relating to worthwhileness, the smallest sample of all six measures studied in this review, and these tended to be mostly cross-

sectional studies, providing data on a sample of participants, with the exception of one systematic literature review. The small volume of papers in this area, alongside the tendency of these papers to be lower down the hierarchy, indicates that whilst sport and physical activity may have the potential to positively impact upon feelings of self-worth, more rigorous research is needed in order to fully establish the impacts.

Worthwhileness and activity type

A systematic review conducted by Lubans et al. (2012), explored evidence around the impact of physical activity programmes on social and emotional wellbeing in at-risk youth. The search identified 15 studies in this area, which reported on three different types of physical activity programmes (outdoor adventure, sport and skilled-based, and physical fitness programmes). The analysis found evidence that physical activity programmes have the potential to improve social and emotional wellbeing in at-risk youth, but more rigorous trials are needed to evaluate their effectiveness. As none of the studies included long-term follow-ups, it remained untested whether the benefits associated with participation in physical activity programmes were sustained once youth returned to their daily routines. Two papers reported by Lubans et al. which specifically appeared to demonstrate positive results around self-worth included Pommier and Witt (1995) who conducted research with young offenders aged between 13-17, taking part in an outward bound training programme, compared with a control group which continued with normal routines. The findings showed significant improvements in self-perceptions and global self-worth when assessed four weeks post the intervention. Secondly, Tester et al. (1999), through a cross-sectional study with at risk children and adolescents taking part in a programme involving basketball and other sports, measured self-esteem, including thoughts around one's own self-worth, and found 44% improvements in overall self-esteem in children, and 18% improvements in overall self-esteem in adolescents.

With a focus on the impact of badminton, Gencer and Iiham (2012) examined the self-esteem and self-perception of 56 players in the Badminton Turkey Clubs Championship in 2009, and found that scores for all the participants were high. Through a comparison with previous research around self-esteem, they came to the conclusion that national badminton athletes' self-esteem is higher than that of non-national badminton athletes. The research also showed that an athlete's attitude towards herself / himself improves as they grow older. They also found that female participants had higher self-esteem, and were more self-confident, optimistic and had a higher passion to succeed than male badminton players. Other factors tested, including education status, number of training days per week, and satisfaction levels were found to not have an effect on self-esteem and self-perception.

Physical self-perceptions and self-worth

Some studies related self-worth to feelings about one's physical appearance, finding that worthwhileness is dependent upon perceived physical attractiveness, which may in turn be developed through participation in exercise. McAuley et al. (2000), explored self-esteem amongst 174 older adults taking part in a six month exercise intervention of either walking or a stretching / toning programme, with a six month follow up. The study found that perceptions of body attractiveness and physical condition were related to changes in self-worth, which were increased in relation to frequency of activity, changes in physical fitness, body fat and physical self-efficacy. However, self-esteem declined in the six month follow up period during which participants were no longer exercising.

Liu and Li (2010) studied the impact of badminton on the physical self-perceptions and self-esteem of non-active female university students. After four months of twice-weekly badminton sessions, the participants showed significant improvements to their social physique anxiety and general self-perception and self-esteem. Patterson et al.'s (2017) research examined the physical and emotional health impacts of badminton on untrained women via a case control study in which a small group of women participated in badminton sessions for eight weeks and were compared with a running and control group. The findings also showed positive changes in women's self-perception of their appearance after completing the eight week badminton training programme. They also found that the badminton programme was effective at increasing the participants' social engagement motives to exercise compared to the control group, suggesting that playing badminton with friends increased the women's motivation to exercise, and may impact positively on the sustainability of their participation.

Schneider and Harley (2016) investigated the mental health benefits of therapeutic riding for people with disabilities in comparison to therapeutic skiing for people with disabilities. All participants completed The Beck Depression Inventory, The Beck Anxiety Inventory, and The Rosenberg Self-Esteem Scale, as well as an adjective checklist, consisting of 26 items that focused on mood, emotion, and sense of self. Open-ended interviews were conducted with a subset of riders. Both groups improved on the three psychometric measures during the course of their respective programs, however, on the adjective checklist riders felt more positive regarding the majority of items, and the interviews demonstrated that riders reported an increase in self-esteem, feeling better about themselves and a sense of accomplishment and pride for developing a skill. Although these results must be interpreted with caution, due to the exploratory nature of the checklist and the interviews, they suggest that equine activities have a positive impact for people with disabilities and may have a greater impact than other activities for some aspects of mental health.

Volunteering

Earlier, we described evidence around the impacts of volunteering on life satisfaction. With regard to worthwhileness, the same papers (Ockenden et al., 2014; Williams and Jacques, 2015) describe feelings of self-worth and positive self-perceptions as stemming from volunteering in sport. Williams and Jacques' results show that, in comparison to those individuals who have never volunteered in sport, people who do volunteer in sport:

- Have 10% higher self-esteem, emotional wellbeing and resilience;
- Are 28% more likely to feel what they do has importance; and
- Are 18% more likely to feel proud of themselves.

In addition, 87% of sports volunteers felt that their life has meaning, and 88% agreed that they had a lot to be proud of.

A1.3.5 Mental Wellbeing - summary

Our review found a number of papers demonstrating a positive association between engagement in sport and physical activity, via both participation and volunteering, and mental wellbeing. Literature focuses on a wide variety of aspects of wellbeing, including confidence, stress, depression, and self-esteem, although the four measures upon which Active Lives focuses appear to be the main areas on which there is a concentration of evidence available. The evidence base across the four variables is mixed, with a greater volume of evidence available for life satisfaction, followed by anxiety, and a much smaller number of papers relating to happiness and worthwhileness. The quality of evidence is also mixed, with a higher quality of evidence available on life satisfaction, according to our hierarchy of evidence.

The findings across the four measures demonstrate positive links in particular in the following areas:

- Mental wellbeing appears to particularly be associated with sport and physical activity participation in older adults, through both their improved physical health (for example improved balance and coordination) leading to an improved experience of ageing, and also the social relationships developed through sport helping to combat loneliness. This in turn contributed in particular to improved life satisfaction and happiness for older adults;
- There was some evidence of the contribution of sport and exercise to an improved quality of life for those suffering from mental illnesses, particularly to help aid recovery from various mental health conditions, including anxiety and PTSD;
- Links were found between participation and increasing feelings of self-worth in young people, particularly through physical activity based interventions with at-risk

youth, and also through improved physical self-perceptions leading to greater self-esteem and confidence; and

- Volunteering in sport appears to have some positive mental wellbeing impacts in particular in contributing towards life satisfaction, happiness and self-worth, through feeling what they do is important, that they are making a positive contribution, and feeling proud of themselves.

It should be noted, however, that whilst some important and significant papers were found to demonstrate some positive links between mental wellbeing and sport and physical activity, the existing evidence base is fairly low, with some of the above key findings being based on only a small number of papers. In addition, the existing research in most areas is not of sufficient rigour, often based on the subjective perceptions of individuals, through narrative and anecdotal evidence. Thus it is difficult to make clear conclusions from the literature around the full extent of the associations, and this highlights a need for further research in order to strengthen the evidence base in this area.

A1.4 Individual development

The measure used in Active Lives to assess individual development is that of self-efficacy, through the variable *'I can achieve most of the goals I set myself'*. In this section we describe the findings of our literature search for papers which examined the impact of sport and physical activity participation on self-efficacy. Of all the outcome areas examined in this review, we found the highest concentration of papers to be in this area (48 papers in total). These papers are based upon a variety of different research methodologies, however are mostly concentrated towards the middle to bottom end of the hierarchy of evidence, with the majority being based upon cross-sectional research or broader narrative reviews examining a variety of outcomes. Whilst the evidence found is positive with regard to the impact upon self-efficacy, the weak quality of the evidence means that further research would be needed to fully establish an association. The Sport England review also found a relatively large number of papers focused on self-efficacy; however it was not fully conclusive about the extent of the impact made, or the specific ways in which activity impacts on self-efficacy. It should also be noted that the term 'self-efficacy' is often used interchangeably with the terms 'self-esteem', 'confidence' and 'empowerment' in the literature. For this reason, some of the papers that we have included in this section actually make either no or very little use of the term 'self-efficacy' and instead use these alternative terms, yet upon inspection it was deemed that they were of use to this review as it was clear that self-efficacy was a concept being discussed. It is also important to point out that a number of papers had a focus predominantly on the impact of self-efficacy on sports participation or performance, as in, an individual's perception of their ability to succeed

leading to either an improved performance or an increased likelihood to participate, as opposed to examining self-efficacy as an outcome of participation.

Performance and participation

Self-efficacy has previously been defined as *'…a person's belief in his / her capacity to organise and execute the required skills to attain a specific desired outcome'* (Bandura, 1997). According to Bandura, the greater an individual's level of self-efficacy, the more likely he or she is to choose a harder task, expend a greater level of effort, and persist longer while performing. Sports psychologists have explored the idea that mental preparation strategies have a positive effect on performance - focusing on self-efficacy as an influence on sports behaviour (for example, Moritz et al., 2000; Mcauley, 1993; and Singh et al., 2009). Feltz and Lirgg (2001) identified self-efficacy as superior to all other variables (e.g. anxiety, perceived control, personal goals) when predicting sport performance.

The literature search conducted by SIRC on behalf of the England Golf Partnership (2016), found 13 papers relating to self-efficacy and golf, however most of these papers related to self-efficacy as being a determinant of golf performance, as opposed to golf participation resulting in increased self-efficacy characteristics. The papers found with a focus on golf were mostly cross-sectional studies examining the self-efficacy beliefs and golf performance of a specific group of people (such as Beattie et al., 2014), for example where experiments were conducted with groups of non-golfers, asking them their perceptions of their ability to complete a golf task using Likert scales where specific tasks are listed and respondents are asked to provide their views on their abilities. It was found consistently that those reporting greater self-efficacy prior to the task tended to go on to perform better. Research examining the factors determining self-efficacy shows that previous experience of golf is significant in developing one's confidence in their ability to succeed in a golf-related task. For non-golfers, any previous experience or knowledge of golf will be taken into account when they make their self-efficacy assumptions (Beattie et al., 2014). This was consistent also for professional golfers, as found by Valiante and Morris (2013), who undertook research with male professional golfers, interviewing 12 golfers participating in the PGA tour. The interviews explored what factors increased their self-efficacy and found that for most, drawing on specific past experiences, for example, a single clear memory of a great golf shot or a particular winning round is drawn upon to give them confidence.

In addition to these findings around self-efficacy and the impact upon performance in golf, an evidence review conducted by McPhee et al. (2016) examined the evidence base around the influences of physical activity in general on healthy ageing in older adults. Whilst the research was mostly concerned with impacts of participation on physical health, it was reported that the papers examined did show that the most consistent predictor of physical activity initiation and longer term sustainability of participation is self-efficacy (French,

2013; Koeneman et al., 2011; van Stralen et al., 2010). Another factor that was also shown to be important in the initiation of physical activity is a person's expectations that the activities will result in positive outcomes. These expectations may relate to health, social or other desired outcomes.

Mental illness and disability

The review found two papers based upon literature reviews, which examined evidence around the self-efficacy impacts of sport and physical activity participation for people suffering with mental illness and disabilities, through increasing individuals' self-confidence and self-esteem (Alexandratos et al., 2012; Caddick and Smith, 2014). Alexandratos et al. (2012) found 16 different papers published between 1998 and 2009 (including a combination of qualitative and quantitative studies) describing the effect of physical exercise interventions on the mental health and quality of life of people with severe mental illness. The results of the studies reviewed suggested that exercise could lead to improvements in quality of life in a number of different ways but including a sense of empowerment and improved self-confidence for people suffering with severe mental illness. Participants described the ways in which the exercise intervention increased their level of personal control and self-confidence. The mechanism through which this confidence improvement occurs was described as unclear from the literature. Some researchers believed that it is secondary to the effect of exercise, linked to improvements in, and control over, their own body-image (Faulkner and Sparkes 1999). Other research described the way in which improved self-confidence from the exercise intervention transferred into other domains of life (Shiner et al., 2008).

A systematic review conducted by Caddick and Smith (2014) questioned *'What is the impact of sport and physical activity on the well-being of combat veterans?'* and found 11 papers relevant to this topic. It was concluded that sport and physical activity had an impact on improving the mental wellbeing of veterans suffering with PTSD and also on individual development, with three papers found which showed a positive impact upon self-efficacy and self-esteem. Caddick and Smith discuss a paper by Dustin et al. (2011) which described a qualitative study via journal writing and observational research with 13 veterans suffering with PTSD and which demonstrated that, through a four day kayaking trip, veterans had positive impacts in terms of enhanced perceived coping skills, confidence and self-efficacy. Sporner et al.'s (2009) larger-scale quantitative study describes the results of questionnaires administered with 132 disabled veterans at the National Veterans Wheelchair Games and Winter Sports Clinic, in which participants rated overall improvements in self-esteem and quality of life, interaction with other disabled veterans, acceptance of disability, and mobility skills as important outcomes of participation. Finally, Caddick and Smith reviewed a paper by Hawkins et al., (2011) which depicts qualitative research with 10 injured combat veterans aged between 20 and 40 who were taking part in a three day military sports camp.

The camp introduced injured and disabled veterans to a range of Paralympic sports as well as to people who could assist them with participation in adapted sport. Participation in the sports camp was reported to provide a range of individual development benefits including a source of motivation, sense of competence, autonomy, general perceived health and fitness benefits, and normalisation of disability.

Our review found an additional paper (McConkey et al., 2013) which examined the impact of sports participation on self-efficacy for individuals with intellectual disabilities. McConkey et al. examined the Youth Unified Sports Programme of Special Olympics, which combines players with intellectual disabilities and those without intellectual disabilities of similar skill levels in the same sports teams for training and competition. Through individual and group interviews with participants as well as coaches, parents and other stakeholders, it was reported that the programme improved the interpersonal skills of players, through a positive development in communication skills and in physical capabilities, building bonds with other disabled children and learning from others, all of which helped to grow self-esteem, helping them to realise that they can be included, they are worthwhile and they do have capabilities.

Young people

In 2015, Chalkley et al. conducted a rapid evidence review on behalf of Public Health England, to examine the effect of physical activity participation amongst children aged 5 to 11 years. The aim was to identify relevant literature around a range of physiological, psychological, social and behavioural variables, and provide an indication of the strength of the evidence for each area. The review listed different variables under a traffic light system, by which green related to those for which there was a strong base of evidence, amber for those with either inconsistent evidence or evidence from a small number of studies, and red for variables with insufficient evidence. Self-efficacy was highlighted as amber, and it was found that there was some evidence to support the association between physical activity and self-efficacy, but this evidence only came from a small number of studies. Results from a recent review (Cataldo, 2013) showed that there is moderately strong evidence to suggest that participation in physical activity programs and interventions is associated with improved self-efficacy in children. This adds strength to an earlier review which reported that self-efficacy had 'indeterminate' relations with children's physical activity (Sallis et al., 2000).

Like Chalkley et al., our review similarly did not find an extensive evidence base in this area, but we did find five papers demonstrating a positive impact of sport and physical activity on the development of self-efficacy in young people and children. SIRC's recent literature review on behalf of the Rugby Football Union (2017) examined the impact of rugby on mental wellbeing, individual development and social and community development. In terms

of individual development, the review found two papers which highlighted the potential of rugby for developing self-efficacy in young people. In Parise et al. (2015), the effectiveness of a rugby training course was studied in a sample of 103 school pupils in Italy, 63 participating in the rugby course compared with 40 who were part of a control group and did not take part in the intervention. The results demonstrated that the rugby group had higher post-intervention scores in the following areas:

- Perceived self-efficacy in dealing with negative emotions;
- Self-efficacy in expressing positive emotions;
- Social self-efficacy;
- Empathic self-efficacy; and
- Pro-social behaviour (i.e. the degree to which adolescents show predisposition to help).

Overall, the study encourages the use of rugby union in schools as a method of enhancing self-efficacy and pro-sociality in young people by familiarising students with rugby and its culture and values. The paper argues that rugby may help young people to develop their 'own self', teaching them to mitigate their fears and insecurities, and to give their 'best' both as part of a team and as an individual. It should be pointed out that it is not clear what specific elements of the programme supported these outcomes.

The second paper discussed in our literature review on the impacts of participation in rugby was focused on a pilot study evaluating the 'On the Front Foot' project on behalf of Premiership Rugby (Scott and Cadywould, 2016). The project was designed to build character and resilience in pupils and the evaluation revealed that on average participants experienced a significant positive change in their self-reported character capabilities over the course of the programme, and this was particularly effective with secondary school pupils opposed to primary school pupils, in areas such as performance character (including grit, self-efficacy, problem solving, creativity and locus of control) and leadership and social skills (such as empathy, communication, co-operation and leadership).

Both of these rugby-based papers recommend further rugby-based education programmes to develop various character capabilities in schools. In addition, a study found in this literature review by Bignold (2013), makes the case for lifestyle sports (also known as extreme or adventure sports) to become part of the school PE curriculum. Based on an eight year ethnographic study of unicycling (riding a one wheeled cycle), as well as quantitative research in the form of questionnaires with 148 unicyclers, Bignold argues that unicycling has the potential to impact positively on certain areas of pupil development, particularly self-esteem, social skills, motivation and achievement behaviour. Bignold states that much of the research evidence to date has focused on the benefits of participation in mainstream

sports, yet such benefits can equally be applied to lifestyle sports. One major difference between mainstream sports and lifestyle sports is the extent to which lifestyle sports can focus on the individual, whereas many mainstream sports are often team orientated, and so it could be said that they have a greater potential to develop social skills. However, Bignold suggests that whereas lifestyle sports, such as unicycling, are about individual performance, it is common for the individual to practice and perform within a social group and so the development of positive social relationships and skills can still be a key outcome.

Two papers with an emphasis on sport for social change also showed positive impacts in relation to self-efficacy, particularly for disaffected youth. A qualitative study of the Positive Futures project (a sports-based intervention in England aimed at young people aged 10-19 living in areas of deprivation) by Kelly (2013), used 88 interviews in total with participating young people, project managers, operational staff, and partner agencies. The research showed that young people's participation had beneficial impacts in terms of confidence, esteem, achievement, positive relationships, and new opportunities. Secondly, Research Scotland's (2017) research into sport for change suggests that involvement in sport and physical activity can lead to developing personal skills such as self-esteem, confidence, discipline, resilience, and time-management. Through a combination of an online survey to organisations delivering sport and physical activity, telephone interviews with sport for change organisers and clubs, focus groups with wider stakeholders, and a review of literature, the research found that evidence about the outcomes in the area of personal development are often demonstrated in programme evaluations, rather than through academic research studies. Some examples of programme evaluations are provided in the report. For example, the 'Sky Sports Living for Sport' project in the UK (a free initiative for UK and Irish secondary schools offering multi-week sport projects and involving athlete mentors who worked directly with students), was independently evaluated by Chrysalis Research (2014). The evaluation found that young participants had self-reported changes in themselves since participating in the Living for Sport programme. This included that 91% of participants reported that they had improved in self-confidence and self-esteem.

Female participation and self-perception

The review found two papers with a focus on the impact of female participation on self-perceptions (Klusmann et al., 2011; Delextrat et al., 2016). Klusmann et al., describe a control group study in which 247 women aged between 70 and 93 years were randomised into one of an exercise course, an 'active control group' or a 'passive control group'. The group taking the exercise course participated in sessions of aerobic endurance, strength and flexibility training three times per week for six months. The active control group took part in a computer course with equal frequency and duration of sessions as the exercise group to control for the new activity level and for social contact. The women in the passive control group lived their life as usual. The study examined differences in changes of views on one's

ageing, finding that those women taking part in the exercise course had less ageing dissatisfaction than both control groups, and this was consistent when re-tested six months after the intervention. The paper concluded that not only does participation in exercise lead to physical and mental health benefits for older women, but it gives them positive self-perceptions and feelings of subjective wellbeing, and these promoted motivation for future activity and buffered against negative views about one's own ageing.

A paper by Delextrat et al. (2016) studied the effects of participating in Zumba on physiological and psychological outcomes in healthy women. Through a control group study, a group of women participated in Zumba three times per week for eight weeks, compared with a control group that did not participate. Cardiovascular fitness, body composition, physical self-perception and psychological well-being were assessed before and immediately after the sessions. It was found that Zumba provided significant positive changes in maximal aerobic fitness, (+3.6%), self-perception of physical strength (+16.3%), self-perception of muscular development (+18.6%), greater autonomy (+8.0%), and purpose in life (+4.4%). No significant changes were observed in the control group. The significantly greater perceived physical strength and muscular development were deemed to be important aspects in improving self-esteem and self-purpose.

A1.4.1 Individual development - summary

Our review found the highest volume of papers relating to individual development with a focus on self-efficacy, compared with all other outcome areas studied. However it must be noted that the quality of evidence available is concentrated at the lower end of the hierarchy of evidence, with mostly individual subjective perceptions of self-efficacy being reported. In addition, the literature points to a need for clearer definitions of self-efficacy, which is often used interchangeably in papers with the terms self-esteem, confidence and empowerment. Nonetheless, the following summarises the key findings made with regard to self-efficacy:

- There is a concentration of literature which focuses on the impact of self-efficacy on motivations to participate, performance in, and sustainability of sport participation, as opposed to the impact of sport participation on developing self-efficacy;
- A particular theme in the literature is around the capacity of sport and physical activity as being beneficial for people with mental illness, including cases of PTSD, as well as disabilities, in improving confidence and self-esteem;
- Several papers focused on the potential for self-efficacy benefits in young people, and gave examples of specific interventions with young people such as in schools, and sport for change interventions with at-risk youth.

A1.5 Social and community development

For the outcome area of social and community development, we have focused our literature search on the impact of sport and physical activity upon the measure of social trust, as measured in Active Lives by the variable *'Most people in my local area can be trusted'*. In this section, we describe the key themes emerging from the literature in this area, although we should note that the evidence base is small and social trust is not explicitly defined or explained through the literature. This is reflective of the findings of the Sport England review which highlights a small number of papers on civic engagement and trust, but which did not find extensive material in this area. We found a relatively small body of literature in this area (14 papers in total) compared with other outcome areas discussed in the previous sections. In addition, the papers are concentrated at the bottom end of the hierarchy of evidence, based upon either qualitative research with small numbers of participants, or broader literature reviews examining a variety of potential social outcomes, perhaps with a small mention of social trust. It is therefore difficult for us to make conclusive statements as to the exact impact of sport and physical activity on social trust. Whilst the literature we have found is positive regarding the impact of sport and physical activity in the broad area of social and community development, we found no literature with specific focus on just social trust. The literature instead focuses on social trust as just one component in building communities / social cohesion / social capital, as being a key factor in developing networks and relationships. The literature tends to list trust as one factor amongst a number of other social factors (for example, developing communication skills, team working skills, feelings of belonging), that may be developed through sport.

The role of social trust

As described above, the literature found in this area predominantly describes social trust as an element which leads to a wider range of social and community outcomes in terms of developing belonging, relationships and communities. In particular, social trust is shown to be a key component in building social capital (defined in the Oxford Dictionary as *'the networks of relationships among people who live and work in a particular society, enabling that society to function effectively'*). It is argued by Delaney and Keaney (2005) that the degree of trust placed in other people is central to social capital. Putnam's (1995, 2000) work on social capital in America described that through face to face interactions with people from a diversity of backgrounds, trust is established in society. He argues that a basic level of trust in others is essential to a functioning society, and that social organisations such as sports clubs play a key role in creating associations in which these elements can be developed. Hall (1999) examined social trust in Britain, finding that it declined in the early 1990s as a result of changing values, government policies and social integration.

A more recent governmental focus on social cohesion and social capital has emphasised the importance of bringing people together, for example the Coalition Governments 'Big

Society' programme which saw organisations such as community and sports clubs at the forefront of this effort. The Citizenship Survey (Department for Communities and Local Government, 2011) which examined 'community spirit in England' found that 75% of people felt a strong sense of belonging to their local neighbourhood and local area, but only half of people (50%) felt that many of the people in their neighbourhood could be trusted, and 38% of people were worried about being a victim of crime.

Prior to the publication of Sporting Futures, an evidence review conducted by the Sport and Recreation Alliance (Cox, 2012) brought together evidence around the impacts of sport in terms of physical health, mental health, education and employment, antisocial behaviour and crime, and social cohesion. The evidence found around social cohesion showed that a number of factors made up social cohesion, including employment, health, income, education and housing, which facilitate good relationships, social order and positive interactions between and within communities, offering support and trust.

In the following sections we describe the key themes found in the literature which include some mention of the development of social trust, although for all papers this is part of a discussion around social trust as one part of some of the much broader concepts outlined.

Team sports and club membership

It is pointed out by Delaney and Keaney (2005) that not all types of sport have the same effect, for example, going for a run alone is unlikely to create the same social capital as joining a running club and going running with a group of people. Thus the papers found in this area focus much more on the positive impact of participation in team sports, membership of clubs, and at team building events. Schulenkorf and Edwards's (2012) research looked at the impact of a children's multisport event weekend in Sri Lanka, which had a focus on integrative team sport activities. The research was qualitative, involving two focus groups and 35 interviews with event stakeholders and organisers. It was found that the event had the potential to create a range of social impacts, including intercommunity communication, sustainable relationships, and to improve image of communities. Interviewees believed small-scale events had proven to unite people successfully, through a team building effect, interaction and the cooperation required to achieve common objectives.

Through an analysis of data from a large number of existing statistical studies, Delaney and Keaney examine the extent of sporting participation and level of social capital in the UK, and compare this with other European countries. The data demonstrates that participation in sport and social capital are linked. There are very strong correlations between a nations' level of sports membership and the levels of social trust and well-being, indicating that those countries with higher levels of membership in sports groups among their citizens also

have higher levels of social trust. Individuals who are involved in sports organisations were more likely than non-members to be politically engaged, to meet socially with friends, and to have higher levels of trust in civil institutions. Sports members were also more likely to express the view that immigration enriched the cultural life of the nation. The authors argue that the links between participation in sport and social and political trust and levels of social engagement therefore suggests that sport could be a useful tool for building up community networks and relationships.

Young people and sport for change

Two papers focus on young people, specifically in outdoor physical activity programmes, which incorporate team building activities, and describe a variety of skills developed, of which trust is one factor - developed through working closely in a team with others (Armour and Sandford, 2013; Acton and Carter, 2016). Armour and Sandford (2013) examined the impact of an outdoor programme aimed at disaffected or disengaged youth. During the five year lifetime of the intervention, approximately 750 young people participated. Activity sessions took place at venues in and around London as well as at two national Outward Bound centres. The research took the form of a combination of participant observation, focus groups, interviews with mentors and staff, and reflective journals and surveys. Many of the skills identified by pupils related to their connections or interactions with others including trust, team work and communication. This reflected the social nature of the group activities in which they took part. Similarly, Acton and Carter's (2016) smaller-scale study with eight young carers, aged between 9 and 13, examined the effects of an activities programme which took place in local woodlands on emotional literacy and wellbeing. Activities included fire making, cooking, building shelters, looking at nature and team games and activities performed in pairs or larger groups. Activities aimed to focus on team building and developing trust. Using the Emotional Literacy Checklist (Southampton Psychology Service, 2003) as a measure to assess emotional literacy parameters which included psychological, emotional, social, physical and natural connections, the wellbeing indicators most frequently mentioned by the young carers included feeling *'safe and supported within and through social relationships'* and *'connecting with others through shared beliefs and outlook'*. Feeling *'safe and supported within and through social relationships'* was important for children who often felt insecure and uncertain, and they expressed feelings of being accepted and liking working together as a team.

Research Scotland's (2017) research into sport for change examines the existing evidence base for the impact of sport for change, the current sport for change landscape in Scotland, and the future sport for change landscape in Scotland, through a combination of an online survey to organisations delivering sport and physical activity, telephone interviews with sport for change organisers and clubs, focus groups with wider stakeholders, and a review of literature. Amongst other outcome areas, one of the themes that was examined was that of

community development. Building social capital, connectedness and sense of belonging were the key outcomes that were found. The research noted the role for sport and physical activity in:

- Providing a safe and neutral space to meet and interact especially for young people for whom territoriality can be an issue;
- Building a sense of belonging through neighbourhood participation;
- Helping people from different backgrounds get to know each other and dispel 'myths'; and
- Building social capital through involvement in volunteering and leadership roles.

Volunteering

The literature review found a small but significant body of evidence around the impacts of volunteering for social and community development, including social trust. The Research Scotland (2017) work described that volunteering can play an important role in creating new networks and relationships, bringing together people from diverse backgrounds who might not otherwise have met.

In order to measure the impact of sports volunteering on communities, the 'Join In' Report (Williams and Jacques, 2015) used the Revised Sense of Community Index (SCI-2), a quantitative measure of sense of community in the social sciences. The findings showed that, compared to those that don't volunteer, volunteers in sport were significantly more likely to feel the following:

- Good about their community;
- Like they have influence in their community;
- Like their needs are met; and
- That it is important to be part of their community.

These social benefits were also felt by those that did not volunteer but were members of a sports club, but not as significantly as by those who volunteered in sport. Compared to those who have never volunteered in sport, people who have volunteered in sport were four times more likely to report that *'I trust others in my community'*. The findings suggest that volunteering in sport can be an effective way for people to alleviate the symptoms of major societal problems including isolation and loneliness. In addition, the research found that the longer someone volunteers for, the greater the impacts, and that these benefits seem to endure even after someone stops volunteering.

In addition, two other papers also describe the length of time volunteering to be important. Harvey et al.'s (2007) research with Canadian sports volunteers found long term

involvement was related to social capital, and this was described as being due to relationships needing time to develop and accumulate. Kay and Bradbury (2009) found that the greater benefits were seen with higher levels of volunteer involvement of 100 hours or more and also with diverse volunteer involvement at a number of venues or a number of different activities. Qualitative research supported a notion of increased social connectedness from volunteering.

A1.5.1 Social and Community Development - summary

The review found a small base of evidence around the impact of sport and physical activity on the measure of social trust, with the majority of available literature based on research towards the bottom end of the hierarchy of evidence. Social trust is also described in the literature as one component in building wider outcomes of social cohesion, social capital, and building networks and communities. The following key themes were found in the literature in this area:

- Social trust appears to be built particularly through engagement in team sports, sports events, and through sports club membership, as opposed to individual sports and individual physical activities. Building relationships with other people through sports engagement was key in developing feelings of trust;
- Literature was found with a focus on the development of trust in young people through sports based interventions, especially through sport for change interventions with young and at-risk young people;
- Finally, the literature demonstrates a potential for volunteering in sport as being important in the development of social trust, in building relationships with others, and trusting others within the community. In particular, there was some evidence that the duration of volunteering was important, in that someone who had volunteered over a longer period of time was more likely to develop feelings of social capital due to the time needed for relationships and trust to be developed.

A1.6 Concluding thoughts

The previous sections outlining the findings of our literature review have demonstrated that the evidence base for the different outcome areas varies in both size and quality. Much of the evidence base is qualitative with some cross sectional or cohort studies, and a small number of systematic reviews. There is also generally a lack of definitions or clarity in the literature around the meaning of the different variables, with lots of cross-over in the literature particularly, for example, amongst the mental wellbeing measures in which life satisfaction, happiness and worthwhileness are terms often used interchangeably in the literature. It is difficult therefore to make definitive conclusions as to the extent of the

impact of engagement, and this provides a clear justification for further research to clarify the associations between the different measures and to strengthen this existing evidence base.

Despite this, the evidence that we have found in the review does demonstrate some positive links with engagement, through both being active and volunteering. There are examples of particular interventions that have had positive impacts in all areas. Little existing research is available on levels of activity / types of activity / type of volunteering, although there is some evidence to suggest that variety of activity is positive, as well as, for volunteering, the length of time someone has acted as a volunteer. A small amount of literature backs up the findings of our analysis of Active Lives that being active drives self-efficacy and volunteering appears to be a factor driving social trust. Also, a small amount of evidence shows that there are links between physical health, as developed through participation, and the other outcomes, in particular mental wellbeing and self-efficacy.

A1.7 References

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A2: APPENDIX 2 - BIVARIATE ANALYSIS

A2.1 Context

This strand of the research examines the bivariate relationships between the wellbeing and development outcomes and the measures of engagement in the Active Lives Survey. This analysis also introduces the basic demographic categories and voluntary roles. We provide an introduction to the variables of interest first and then outline the methodology and the results. All the numerical tables that relate to the results are presented at the end of the section.

A2.2 Variables

We have four types of variables: wellbeing and development outcomes, variables of engagement, activities and demographics.

(i) Wellbeing and development outcomes: These are the focus of the analysis and are divided into mental wellbeing (four measures), individual development (self-efficacy) and social and community development (social trust). Mental wellbeing includes four further variables: life satisfaction, happiness, anxiety, and worthwhileness.

The table below gives an overview of the variables used in the Active Lives Survey (ALS) together with their thresholds and scales. It is worth noting that the scales used for the self-efficacy and social trust outcome measures have been inversed in our analysis (from the way in which they have been coded originally in the ALS dataset), so that a score of 1 equals strongly disagree and a score of 5 equals strongly agree.

Table A1: Outcome Variables

Outcome Measures	Thresholds				
	Very Low	Low	Medium	High	Very High
Life Satisfaction	NA	0-4	5-6	7-8	9-10
Happiness	NA	0-4	5-6	7-8	9-10
Worthwhileness	NA	0-4	5-6	7-8	9-10
Anxiety	0-1	2-3	4-5	6-10	NA
	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
Self-efficacy	1	2	3	4	5
Social trust	1	2	3	4	5

(ii) Engagement variables: The outcomes are investigated in relation to peoples' engagement in sport and physical activity (pa). We have used the following engagement variables as illustrated in Table A2: three levels of sport and pa (Active, Fairly Active and Inactive) and two measurements of engagement in sport volunteering. Questions that are

examined include the nature of the bivariate relationship between the participation variables and the outcomes. For example, do we observe a continuous increase in life satisfaction as participation increases?

Table A2: Engagement Variables

Variable	Definition	Frequency in the sample
Inactive	Less than 30 minutes a week of sport and pa	25.6%
Fairly Active	30-149 minutes a week of sport and pa	13.8%
Active	150+ minutes a week of sport and pa	60.6%
Volunteering_12months	Sport volunteering at least twice in the last year (excluding raising funds)	15.4%
Volunteering_4weeks	Sport volunteering in the last four weeks (excluding raising funds)	9.4%

(iii) Activity variables

The outcomes are further examined in terms of the following specific activities: leisure walking, active travel, leisure cycling, creative or artistic dance, fitness activities, and traditional sporting activities. We also examine the sport club membership variable, which is only asked when people report participation in traditional sport.

It should be noted that all activities are defined with a minimum threshold of 2 sessions per 28 days. Table A3 shows that, with the sole exception of creative or artistic dance, all activities have very high frequencies in the sample ranging from 46.2% in the case of leisure walking to 14.2% in the case of leisure cycling. Creative or artistic dance has a much smaller participation rate at 1.6%.

Table A3: Activity Variables

Variable	Sample
Leisure walking	46.2%
Active Travel	38.6%
Leisure cycling	14.2%
Creative or artistic dance	1.6%
Fitness activities	27.3%
Traditional Sport	35.5%
Club membership	22.5%

(iv) Demographic variables: The outcome measures are further examined in terms of a number of demographics. These include:

- Gender
- Age (only adults are considered in the sample: a eight band category is used)
- Occupation (based on SEC categories 1-7, where SEC1, SEC6 and SEC7 stand for managerial occupations, long term unemployed and students respectively.
- Ethnicity
- Disability

A2.3 Outline of Methodology

Part of the analysis was performed using the grouped outcome variables from the survey (as shown in Table A1), which are widely used both by Sport England and ONS. Consequently, chi-square tests (which suit categorical variables) were performed to establish whether or not pairs of variables were independent or related. Such a test can show if engagement is closely related to wellbeing and development outcomes but it does not reveal the direction of the relationship. For this reason we conducted a correlation analysis between the outcomes and the engagement and activity variables. Differences in the mean scores for the outcome measures were tested for statistical significance using t-tests and one way analysis of variance (ANOVA) and appropriate post-hoc comparisons. This analysis provides a platform for the subsequent multivariate logistic regression (see Appendix 3).

A2.4 Results of chi-square tests

The chi-square test is used to establish if there is a significant relationship between two categorical variables. The null hypothesis that we test is that there is no relationship between the examined categories, in this case outcome and input (engagement and activity) variables.

Table 1 shows the results of the chi-square test between the wellbeing and development measures and the measures of engagement. At the 5% significance level all pairs of outcomes and engagement reject the null hypothesis of no relationship. Cleary there is a statistically significant association between sport engagement and all the outcomes. The higher the chi-square statistic the greater is the association.

<TABLE 1>

A similar table is constructed to illustrate the association between the outcomes and the activity variables including club membership. It can be seen that most measures of activity reject the null hypothesis of no relationship with the outcomes. There is only one insignificant relationship between 'social trust' and 'creative or artistic dance'. Nevertheless, this must be considered in the context that the participation rate in this activity corresponds

to less than 2% of the overall sample. Tables 1 and 2 show that there is a strong link between the outcome measures and engagement/activities overall.

<TABLE 2>

Table 3 provides an extra dimension by introducing the demographic variables. For example, the chi-square statistic in the top left cell (886.8) is the same as in Table 1, corresponding to the test of independence between 'life satisfaction' (appearing in the headline) and being 'active'. In the demographic columns this is situated under 'All' indicating that we consider the totality of the sample. The next cell with chi-square value 389.9 corresponds again to the relationship between 'life satisfaction' and being 'active', but this time only for men. The chi-square statistics for both men and women are smaller than the population as a whole because of the reduction of the sample in each case. For this reason to increase comprehension, we imposed a conditional colouring formatting pattern for each five cell group of outputs in each demographic category. In each five cell group a dark green colour corresponds to a strong relationship and vice versa. Insignificant relationships are marked with white empty cells.

<TABLE 3 >

The table below summarises the main results of the chi-square tests.

Table A4: Conclusions from the associations between outcomes and engagement

Life satisfaction (LS) and happiness	Across the demographic categories there are strong relationships with being 'active' and 'inactive'	The relationship between LS (and happiness) and being 'fairly active' in many demographic groups (e.g. males) is insignificant	Annual volunteering has a stronger relationship to LS (and happiness) than monthly volunteering
Anxiety and worthwhileness	A strong relationship exists with being 'active' and 'inactive' but not to the same extent as LS and happiness	The volunteering variables are more important in their associations than for LS and happiness. This is more pronounced in the case of worthwhileness	In the case of many demographics (e.g. aged 65-74) the relationship with being 'fairly active' remains insignificant
Individual development (ID)	Across the demographic categories there are strong relationships with being 'active' and being 'inactive'	Annual volunteering has a stronger relationship to ID than monthly volunteering	Associations are rejected in many 'fairly active' demographic categories
Social Trust	The predominant characteristic of this outcome is the strong association with volunteering, overall and across most demographic categories	Being 'fairly active' is insignificant in the majority of the demographic categories.	People aged 75+ do not associate social trust with being 'active'
Demographics	Young people (and students) form stronger associations between outcomes and volunteering than with being active. This is reproduced across the outcomes.	Similarly, the unemployed have stronger associations between the outcomes and volunteering than with participation.	People with a disability do not show strong associations between social trust and volunteering. Their social trust is associated better with being 'active'.

The Table above underlines a strong association between mental wellbeing and being active or inactive and between social trust and volunteering. The same interpretation is provided by the correlation analysis - see below.

A2.5 Results of correlation analysis

The advantage of a correlation analysis over the chi-square tests is that it can assign positive and negative associations between variables. We conducted both parametric and non-parametric correlations, which produced comparable results.

Table 4 presents the correlation coefficients between outcomes and measures of engagement (such as being active or volunteering). The only insignificant correlations appear between the being 'fairly active' and the outcomes related to 'worthwhileness' and

'social trust'. In the vast majority of cases there is agreement between the two tests. The added value of the correlations is the positive or negative sign attached to the coefficients. Table 4 shows that being active and volunteering have a positive relationship with all the outcomes. On the other hand being inactive (and sometimes 'fairly active') has a negative relationship with all the outcomes. This links participation and volunteering, in a positive way, with the mental wellbeing measures, self-efficacy and social trust.

< Table 4>

The activity variables are examined in Table 5.

<Table 5>

As in the case of chi-square tests the relationship between 'creative dance' and 'social trust' remains insignificant. A further insignificant pairing in the correlation test is between 'social trust' and 'active travel'. Finally, the correlation analysis considers the associations across the spectrum of demographic characteristics.

<Table 6>

As before, a conditional colouring pattern has been applied with the only difference that the red colour is used for negative relationships. Blank cells indicate insignificant associations. The major points that were noted in the case of chi-square tests are reproduced in the correlations. Note however that with only a few exceptions all negative correlations appear primarily in the case of the 'inactive' group and, to a lesser extent in the 'fairly active' group. In general all 'active' adults and volunteers have a positive association with the outcomes. As before, the associations of volunteering with social trust and worthwhileness are particularly strong. Volunteering also features very prominently in the associations of young people, students and the unemployed. However the latter show insignificant correlations between engagement and worthwhileness or social trust.

The final aspect to consider is in Table 7, a correlation table linking participation in specific activities with the outcomes across all demographic characteristics.

<Table 7>

In general activities are associated with positive outcomes. Table A5 below summarises the main trends.

Table A5: Conclusions from the associations between outcomes and activities.

Life satisfaction and happiness	Across the demographic categories there are strong positive associations between LS/ happiness and walking for leisure and traditional sport.	However, negative correlations exist in the case of walking and active travel for the youngest age category and students.	Club membership appears to have positive associations, especially in the case of life satisfaction.
Anxiety and worthwhileness	Many positive associations can be established between anxiety or worthwhileness and walking/ traditional sport. This is especially true in the case of worthwhileness.	Active travel forms many negative associations with anxiety across many demographic groups.	Anxiety forms the most unclear pattern of associations among all outcomes under considerations.
Individual development (ID)	Strong associations exist with traditional sports and club membership.	Compared to the mental wellbeing outcomes, under ID, walking for leisure is less pronounced.	Nevertheless, strong associations exist between ID and walking in the cases of the elderly and people with a disability.
Social Trust (ST)	A characteristic of this outcome is the strong positive association with club membership, across many demographic categories including people with disability	ST is not significantly associated with leisure walking in the case of young people, students, the unemployed and some ethnic minorities.	Most negative associations exist in the case of active travel.
Demographics	The strong associations of the outcomes with walking usually start in the 55+ age group.	Young people (and students) have negative or no significant associations between outcomes and walking or active travel.	As in the case of engagement, unemployment does not show significant associations between social trust and participation in activities.

The analysis so far has presented a bivariate analysis centred on the wellbeing and development outcomes. The mental wellbeing measures have strong correlations among them especially in the cases of life satisfaction and happiness (0.74). These are indicated in Table 8.

<Table 8>

Life satisfaction is also strongly linked to worthwhileness (0.622). On the other hand, anxiety behaves differently than the remaining mental wellbeing variables. Its strongest association is with happiness (0.41). Overall life satisfaction seems to have a more consistent

association with most engagement and activity variables. For this reason it was chosen for further regression modelling in the case of mental wellbeing.

A2.6 Results of ANOVA and t-tests

Having established that some outcomes are strongly correlated with forms of engagement we test if the observed increase of the means (as the amount of participation increases) is significant. One way ANOVA is required for variables such as engagement giving three possibilities: inactive, fairly active and active. When however variables are binary (such as in the case of volunteering) we use a t-test to establish if there is a statistical significance in the mean difference of outcomes. Such tests are particularly interesting when there is a 'grading' of the grouping variable as in the case of inactivity/fairly active/active. An important question to answer is about the level of association with outcomes when engagement becomes more intense. Hence, this part of the analysis is focused on descriptive statistics coupled with tests of significance for differences between outcome means.

Table 9 presents the mean scores of being 'active' compared with 'fairly active' and 'inactive'. Similarly, the mean scores of the volunteers are compared with non-volunteers.
The one way ANOVA test is used to test if the observed differences are statistically significant in the case of the Active/Fairly Active/Inactive category. However, in the case of volunteering a simple t test would suffice due to the binary nature of the variable.

<TABLE 9>

Table 10 presents the ANOVA test results and Table 11 the t-test on the means grouped around volunteering.

<Table 10>

The ANOVA in table 10 was preceded by a test of homogeneity to determine the best testing procedure (Games-Howell). The results show that the assumption of 'dose response' is statistically valid. In each case, as we increase the level of engagement the outcome scores increase significantly across the board. For example the mean value of life satisfaction among those who are 'active' was found to be significantly greater than the 'inactive' and the 'fairly active' (at the 5% level). The same was found to be the case when the grouping variable was volunteering (under both the annual and monthly definition).

As Table 11 indicates the mean scores are greater under volunteering than under non-volunteering. Further, as the second part of Table 11 indicates these differences are all

statistically significantly at the 1% level. These results are true for both annual and monthly definitions of volunteering.

<Table 11>

Table 12 shows that there is significant improvement as we combine active participation with volunteering. A combined variable is constructed under the four possibilities:

- No participation and no volunteering
- Only participation
- Only volunteering
- Both participation and volunteering

The first part of Table 12 shows that 51% of the sample are active participants but not volunteers, whilst only 3% of the sample are volunteers but not active participants.

Table 12 shows that the mean scores outcomes across all the outcomes are at their highest point when a person is both a participant and a volunteer. Note however that the difference between 'only participant' and 'only volunteer' is not always significant.

Table 13 introduces some characteristics of the activities considered. Table 13 shows that 45% of the participants in leisure walking also do active travel, 16% do leisure cycling etc. Considerable overlaps exist between active travel and leisure walking, leisure cycling and traditional sport, creative dance and active travel, fitness and traditional sport, and traditional sport with leisure walking.

<TABLE 13>

Table 14 introduces the mean wellbeing scores of outcomes against all the main activities. Each activity is presented in terms of frequency. For example walking can be ‘not at all’ (0), ‘once in 28 days’ (1) or ‘at least twice’ (2). In this way we can see if the outcome scores increase at the same time as frequency. Only in two activities, walking for leisure and traditional sport there is not a single reversal in the direction of increase: the more activity one does the better the outcomes become (generally greater, but in the case of anxiety smaller). In the other variables the finding are contradictory, however one has to take into account the small samples associated with observations of participating once in 28 days.

<TABLE 14>

A variable combining participation activities with traditional sport can be seen in Table 15. A similar case to Table 12 can be argued for participating in more than one activity. A combined variable is constructed under four possibilities:

- No traditional sport and no other activities
- Only traditional sport
- Only other activities
- Both traditional sport and other activities.

<TABLE 15>

Hence, there is an increase of involvement from no-participation to being engaged in both traditional sport and other activities. The mean outcome scores of this variable are reported in Table 16.

<TABLE 16>

In all cases, the most desirable outcome is obtained under participating in traditional sport and other activities, whilst the least desirable under no participation. This result indicates that a diversity of activities is beneficiary for higher outcome scores.

Table 17 tests the changes of these mean scores from one 'grade' to another. As the table illustrates, under life satisfaction and individual development all changes are statistically significant at the 5% level. However under happiness and worthwhileness outcomes, the change between 'only traditional sport' and 'only other activities' is not significant.

<TABLE 18>

Finally, Table 18 presents the mean outcomes associated with specific voluntary roles. Regular volunteers have higher average scores, which mostly are dominated by those that perform administrative and committee roles in sport organisations. This again is consistent with the existing pattern of greater average scores for more participation.

Table 1 Chi square statistics of Engagement v Outcomes

		Summary of Activity	Active 150+	Fairly Active	Inactive	Volunteering 2 x year	Volunteering 4 weeks
Life satisfaction	Chi-Square	1193.51	886.82	14.60	1106.68	362.60	244.76
	Sig.	0.00	0.00	0.00	0.00	0.00	0.00
	N	54696.28	54696.28	54696.28	54696.28	54696.28	54696.28
Happiness	Chi-Square	682.60	521.99	12.60	620.95	269.05	213.15
	Sig.	0.00	0.00	0.01	0.00	0.00	0.00
	N	54644.04	54644.04	54644.04	54644.04	54644.04	54644.04
Anxiety	Chi-Square	178.38	155.25	23.35	131.13	99.35	104.63
	Sig.	0.00	0.00	0.00	0.00	0.00	0.00
	N	54607.49	54607.49	54607.49	54607.49	54607.49	54607.49
Worthwhileness	Chi-Square	605.24	391.85	12.67	583.28	362.89	289.94
	Sig.	0.00	0.00	0.01	0.00	0.00	0.00
	N	54538.99	54538.99	54538.99	54538.99	54538.99	54538.99
Individual Development	Chi-Square	1228.75	1001.14	17.55	1094.52	441.48	249.45
	Sig.	0.00	0.00	0.00	0.00	0.00	0.00
	N	54557.37	54557.37	54557.37	54557.37	54557.37	54557.37
Social Trust	Chi-Square	190.30	151.61	6.81	166.50	269.33	215.10
	Sig.	0.00	0.00	0.03	0.00	0.00	0.00
	N	54436.45	54436.45	54436.45	54436.45	54436.45	54436.45

Table 2 Chi square statistics of Activities v Outcomes

		Walking for Leisure	Active Travel	Leisure Cycling	Creative or artistic dance	Fitness	Traditional Sport	Club member (traditional sport)
Life satisfaction	Chi-Square	927.88	135.21	250.56	52.28	354.49	1032.7	595.731
	Sig.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	N	54696	54696	54696	54696	54696	54696	54696
Happiness	Chi-Square	781.23	64.52	176.6	31.41	193.92	619.46	312.474
	Sig.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	N	54644	54644	54644	54644	54644	54644	54644
Anxiety	Chi-Square	295.94	45.5	134.56	13.02	60	159.42	88.818
	Sig.	0.000	0.008	0.000	0.040	0.000	0.000	0.000
	N	54607	54607	54607	54607	54607	54607	54607
Worthwhileness	Chi-Square	627.72	54.29	143.54	27.22	179.44	484.48	334.091
	Sig.	0.000	0.008	0.000	0.000	0.000	0.000	0.000
	N	54539	54539	54539	54539	54539	54539	54539
Individual Development	Chi-Square	277.67	184.13	382.71	33.86	441.97	958	691.990
	Sig.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	N	54557	54557	54557	54557	54557	54557	54557
Social Trust	Chi-Square	483.12	40.160	102.54	5.39	55.15	333.55	217.928
	Sig.	0.000	0.000	0.000	0.250	0.000	0.000	0.000
	N	54436	54436	54436	54436	54436	54436	54436

Table 3 Overall chi square statistics for Engagement

	ALL	MALES	FEMALES	AGE 16-24	AGE 25-34	AGE 35-44	AGE 45-54	AGE 55-64	AGE 65-74	AGE 75-84	AGE 85+	Managers	Intermediate	Small employers	lower	routine	unemployed	students	white British	other white	Asian	Black	Chinese	disability
Life satisfaction																								
Active	886.8	389.9	480.4	85.5	129.2	109.1	281.2	213.4	121.5	184.4	84.6	243.3	79.8	62.1	60.8	74.1	23.1	44.5	728.2	27.7	47.8	25.4		162.6
Fairly Active	14.6		11.2		19.2	15.7				31.8	8.4	24.8							9.7		9.3		11.7	9.0
Inactive	1106.7	456.3	642.2	97.0	220.4	88.3	353.4	236.3	132.2	218.9	70.2	246.1	133.6	57.9	71.3	94.3	16.2	53.6	903.6	29.2	47.6	34.3	13.8	227.6
Volunteer 2 x year	362.6	213.5	132.4	84.9	24.9	67.4	91.7	43.3	49.9	60.8	46.0	84.4	26.8		27.4	30.9	28.3	60.7	281.6	24.9	27.9	10.7		23.7
Volunteer x 4 weeks	244.8	144.5	86.7	55.5		41.7	62.5	37.5	34.5	54.4	56.2	68.1	18.3			24.9	27.8	37.1	208.9	17.7	8.4	12.1		40.6
Happiness																								
Active	522.0	228.3	284.7	30.6	60.0	87.1	234.8	164.5	100.8	111.2	68.5	181.2	70.9	39.1	29.6	40.1	27.1	19.3	422.2	29.3	27.2	9.2		90.4
Fairly Active	12.6	11.2				14.3						27.0							9.3				8.9	
Inactive	621.0	240.0	379.4	29.0	91.4	79.6	271.5	182.1	109.3	116.7	54.6	159.3	124.8	37.6	43.9	43.6	20.6	18.7	493.6	26.1	31.5	15.9	13.1	125.3
Volunteer 2 x year	269.1	172.0	88.6	73.9	13.5	29.6	64.4	39.8	45.2	64.5	63.4	76.7	10.3		24.5	19.3	24.6	42.2	237.5	33.3	24.8	27.7		24.8
Volunteer x 4 weeks	213.2	143.0	70.1	37.1		20.0	47.6	36.5	40.2	45.7	53.9	54.8	13.2	11.3	8.4	21.8	21.0	11.6	184.0	43.7	9.9	9.2		29.8
Anxiety																								
Active	155.3	66.3	72.3	19.7	38.7	26.2	96.7	59.2	28.9	35.5	12.5	70.2	21.7	12.0	32.0	20.0		18.9	104.1	20.5	33.6			
Fairly Active	23.4	8.6	21.3	19.2			19.5	12.3			38.9	38.0			9.0			13.6	20.3	16.0		19.6		25.8
Inactive	131.1	53.3	78.0		45.7	19.7	82.6	37.1	23.5	40.8	23.9	41.5	19.8	8.0	17.5	13.8	10.0		85.7		25.8			14.8
Volunteer 2 x year	99.4	55.5	25.9	57.8	17.3	12.7	32.7	9.2		29.5	13.3	31.5			11.3	37.4	17.5	38.7	67.9	19.7	14.5	9.6		
Volunteer x 4 weeks	104.6	58.8	30.3	30.6	9.3	21.0	24.5	15.9		57.0	13.3	23.1	14.0		10.7	21.3		20.4	85.7	19.9				
Worthwhileness																								
Active	391.9	176.2	217.2	25.0	52.1	78.2	181.3	135.4	92.1	58.2	86.3	123.6	32.5	60.7	22.2	22.6	8.2		323.3	14.2	12.7	21.2	11.0	59.2
Fairly Active	12.7	24.8	11.6		11.2	15.1	16.5			14.9	21.5			9.1	10.9	13.9			16.1					10.3
Inactive	583.3	229.2	358.6	35.7	109.4	68.5	242.8	148.1	120.2	92.7	87.2	146.7	59.4	64.0	32.3	46.0	8.2	16.7	501.9	19.6	24.1	19.6	12.0	94.8
Volunteer 2 x year	362.9	227.5	162.2	105.3	9.0	43.4	125.8	78.8	65.1	29.2	54.0	116.0	17.9	17.5		31.7	23.3	53.2	313.1	29.4	26.4	12.2	10.7	75.4
Volunteer x 4 weeks	289.9	208.1	100.0	52.1		30.2	78.4	72.4	57.5	15.7	58.0	108.0	19.2	21.7		28.6		15.7	256.9	26.5	9.2	9.6	9.9	54.0
Individual Development																								
Active	1001.1	450.4	514.2	39.1	115.2	96.8	245.2	206.9	156.5	78.9	23.7	224.1	88.8	46.5	56.9	94.4	22.5		882.1	36.9	18.9	14.5	11.2	163.0
Fairly Active	17.6	14.3			7.7	16.8		8.2		19.9	24.0	31.0	7.0		10.4				19.4					
Inactive	1094.5	456.3	633.7	38.6	111.1	79.0	294.1	202.7	156.3	132.5	54.1	181.1	76.1	64.9	45.4	95.8	28.7	12.0	968.6	45.7	33.0	7.3	22.8	197.9
Volunteer 2 x year	441.5	209.6	183.0	153.6	31.3	44.4	75.2	21.3	64.8	79.3	12.7	63.4	8.6	12.9	13.6	41.2	34.7	88.8	360.8	9.6	41.2			82.3
Volunteer x 4 weeks	249.5	135.9	82.0	68.3	11.7	40.7	31.3	15.9	54.9	54.9	9.9	33.9	11.4	7.4	7.4	21.2	14.9	31.9	203.3	7.6	22.5			31.7
Social Trust																								
Active	151.6	116.3	49.0	28.6	32.4	78.7	92.9	129.9	40.3			75.3	25.4	27.9	7.5	23.0	7.0	19.4	98.1	25.2	9.0			28.3
Fairly Active	6.8		8.4													6.6			0.5		17.8		7.6	
Inactive	166.5	117.5	55.6	26.5	38.5	78.6	99.2	146.0	44.2	7.7		92.8	28.5	38.8		11.6		33.9	129.3	17.8			16.2	13.8
Volunteer 2 x year	269.3	145.9	113.2	49.8	47.2	34.1	95.6	46.5	13.0	20.0	8.8	54.4	35.5	8.2	14.7	52.2	16.9	47.8	190.8		38.1			16.6
Volunteer x 4 weeks	215.1	103.3	106.6	36.2	27.6	33.3	50.8	48.0	11.9	7.4		41.7	46.1	10.3	19.2	27.3	6.4	30.6	146.5		17.8	15.6		16.1

Table 4 Correlations of Engagement v Outcomes

		Summary of Activities	Active 150+	Fairly Active	Inactive	Volunteering 2 x year	Volunteering 4 weeks
Life satisfaction	Correlation	0.128**	.115**	-.010*	-.123**	.075**	.065**
	Sig.	.000	.000	.016	.000	.000	.000
	N	54696	54696	54696	54696	54696	54696
Happiness	Correlation	.104**	.094**	-.010*	-.100**	.067**	.062**
	Sig.	.000	.000	.021	.000	.000	.000
	N	54644	54644	54644	54644	54644	54644
Anxiety	Correlation	.048**	.049**	-.019**	-.040**	.037**	.041**
	Sig.	.000	.000	.000	.000	.000	.000
	N	54607	54607	54607	54607	54607	54607
Worthwhileness	Correlation	.087**	.076**	.000	-.087**	.076**	.071**
	Sig.	.000	.000	.969	.000	.000	.000
	N	54539	54539	54539	54539	54539	54539
Individual Development	Correlation	149**	.135**	-.016**	-.141**	.087**	.065**
	Sig.	.000	.000	.000	.000	.000	.000
	N	54557	54557	54557	54557	54557	54557
Social Trust	Correlation	.054**	.047**	-.002	-.052**	.067**	.061**
	Sig.	.000	.000	.569	.000	.000	.000
	N	54436	54436	54436	54436	54436	54436

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 5 Correlations of Activities v Outcomes

		Walking for Leisure	Active Travel	Leisure Cycling	Creative or artistic dance	Fitness	Traditional Sport	Club member
Life satisfaction	Correlation	.129**	.020**	.062**	.028**	.061**	.123**	.100**
	Sig.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	N	54696	54696	54696	54696	54696	54696	54696
Happiness	Correlation	.119**	.020**	.052**	.017**	.050**	.099**	.071**
	Sig.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	N	54644	54644	54644	54644	54644	54644	54644
Anxiety	Correlation	.066**	-.011**	.046**	-.011**	.022**	.051**	.036**
	Sig.	0.000	0.008	0.000	0.009	0.000	0.000	0.000
	N	54607	54607	54607	54607	54607	54607	54607
Worthwhileness	Correlation	.104**	.011**	.044**	.020**	.045**	.082**	.065**
	Sig.	0.000	0.008	0.000	0.000	0.000	0.000	0.000
	N	54539	54539	54539	54539	54539	54539	54539
Individual Development	Correlation	.071**	.058**	.081**	.018**	.088**	129**	.109**
	Sig.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	N	54557	54557	54557	54557	54557	54557	54557
Social Trust	Correlation	.093**	-0.001	.043**	0.003	.029**	.076**	.062**
	Sig.	0.000	0.885	0.000	0.500	0.000	0.000	0.000
	N	54436	54436	54436	54436	54436	54436	54436

Table 6 Overview of correlation coefficients for Engagement

	ALL	MALES	FEMALES	AGE 16-24	AGE 25-34	AGE 35-44	AGE 45-54	AGE 55-64	AGE 65-74	AGE 75-84	AGE 85+	Managers	Intermediate	Small employers	lower	routine	unemployed	students	white British	other white	Asian	Black	Chinese	disability
Life satisfaction																								
Active	0.12	0.11	0.12	0.09	0.08	0.08	0.17	0.16	0.13	0.20	0.30	0.10	0.11	0.12	0.10	0.08	0.07	0.09	0.12	0.09	0.09	0.13		0.13
Fairly Active	-0.01	-0.02		-0.02								-0.03		-0.03					-0.01					0.03
Inactive	-0.12	-0.11	-0.13	-0.09	-0.10	-0.10	-0.18	-0.17	-0.13	-0.21	-0.28	-0.10	-0.14	-0.12	-0.11	-0.08	-0.06	-0.09	-0.13	-0.08	-0.10	-0.15	-0.10	-0.15
Volunteer 2 x year	0.08	0.09	0.06	0.10	0.04	0.04	0.09	0.06	0.08	0.10	0.20	0.06	0.05		0.04	0.05	0.07	0.10	0.07	0.08	0.08	0.09	0.12	0.05
Volunteer x 4 weeks	0.07	0.07	0.05	0.07			0.08	0.06	0.06	0.11	0.19	0.06	0.04			0.05	0.06	0.06	0.07	0.06	0.04	0.07		0.07
Happiness																								
Active	0.09	0.09	0.10	0.06	0.07	0.07	0.15	0.15	0.12	0.15	0.26	0.09	0.11	0.10	0.08	0.07	0.08	0.05	0.09	0.09	0.08	0.08		0.10
Fairly Active	-0.01	-0.02					-0.02					-0.03							-0.01					
Inactive	-0.10	-0.09	-0.11	-0.06	-0.08	-0.08	-0.16	-0.15	-0.12	-0.16	-0.22	-0.08	-0.14	-0.09	-0.09	-0.07	-0.08	-0.06	-0.10	-0.09	-0.09	-0.11	-0.16	-0.12
Volunteer 2 x year	0.07	0.08	0.05	0.08	0.04	0.04	0.08	0.06	0.08	0.11	0.20	0.06	0.04		0.05	0.05	0.07	0.06	0.07	0.10	0.04		0.11	0.05
Volunteer x 4 weeks	0.06	0.07	0.05	0.06			0.07	0.07	0.07	0.10	0.18	0.05	0.05	0.05	0.04	0.04	0.09	0.04	0.07	0.09				0.06
Anxiety																								
Active	0.05	0.04	0.05	0.01	0.05	0.05	0.10	0.09	0.06	0.08	0.12	0.05	0.06	0.05	0.09	0.04	0.06		0.04	0.07				
Fairly Active	-0.02	-0.02	-0.02				-0.04	-0.04	-0.03		-0.10	-0.03			-0.04	-0.03			-0.02	-0.07		-0.10		
Inactive	-0.04	-0.04	-0.04		-0.05	-0.05	-0.08	-0.07	-0.05	-0.08		-0.03	-0.05	-0.04	-0.07	-0.02	-0.07	-0.03	-0.04					
Volunteer 2 x year	0.04	0.04	0.02	0.07	0.04	0.04	0.03	0.03	0.03	0.08		0.04	0.02		0.04	0.03	0.08	0.05	0.04	0.04		0.06		
Volunteer x 4 weeks	0.04	0.05	0.03	0.04	0.02	0.02	0.04	0.04	0.02	0.10		0.03	0.04		0.04	0.03	0.06	0.03	0.04					
Worthwhileness																								
Active	0.08	0.07	0.08	0.06	0.05	0.05	0.13	0.12	0.10	0.11	0.28	0.07	0.07	0.10	0.07	0.05			0.08	0.06	0.04	0.11		0.08
Fairly Active		-0.01									0.09	-0.02		-0.04							0.03			0.03
Inactive	-0.09	-0.07	-0.10	-0.06	-0.07	-0.07	-0.14	-0.12	-0.11	-0.12	-0.31	-0.07	-0.09	-0.09	-0.07	-0.05		-0.05	-0.09	-0.08	-0.06	-0.08		-0.10
Volunteer 2 x year	0.08	0.09	0.06	0.11	0.03	0.03	0.10	0.10	0.09	0.06	0.18	0.07	0.05	0.06	0.04	0.05		0.09	0.08	0.09	0.06			0.07
Volunteer x 4 weeks	0.07	0.09	0.06	0.08	0.03	0.03	0.09	0.09	0.09	0.05	0.18	0.07	0.06	0.07	0.04	0.05		0.05	0.08	0.09	0.03			0.08
Individual Development																								
Active	0.14	0.13	0.14	0.07	0.11	0.11	0.16	0.16	0.15	0.13	0.14	0.10	0.12	0.11	0.13	0.11	0.11		0.14	0.11	0.07	0.11	0.16	0.13
Fairly Active	-0.02	-0.02						-0.03	-0.03	0.04	0.15	-0.04	-0.03		-0.04				-0.02					
Inactive	-0.14	-0.13	-0.15	-0.07	-0.11	-0.11	-0.18	-0.16	-0.15	-0.16	-0.24	-0.09	-0.12	-0.12	-0.12	-0.11	-0.12	-0.05	-0.15	-0.12	-0.09	-0.08	-0.23	-0.15
Volunteer 2 x year	0.09	0.09	0.08	0.14	0.05	0.05	0.09	0.05	0.09	0.13	0.11	0.05	0.04	0.03	0.07	0.07	0.09	0.12	0.09	0.05	0.10			0.09
Volunteer x 4 weeks	0.07	0.07	0.05	0.09	0.03	0.03	0.05	0.04	0.08	0.11	0.09	0.04	0.04		0.05	0.05	0.08	0.07	0.07	0.05	0.07			0.06
Social Trust																								
Active	0.05	0.06	0.03	0.06	0.05	0.05	0.10	0.13	0.07	0.03	0.08	0.06	0.06	0.08	0.04	0.05		0.06	0.05	0.04				-0.04
Fairly Active																								
Inactive	-0.05	-0.07	-0.04	-0.06	-0.06	-0.06	-0.10	-0.14	-0.08	-0.04		-0.07	-0.07	-0.09		-0.04		-0.08	-0.05	-0.04			0.11	0.03
Volunteer 2 x year	0.07	0.07	0.06	0.08	0.07	0.07	0.10	0.07	0.04	0.07	0.09	0.05	0.08	0.04	0.07	0.07		0.09	0.07		0.09			
Volunteer x 4 weeks	0.06	0.06	0.06	0.06	0.05	0.05	0.07	0.08	0.04	0.04	0.07	0.04	0.09	0.05	0.08	0.05		0.07	0.06		0.07	0.12		0.03

Table 7: Overview of correlation coefficients for Activities

	ALL	MALES	FEMALES	AGE 16-24	AGE 25-34	AGE 35-44	AGE 45-54	AGE 55-64	AGE 65-74	AGE 75-84	AGE 85+	Managers	Intermediate	Small employers	lower	routine	unemployed	students	white British	other white	Asian	Black	Chinese	disability
Life satisfaction																								
Walking for Leisure	0.13	0.13	0.13	-0.03	0.05	0.07	0.12	0.14	0.16	0.23	0.29	0.12	0.13	0.16	0.10	0.09	0.05	-0.04	0.13	0.07	0.07	0.08		0.17
Active Travel	0.02	0.02	0.02	-0.03	0.02	0.04	0.04	0.04	0.04	0.10	0.09	0.02	0.03						0.02		0.05			0.03
Cycling for leisure and sport	0.06	0.06	0.06	0.09	0.07	0.09	0.10	0.08	0.06		0.13	0.05	0.08	0.09	0.08	0.05		0.08	0.06		0.07			0.03
Creative or artistic dance	0.03	0.02	0.04	0.03	0.04		0.04			0.05	0.08	0.02	0.03					0.07	0.02	0.06			0.11	
Fitness activities	0.06	0.04	0.08	0.04	0.04	0.07	0.13	0.09	0.07	0.05	0.21	0.06	0.09	0.05	0.04	0.05	-0.05	0.03	0.07	0.04		0.08		0.09
Traditional sport	0.12	0.12	0.12	0.18	0.11	0.12	0.17	0.15	0.11	0.12	0.26	0.10	0.13	0.09	0.09	0.07	0.14	0.19	0.12	0.11	0.12	0.15	0.25	0.12
Club member in traditional sport	0.10	0.11	0.08	0.14	0.08	0.09	0.11	0.09	0.09	0.11	0.13	0.08	0.09	0.07	0.07	0.07	0.10	0.13	0.09	0.07	0.06		0.13	0.09
Happiness																								
Walking for Leisure	0.12	0.12	0.12	-0.03	0.04	0.08	0.11	0.13	0.15	0.18	0.22	0.12	0.14	0.11	0.08	0.09	0.07	-0.04	0.12	0.09	0.08	0.07		0.15
Active Travel	0.02	0.02	0.02		0.03	0.03	0.03	0.04	0.05	0.06	0.12	0.03							0.02	0.04	0.05			0.02
Cycling for leisure and sport	0.05	0.05	0.05	0.08	0.07	0.07	0.09	0.07	0.03		0.15	0.04	0.06	0.11	0.05	0.05		0.07	0.05	0.06	0.04			0.04
Creative or artistic dance	0.02		0.03		0.04				0.03	0.05	0.09	0.02		0.04				0.03		0.05	0.03		0.13	
Fitness activities	0.05	0.03	0.07		0.04	0.07	0.12	0.07	0.07	0.07	0.15	0.05	0.09	0.05	0.05	0.03			0.06				0.10	0.08
Traditional sport	0.10	0.10	0.09	0.14	0.09	0.11	0.14	0.13	0.10	0.10	0.22	0.08	0.11	0.08	0.05	0.05	0.17	0.16	0.10	0.12	0.09	0.08	0.19	0.09
Club member in traditional sport	0.07	0.09	0.05	0.11	0.06	0.06	0.09	0.07	0.07	0.09		0.06	0.05	0.04	0.05	0.05	0.11	0.11	0.07	0.05	0.05			0.07
Anxiety																								
Walking for Leisure	0.07	0.07	0.07	-0.06			0.05	0.07	0.07	0.09	0.14	0.07	0.06	0.06	0.04	0.05		-0.05	0.06					0.05
Active Travel	-0.01		-0.02	-0.05				0.03	0.05	0.05						-0.03	0.05	-0.04	-0.01		-0.03			-0.02
Cycling for leisure and sport	0.05	0.04	0.04	0.07	0.07	0.04	0.07	0.06	0.05			0.04	0.05	0.08	0.06	0.05		0.07	0.04	0.05	0.04			
Creative or artistic dance	-0.01	-0.01		-0.04												-0.02		-0.05	-0.02					-0.05
Fitness activities	0.02		0.04		0.05	0.04	0.06	0.03	0.03			0.02	0.05			0.05	0.05		0.02		0.03		0.13	
Traditional sport	0.05	0.05	0.04	0.06	0.08	0.07	0.08	0.07	0.07	0.06	0.15	0.05	0.07		0.07	0.06	0.07	0.05	0.05	0.06			0.12	
Club member in traditional sport	0.04	0.04	0.02	0.06	0.05	0.04	0.08	0.05	0.03		0.15	0.04	0.05		0.07	0.05	0.11	0.05	0.04					0.04
Worthwhileness																								
Walking for Leisure	0.10	0.09	0.11			0.06	0.09	0.10	0.11	0.15	0.27	0.09	0.10	0.07	0.07	0.07			0.10	0.08	0.08	0.11	0.11	0.13
Active Travel	0.01		0.01	-0.04		0.04	0.03	0.05	0.04	0.06	0.09	0.03						-0.05	0.01					
Cycling for leisure and sport	0.04	0.06	0.04	0.10	0.05	0.05	0.06	0.06		0.04	0.12	0.02	0.04	0.04	0.05	0.04		0.08	0.04				0.13	
Creative or artistic dance	0.02		0.03	0.04	0.03		0.02			0.08			0.03			-0.03		0.07	0.02		0.04			
Fitness activities	0.05	0.03	0.06	0.04	0.03	0.07	0.10	0.08	0.05	0.06	0.15	0.04	0.06			0.03		0.03	0.05			0.06		0.06
Traditional sport	0.08	0.09	0.08	0.12	0.08	0.11	0.13	0.12	0.07	0.05	0.17	0.05	0.11	0.09	0.09	0.05	0.05	0.10	0.08	0.09	0.06	0.08	0.12	0.08
Club member in traditional sport	0.07	0.08	0.06	0.10	0.05	0.07	0.09	0.07	0.05	0.05		0.05	0.06		0.06	0.04	0.08	0.06	0.06	0.04	0.07		0.12	0.06
Individual development																								
Walking for Leisure	0.07	0.07	0.08	-0.04	0.03	0.06	0.08	0.13	0.14	0.14	0.12	0.06	0.09	0.07	0.06	0.07	0.05	-0.07	0.08	0.04	0.05			0.13
Active Travel	0.06	0.05	0.06		0.04	0.05	0.06	0.05	0.07	0.10	0.20	0.03	0.05		0.08		0.08		0.06		0.05			0.09
Cycling for leisure and sport	0.08	0.07	0.08	0.08	0.07	0.08	0.10	0.08	0.08	0.08		0.07	0.06	0.08	0.06	0.05		0.06	0.09		0.06			0.05
Creative or artistic dance	0.02		0.03							0.05								0.05	0.02					
Fitness activities	0.09	0.08	0.10	0.10	0.08	0.08	0.11	0.08	0.07		0.12	0.06	0.09	0.04	0.06	0.08		0.09	0.09	0.08	0.06	0.11	0.15	0.09
Traditional sport	0.13	0.13	0.12	0.13	0.13	0.13	0.16	0.12	0.11	0.06	0.10	0.09	0.12	0.09	0.11	0.11	0.19	0.09	0.13	0.14	0.11	0.08	0.15	0.11
Club member in traditional sport	0.11	0.11	0.10	0.14	0.09	0.08	0.10	0.09	0.07	0.06	0.10	0.07	0.06	0.06	0.08	0.08	0.10	0.12	0.09	0.06	0.09			0.09
Social Trust																								
Walking for Leisure	0.09	0.09	0.10		0.03	0.06	0.07	0.09	0.09	0.04	0.19	0.10	0.09	0.08	0.08	0.06			0.09	0.06				0.06
Active Travel		0.02	-0.02		0.03	0.03		0.05	0.02		-0.16	0.03	-0.03					-0.03		0.04				-0.06
Cycling for leisure and sport	0.04	0.05	0.03	0.06	0.04	0.08	0.10	0.08	0.03			0.05		0.05		0.05		0.06	0.04		0.03			
Creative or artistic dance					0.03		0.04	0.04		-0.10			0.04										0.12	-0.03
Fitness activities	0.03	0.01	0.05	0.04	0.04	0.04	0.09	0.08	0.06				0.06	0.03		0.07			0.04					
Traditional sport	0.08	0.08	0.07	0.13	0.11	0.14	0.13	0.11	0.06		-0.10	0.07	0.08	0.07	0.07	0.07		0.13	0.07	0.05	0.06	0.11		
Club member in traditional sport	0.06	0.08	0.04	0.13	0.08	0.08	0.08	0.09	0.05	0.07	-0.11	0.05	0.05	0.08	0.05	0.08		0.11	0.07	0.06	0.09			0.07

Table 8 Correlations of Mental wellbeing outcomes

		How satisfied with life nowadays	How happy did you feel yesterday	How anxious did you feel yesterday	To what extent are the things you do in your life worthwhile
How satisfied with life nowadays	Correlation	1	.737**	.347**	.622**
	Sig.		0.000	0.000	0.000
	N	54696	54638	54604	54534
How happy did you feel yesterday	Correlation	.737**	1	.409**	.582**
	Sig.	0.000		0.000	0.000
	N	54638	54644	54597	54527
How anxious did you feel yesterday	Correlation	.347**	.409**	1	.300**
	Sig.	0.000	0.000		0.000
	N	54604	54597	54607	54512
To what extent are the things you do in your life worthwhile	Correlation	.622**	.582**	.300**	1
	Sig.	0.000	0.000	0.000	
	N	54534	54527	54512	54539

Table 9 Means of Outcomes against Engagement and Volunteering

Sport And Pa Engagement		life satisfaction 0 to 10	happiness 0 to 10	anxious 0 to 10	worthwhileness 0 to 10	individual development 1 to 5	social trust 1 to 5
Inactive	Mean	6.513	6.685	3.562	6.937	3.517	3.264
	N	12562	12543	12530	12515	12508	12453
	Std. Deviation	2.455	2.421	2.940	2.384	0.929	0.886
Insufficiently Active	Mean	6.996	7.069	3.445	7.297	3.686	3.347
	N	7679	7677	7674	7660	7664	7653
	Std. Deviation	2.003	2.132	2.828	2.074	0.825	0.851
Active	Mean	7.241	7.270	3.208	7.436	3.835	3.382
	N	34455	34424	34403	34364	34385	34331
	Std. Deviation	1.900	2.068	2.788	2.019	0.801	0.862
Total	Mean	7.039	7.107	3.323	7.302	3.741	3.350
	N	54696	54644	54607	54539	54557	54436
	Std. Deviation	2.076	2.176	2.833	2.126	0.846	0.868
'Volunteered at least 2x in the last 12 months excluding those doing solely raising funds'		**life satisfaction 0 to 10**	**happiness 0 to 10**	**anxious 0 to 10**	**worthwhileness 0 to 10**	**individual development 1 to 5**	**social trust 1 to 5**
"No"	Mean	6.972	7.044	3.368	7.231	3.706	3.324
	N	46311	46265	46230	46173	46183	46087
	Std. Deviation	2.115	2.200	2.841	2.159	0.853	0.871
"Yes"	Mean	7.413	7.455	3.071	7.690	3.932	3.493
	N	8385	8379	8378	8366	8374	8349
	Std. Deviation	1.805	2.001	2.777	1.884	0.776	0.837
Total	Mean	7.039	7.107	3.323	7.302	3.741	3.350
	N	54696	54644	54607	54539	54557	54436
	Std. Deviation	2.076	2.176	2.833	2.126	0.846	0.868
'Volunteered in the last 4 weeks excluding those doing solely raising funds'		**life satisfaction 0 to 10**	**happiness 0 to 10**	**anxious 0 to 10**	**worthwhileness 0 to 10**	**individual development 1 to 5**	**social trust 1 to 5**
"No"	Mean	6.995	7.064	3.359	7.253	3.720	3.332
	N	49589	49538	49502	49447	49460	49345
	Std. Deviation	2.095	2.186	2.836	2.143	0.849	0.869
"Yes"	Mean	7.469	7.529	2.971	7.777	3.941	3.522
	N	5108	5106	5106	5092	5098	5092
	Std. Deviation	1.832	2.027	2.780	1.881	0.784	0.840
Total	Mean	7.039	7.107	3.323	7.302	3.741	3.350
	N	54696	54644	54607	54539	54557	54436
	Std. Deviation	2.076	2.176	2.833	2.126	0.846	0.868

Table 10 One way ANOVA Testing for mean differences Engagement v Outcomes

Outcome	Level of Activity		Mean Difference	Std. Error	Sig.
Life Satisfaction	Insufficiently Active	Inactive	.48273*	0.032	0.013
	Active	Inactive	.72815*	0.024	0.000
		Insufficiently Active	.24542*	0.025	0.000
Happiness	Insufficiently Active	Inactive	.38436*	0.033	0.000
	Active	Inactive	.58451*	0.024	0.000
		Insufficiently Active	.20014*	0.027	0.000
Anxiety	Insufficiently Active	Inactive	-.11781*	0.042	0.013
	Active	Inactive	-.35450*	0.030	0.000
		Insufficiently Active	-.23669*	0.036	0.000
Worthwhileness	Insufficiently Active	Inactive	.36007*	0.032	0.000
	Active	Inactive	.49865*	0.024	0.000
		Insufficiently Active	.13858*	0.026	0.000
Individual Development	Insufficiently Active	Inactive	.16942*	0.013	0.000
	Active	Inactive	.31818*	0.009	0.000
		Insufficiently Active	.14876*	0.010	0.000
Social Trust	Insufficiently Active	Inactive	.08293*	0.013	0.000
	Active	Inactive	.11815*	0.009	0.000
		Insufficiently Active	.03523*	0.011	0.003

Table 11 t tests of outcome differences grouped by voluntary engagement

'Volunteered at least 2x in the last 12 months excluding those doing solely raising funds'		N	Mean	Std. Deviation	Std. Error Mean
life satisfaction 0 to 10	"Yes"	8385	7.413	1.805	0.020
	"No"	46311	6.972	2.115	0.010
happiness 0 to 10	"Yes"	8379	7.455	2.001	0.022
	"No"	46265	7.044	2.200	0.010
anxious 0 to 10	"Yes"	8378	3.071	2.777	0.030
	"No"	46230	3.368	2.841	0.013
worthwhileness 0 to 10	"Yes"	8366	7.690	1.884	0.021
	"No"	46173	7.231	2.159	0.010
individual development 1 to 5	"Yes"	8374	3.932	0.776	0.008
	"No"	46183	3.706	0.853	0.004
community trust 1 to 5	"Yes"	8349	3.493	0.837	0.009
	"No"	46087	3.324	0.871	0.004

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
life satisfaction 0 to 10	Equal variances assumed	206.746	0.000	17.948	54694	0.000	0.441	0.025
	Equal variances not assumed			20.024	12926.093	0.000	0.441	0.022
happiness 0 to 10	Equal variances assumed	102.425	0.000	15.938	54642	0.000	0.411	0.026
	Equal variances not assumed			17.022	12343.431	0.000	0.411	0.024
anxious 0 to 10	Equal variances assumed	33.646	0.000	-8.828	54605	0.000	-0.297	0.034
	Equal variances not assumed			-8.968	11777.974	0.000	-0.297	0.033
worthwhileness 0 to 10	Equal variances assumed	274.707	0.000	18.197	54537	0.000	0.458	0.025

	Equal variances not assumed			20.000	12692.795	0.000	0.458	0.023
individual development 1 to 5	Equal variances assumed	642.813	0.000	22.609	54555	0.000	0.226	0.010
	Equal variances not assumed			24.149	12341.933	0.000	0.226	0.009
community trust 1 to 5	Equal variances assumed	6.886	0.009	16.377	54434	0.000	0.169	0.010
	Equal variances not assumed			16.830	11858.766	0.000	0.169	0.010

'Volunteered in the last 4 weeks excluding those doing solely raising funds'		N	Mean	Std. Deviation	Std. Error Mean
life satisfaction 0 to 10	"Yes"	5108	7.4692	1.83166	0.02563
	"No"	49589	6.9951	2.09474	0.00941
happiness 0 to 10	"Yes"	5106	7.5292	2.02720	0.02837
	"No"	49538	7.0639	2.18623	0.00982
anxious 0 to 10	"Yes"	5106	2.9713	2.77978	0.03890
	"No"	49502	3.3588	2.83640	0.01275
worthwhileness 0 to 10	"Yes"	5092	7.7766	1.88136	0.02636
	"No"	49447	7.2528	2.14347	0.00964
individual development 1 to 5	"Yes"	5098	3.9406	0.78423	0.01098
	"No"	49460	3.7204	0.84927	0.00382
community trust 1 to 5	"Yes"	5092	3.5217	0.83964	0.01177
	"No"	49345	3.3324	0.86859	0.00391

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
life satisfaction 0 to 10	Equal variances assumed	85.565	0.000	15.573	54694	0.000	0.474	0.030
	Equal variances not assumed			17.365	6562.729	0.000	0.474	0.027
happiness 0 to 10	Equal variances assumed	44.375	0.000	14.578	54642	0.000	0.465	0.032
	Equal variances not assumed			15.501	6392.526	0.000	0.465	0.030
anxious 0 to 10	Equal variances assumed	24.140	0.000	-9.312	54605	0.000	-0.388	0.042

	Equal variances not assumed			-9.466	6252.547	0.000	-0.388	0.041
worthwhileness 0 to 10	Equal variances assumed	179.109	0.000	16.785	54537	0.000	0.524	0.031
	Equal variances not assumed			18.659	6531.715	0.000	0.524	0.028
individual development 1 to 5	Equal variances assumed	352.467	0.000	17.748	54555	0.000	0.220	0.012
	Equal variances not assumed			18.935	6393.501	0.000	0.220	0.012
community trust 1 to 5	Equal variances assumed	6.187	0.013	14.849	54434	0.000	0.189	0.013
	Equal variances not assumed			15.264	6268.937	0.000	0.189	0.012

Table 12 ANOVA Volunteering /Active v outcomes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No Volunteering and no active	18823	34.0	34.0	34.0
	Volunteered and no active	1717	3.1	3.1	37.1
	Volunteering and active	6795	12.3	12.3	49.4
	Active but no volunteering	28049	50.6	50.6	100.0
	Total	55384	100.0	100.0	

Report

States Of Volunteering Compared To Activity		**life satisfaction 0 to 10**	**happiness 0 to 10**	**anxious 0 to 10**	**worthwhileness 0 to 10**	**individual development 1 to 5**	**social trust 1 to 5**
No Volunteering and no active	Mean	6.656	6.798	3.532	7.024	3.564	3.280
	N	18562	18544	18530	18503	18501	18449
	Std. Deviation	2.324	2.337	2.901	2.299	0.897	0.878
Volunteered and no active	Mean	7.140	7.195	3.355	7.621	3.769	3.472
	N	1679	1676	1675	1672	1671	1657
	Std. Deviation	2.037	2.128	2.870	1.946	0.836	0.810
Volunteering and active	Mean	7.481	7.520	3.000	7.707	3.973	3.498
	N	6706	6703	6703	6694	6703	6692
	Std. Deviation	1.735	1.962	2.749	1.867	0.755	0.844
Active but no volunteering	Mean	7.183	7.209	3.258	7.370	3.801	3.354
	N	27749	27721	27700	27670	27682	27638
	Std. Deviation	1.933	2.088	2.795	2.049	0.809	0.865
Total	Mean	7.039	7.107	3.323	7.302	3.741	3.350
	N	54696	54644	54607	54539	54557	54436
	Std. Deviation	2.076	2.176	2.833	2.126	0.846	0.868

Multiple Comparisons					
(I) States Of Volunteering Compared To Activity			Mean Difference	Std. Error	Sig.
Games-Howell	No Volunteering and no active	Volunteered and no active	-.48461*	0.053	0.000
		Volunteering and active	-.82503*	0.027	0.000
		Active but no volunteering	-.52725*	0.021	0.000
	Volunteered and no active	No Volunteering and no active	.48461*	0.053	0.000
		Volunteering and active	-.34042*	0.054	0.000
		Active but no volunteering	-0.043	0.051	0.838
	Volunteering and active	No Volunteering and no active	.82503*	0.027	0.000
		Volunteered and no active	.34042*	0.054	0.000
		Active but no volunteering	.29778*	0.024	0.000
	Active but no volunteering	No Volunteering and no active	.52725*	0.021	0.000
		Volunteered and no active	0.043	0.051	0.838
		Volunteering and active	-.29778*	0.024	0.000
*. The mean difference is significant at the 0.05 level.					

Table 13 Overlaps of Participation in Activities

ENGAGEMENT TYPE	OTHER ACTIVITIES ENGAGED IN					
	Leisure Walking	**Active Travel**	**Leisure Cycling**	**Creative Dance**	**Fitness**	**Traditional Sport**
Leisure Walking		**45%**	16%	2%	31%	41%
Active Travel	**54%**		21%	2%	33%	43%
Leisure Cycling	54%	57%		2%	49%	**60%**
Creative Dance	56%	**58%**	17%		49%	51%
Fitness	52%	47%	26%	3%		**55%**
Traditional Sport	**53%**	47%	24%	2%	42%	

Table 14 Means of Outcomes Against Activities.

Walking for leisure		life satisfaction 0 to 10	happiness 0 to 10	anxious 0 to 10	worthwhileness 0 to 10	individual development 1 to 5	social trust 1 to 5
0	Mean	6.776	6.864	3.502	7.091	3.690	3.273
	N	28481	28448	28426	28405	28408	28329
	Std. Deviation	2.192	2.260	2.863	2.220	0.885	0.884
1	Mean	7.055	7.156	3.469	7.254	3.766	3.395
	N	876	876	876	876	876	876
	Std. Deviation	1.998	2.098	2.780	2.042	0.879	0.859
2+	Mean	7.335	7.379	3.116	7.541	3.798	3.435
	N	25339	25320	25305	25258	25274	25231
	Std. Deviation	1.898	2.047	2.788	1.991	0.794	0.841
Total	Mean	7.039	7.107	3.323	7.302	3.741	3.350
	N	54696	54644	54607	54539	54557	54436
	Std. Deviation	2.076	2.176	2.833	2.126	0.846	0.868
Active Travel		**life satisfaction 0 to 10**	**happiness 0 to 10**	**anxious 0 to 10**	**worthwhileness 0 to 10**	**individual development 1 to 5**	**social trust 1 to 5**
0	Mean	6.992	7.064	3.301	7.277	3.698	3.348
	N	33173	33143	33120	33075	33069	32983
	Std. Deviation	2.163	2.231	2.866	2.175	0.862	0.857
1	Mean	6.786	6.969	3.435	7.029	3.794	3.471
	N	404	404	404	403	404	404
	Std. Deviation	2.209	2.288	2.749	2.292	0.816	0.911
2+	Mean	7.119	7.178	3.354	7.346	3.807	3.352
	N	21119	21097	21084	21060	21084	21049
	Std. Deviation	1.926	2.083	2.783	2.042	0.815	0.883
Total	Mean	7.039	7.107	3.323	7.302	3.741	3.350
	N	54696	54644	54607	54539	54557	54436
	Std. Deviation	2.076	2.176	2.833	2.126	0.846	0.868

Cycling for leisure and sport		life satisfaction 0 to 10	happiness 0 to 10	anxious 0 to 10	worthwhileness 0 to 10	individual development 1 to 5	social trust 1 to 5
0	Mean	6.978	7.057	3.376	7.259	3.708	3.333
	N	46101	46055	46022	45974	45985	45882
	Std. Deviation	2.115	2.212	2.844	2.153	0.853	0.872
1	Mean	7.215	7.159	3.418	7.442	3.865	3.426
	N	825	825	825	825	822	822
	Std. Deviation	1.867	1.993	2.800	1.930	0.789	0.876
2+	Mean	7.384	7.398	2.998	7.541	3.922	3.441
	N	7770	7764	7760	7741	7750	7732
	Std. Deviation	1.811	1.948	2.753	1.958	0.783	0.832
Total	Mean	7.039	7.107	3.323	7.302	3.741	3.350
	N	54696	54644	54607	54539	54557	54436
	Std. Deviation	2.076	2.176	2.833	2.126	0.846	0.868

Creative or artistic dance		life satisfaction 0 to 10	happiness 0 to 10	anxious 0 to 10	worthwhileness 0 to 10	individual development 1 to 5	social trust 1 to 5
0	Mean	7.031	7.102	3.317	7.296	3.738	3.350
	N	53686	53634	53598	53529	53546	53428
	Std. Deviation	2.079	2.177	2.832	2.127	0.846	0.867
1	Mean	7.701	7.522	3.417	7.643	3.877	3.451
	N	105	105	105	105	105	105
	Std. Deviation	1.570	1.826	2.771	2.019	0.673	0.912
2+	Mean	7.448	7.373	3.616	7.579	3.887	3.341
	N	905	905	904	905	906	904
	Std. Deviation	1.871	2.109	2.894	2.020	0.827	0.917
Total	Mean	7.039	7.107	3.323	7.302	3.741	3.350
	N	54696	54644	54607	54539	54557	54436
	Std. Deviation	2.076	2.176	2.833	2.126	0.846	0.868

Fitness activities		life satisfaction 0 to 10	happiness 0 to 10	anxious 0 to 10	worthwhileness 0 to 10	individual development 1 to 5	social trust 1 to 5
0	Mean	6.949	7.035	3.362	7.238	3.687	3.334
	N	39275	39238	39210	39166	39164	39069
	Std. Deviation	2.159	2.235	2.855	2.176	0.858	0.875
1	Mean	7.163	6.915	3.917	7.577	3.838	3.241
	N	484	482	484	484	484	483
	Std. Deviation	2.054	2.347	2.980	1.978	0.838	0.941
2+	Mean	7.272	7.304	3.200	7.460	3.879	3.395
	N	14937	14923	14914	14889	14909	14884
	Std. Deviation	1.819	1.992	2.765	1.984	0.797	0.845
Total	Mean	7.039	7.107	3.323	7.302	3.741	3.350
	N	54696	54644	54607	54539	54557	54436
	Std. Deviation	2.076	2.176	2.833	2.126	0.846	0.868
Traditional Sport		**life satisfaction 0 to 10**	**happiness 0 to 10**	**anxious 0 to 10**	**worthwhileness 0 to 10**	**individual development 1 to 5**	**social trust 1 to 5**
0	Mean	6.825	6.934	3.441	7.164	3.647	3.297
	N	33785	33756	33731	33681	33690	33604
	Std. Deviation	2.217	2.276	2.878	2.219	0.869	0.875
1	Mean	7.069	7.164	3.369	7.307	3.765	3.367
	N	1449	1450	1450	1448	1448	1447
	Std. Deviation	1.979	2.048	2.756	1.999	0.802	0.846
2+	Mean	7.409	7.404	3.113	7.540	3.903	3.441
	N	19462	19438	19427	19410	19419	19386
	Std. Deviation	1.754	1.965	2.748	1.940	0.781	0.848
Total	Mean	7.039	7.107	3.323	7.302	3.741	3.350
	N	54696	54644	54607	54539	54557	54436
	Std. Deviation	2.076	2.176	2.833	2.126	0.846	0.868

Table 15 Cross tabulation and frequencies of Activities around Traditional Sport

Segment	Traditional Sport	Other Activities	Size
1	✖	✖	21.4%
2	✓	✖	5.3%
3	✖	✓	43.0%
4	✓	✓	30.3%

Table 16 Combination variable Sport / Others activity - Outcome means

Sport/Other combinations		life satisfaction 0 to 10	happiness 0 to 10	anxious 0 to 10	worthwhileness 0 to 10	individual development 1 to 5	social trust 1 to 5
Non Participant	Mean	6.40	6.58	3.70	6.84	3.51	3.22
	N	11657	11641	11628	11614	11607	11556
	Std. Deviation	2.47	2.45	2.96	2.40	0.95	0.89
Sport Only	Mean	7.32	7.21	3.16	7.41	3.83	3.41
	N	2864	2858	2856	2859	2858	2855
	Std. Deviation	1.81	2.06	2.74	1.97	0.79	0.85
Sport and Other	Mean	7.42	7.44	3.10	7.56	3.92	3.45
	N	16598	16580	16570	16551	16561	16531
	Std. Deviation	1.74	1.95	2.75	1.93	0.78	0.85
Other only	Mean	7.05	7.12	3.31	7.33	3.72	3.34
	N	23577	23564	23553	23515	23531	23494
	Std. Deviation	2.03	2.15	2.82	2.09	0.81	0.86
Total	Mean	7.04	7.11	3.32	7.30	3.74	3.35
	N	54696	54644	54607	54539	54557	54436
	Std. Deviation	2.08	2.18	2.83	2.13	0.85	0.87

Table 17 testing the difference of the means Sport/ Other variable v Outcomes One way ANOVA

Dependent Variable: Combination of Traditional sport and other activities against outcomes					
A. Life satisfaction					
Variable comparing the interactions between sport and other activities			Mean Difference	Std. Error	Sig.
Games-Howell	Non participant	Sport only	-.92020*	0.04083	0.000
		Sport and other activities	-1.02914*	0.02656	0.000
		Other activities only	-.65738*	0.02641	0.000
	Sport only	Non participant	.92020*	0.04083	0.000
		Sport and other activities	-.10894*	0.03644	0.015
		Other activities only	.26282*	0.03633	0.000
	Sport and other activities	Non participant	1.02914*	0.02656	0.000
		Sport only	.10894*	0.03644	0.015
		Other activities only	.37176*	0.01893	0.000
	Other activities only	Non participant	.65738*	0.02641	0.000
		Sport only	-.26282*	0.03633	0.000
		Sport and other activities	-.37176*	0.01893	0.000
*. The mean difference is significant at the 0.05 level.					
B. Happiness					
Variable comparing the interactions between sport and other activities			Mean Difference	Std. Error	Sig.
Games-Howell	Non participant	Sport only	-.63083*	0.045	0.000
		Sport and other activities	-.85713*	0.027	0.000
		Other activities only	-.54200*	0.027	0.000
	Sport only	Non participant	.63083*	0.045	0.000
		Sport and other activities	-.22630*	0.041	0.000
		Other activities only	0.089	0.041	0.132
	Sport and other activities	Non participant	.85713*	0.027	0.000
		Sport only	.22630*	0.041	0.000
		Other activities only	.31513*	0.021	0.000
	Other activities only	Non participant	.54200*	0.027	0.000
		Sport only	-0.089	0.041	0.132
		Sport and other activities	-.31513*	0.021	0.000
*. The mean difference is significant at the 0.05 level.					

C. Anxiety					
Variable comparing the interactions between sport and other activities			Mean Difference	Std. Error	Sig.
Games-Howell	Non participant	Sport only	.54005*	0.058	0.000
		Sport and other activities	.59696*	0.035	0.000
		Other activities only	.39226*	0.033	0.000
	Sport only	Non participant	-.54005*	0.058	0.000
		Sport and other activities	0.057	0.055	0.734
		Other activities only	-.14780*	0.054	0.033
	Sport and other activities	Non participant	-.59696*	0.035	0.000
		Sport only	-0.057	0.055	0.734
		Other activities only	-.20470*	0.028	0.000
	Other activities only	Non participant	-.39226*	0.033	0.000
		Sport only	.14780*	0.054	0.033
		Sport and other activities	.20470*	0.028	0.000
*. The mean difference is significant at the 0.05 level.					

D. Worthwhileness					
Variable comparing the interactions between sport and other activities			Mean Difference	Std. Error	Sig.
Games-Howell	Non participant	Sport only	-.57371*	0.04308	0.000
		Sport and other activities	-.72142*	0.02687	0.000
		Other activities only	-.49194*	0.02612	0.000
	Sport only	Non participant	.57371*	0.04308	0.000
		Sport and other activities	-.14772*	0.03982	0.001
		Other activities only	0.08177	0.03932	0.160
	Sport and other activities	Non participant	.72142*	0.02687	0.000
		Sport only	.14772*	0.03982	0.001
		Other activities only	.22949*	0.02030	0.000
	Other activities only	Non participant	.49194*	0.02612	0.000
		Sport only	-0.08177	0.03932	0.160
		Sport and other activities	-.22949*	0.02030	0.000
*. The mean difference is significant at the 0.05 level.					

E. Individual development					
Variable comparing the interactions between sport and other activities			Mean Difference	Std. Error	Sig.
Games-Howell	Non participant	Sport only	-.31892*	0.017	0.000
		Sport and other activities	-.40918*	0.011	0.000
		Other activities only	-.21654*	0.010	0.000
	Sport only	Non participant	.31892*	0.017	0.000
		Sport and other activities	-.09026*	0.016	0.000
		Other activities only	.10238*	0.016	0.000
	Sport and other activities	Non participant	.40918*	0.011	0.000
		Sport only	.09026*	0.016	0.000
		Other activities only	.19264*	0.008	0.000
	Other activities only	Non participant	.21654*	0.010	0.000
		Sport only	-.10238*	0.016	0.000
		Sport and other activities	-.19264*	0.008	0.000
*. The mean difference is significant at the 0.05 level.					

F. Social Trust					
Variable comparing the interactions between sport and other activities			Mean Difference	Std. Error	Sig.
Games-Howell	Non Participant	Sport only	-.19489*	0.018	0.000
		Sport and other activities	-.22999*	0.011	0.000
		Other activities only	-.12397*	0.010	0.000
	Sport only	Non participant	.19489*	0.018	0.000
		Sport and other activities	-0.035	0.017	0.174
		Other activities only	.07091*	0.017	0.000
	Sport and other activities	Non participant	.22999*	0.011	0.000
		Sport only	0.035	0.017	0.174
		Other activities only	.10602*	0.009	0.000
	Other activities only	Non participant	.12397*	0.010	0.000
		Sport only	-.07091*	0.017	0.000
		Sport and other activities	-.10602*	0.009	0.000
*. The mean difference is significant at the 0.05 level.					

Table 18 Mean outcome scores by volunteering role.

	life satisfaction	happiness	anxiety	worthwhileness	individual development	social trust
Provided transport which helps people take part in sport (other than family members)	**7.39**	**7.49**	**2.97**	**7.70**	**3.94**	**3.52**
N	3,458	3,456	3,456	3,453	3,453	3,449
Std. Deviation	1.739	1.923	2.700	1.864	0.767	0.805
Coached or instructed an individual or team(s) in a sport or recreational physical activity (other than solely for family)	**7.45**	**7.46**	**3.05**	**7.77**	**4.02**	**3.45**
N	3,068	3,066	3,067	3,063	3,064	3,051
Std. Deviation	1.748	1.984	2.775	1.847	0.756	0.873
Refereed, umpired, or officiated at a sports match, competition or event	**7.46**	**7.49**	**2.93**	**7.74**	**4.01**	**3.42**
N	1,842	1,841	1,841	1,837	1,844	1,841
Std. Deviation	1.683	1.909	2.687	1.808	0.747	0.881
Performed an administrative or committee role for a sports organisation, activity or event	**7.54**	**7.61**	**2.87**	**7.87**	**3.94**	**3.56**
N	3,107	3,108	3,107	3,109	3,112	3,105
Std. Deviation	1.736	1.883	2.684	1.736	0.761	0.796
Acted as a steward or marshal at a sports activity or event	**7.45**	**7.43**	**3.10**	**7.69**	**3.98**	**3.48**
N	1,845	1,844	1,844	1,844	1,845	1,841
Std. Deviation	1.795	2.038	2.797	1.941	0.775	0.877
Provided any other help for a sport or recreational physical activity	**7.44**	**7.52**	**3.01**	**7.76**	**3.93**	**3.49**
N	3,185	3,180	3,178	3,174	3,177	3,170
Std. Deviation	1.777	1.995	2.747	1.864	0.793	0.843
Mean	**7.04**	**7.11**	**3.32**	**7.30**	**3.74**	**3.35**

A3: APPENDIX 3 - REGRESSION ANALYSIS

A3.1 General context of the regression analysis

Regression analysis is performed in each major outcome group: life satisfaction, (from the general mental wellbeing category), individual development and social trust.

The main statistical method used to analyse the data was multinomial logistic regression. This was constructed in order to take advantage of the survey detail on outcomes such as no individual trust, neutral and high (as they appeared in the grouped variables). In the regression models, in each case three effects are analysed:

- **Life satisfaction**: the effect of achieving 'very high' life satisfaction against 'medium or low' (Model I); second, the effect of achieving 'high' life satisfaction against 'medium or low' (Model II); and, third; the effect of achieving 'very high' life satisfaction against 'high' (Model III).
- **Individual development (ID)**: the effect of reporting 'yes' in ID against 'no' (Model I); second, the effect of reporting 'neutral' against 'no' (Model II); and, third; the effect of reporting 'yes' against 'neutral' (Model III).
- **Social trust**: the effect of reporting 'yes' in social trust against 'no' (Model I); second, the effect of reporting 'neutral' against 'no' (Model II); and, third; the effect of reporting 'yes' against 'neutral' (Model III).

In all cases, Model I is the aggregate case representing a change from a low to a high outcome value. This is disaggregated into Model II (low to medium outcome-in the case of satisfaction low/medium to high) and Model III (medium to high). The latter depends directly on the other models with its coefficients and odd ratios derived from Models I and II.

The underlying equations are as follows:

$$\ln\left(\frac{p(high\_outcome)}{p(low\_outcome)}\right) = \beta X + \varepsilon \qquad (1)$$

$$\ln\left(\frac{p(medium\_outcome)}{p(low\_outcome))}\right) = \gamma X + \varepsilon \qquad (2)$$

$$\ln\left(\frac{p(high\_outcome)}{p(medium\_outcome)}\right) = \delta X + \varepsilon \qquad (3)$$

where p is the probability of achieving outcomes (or not), while X is the vector of the independent variables, as it appears in the models. The list of independent variables includes all measures of engagement and activity, volunteering, club membership and all the demographics: gender, age, occupation (SEC), ethnicity and disability. Using multiple

independent variables in the regression analysis allows us to take into account the inter-relationships between these variables in examining their effect on life satisfaction, which is not possible at the simple descriptive level.

In each case we have a success (such as high outcome, for which we test) and a failure, which is the alternative- usually low outcome.

The ratios of success over failure to achieve the desired outcome score, are shown in the regression table under the column of odds ratios

$$\text{Odds ratio} = p/(1-p) = e^{\beta X} \qquad (4)$$

The odds ratios are the main outcomes of the regression.

The explanatory (i.e. independent variables) are also defined as binary variables with their own bases as described in the model.

Next, to avoid the problem of multicollinearity, all independent variables included in the model had an absolute correlation of less than 0.7, which is below the suggested cut-off criteria of 0.9[8] and consistent with contemporary research linked to sport participation[9]. Further evidence against multicollinearity is provided by variance inflation factors (VIF) and tolerance statistics in the results of the regression analysis below.

Variable pairs with high correlation include the two volunteering variables (only the annual variable was selected); the aged 16-25 and the student population; and finally the aged over 75 and the people with unknown SEC. As a result, in the age categories the base became the aged 75+and in the occupational categories the base became students. In the ethnicity variables the base became 'white British' as this group includes the majority of the population and therefore largely reproduces the average outcomes in the dataset. The remaining bases are self-explanatory, e.g. males against females, volunteering against no volunteering, active against inactive, fairly active against inactive, leisure walking against no leisure walking etc. In the case of the 'age', the detail of the distribution into several categories allowed the inclusion of individual binary variables, rather than an inflexible squared age term, in order to capture the maximum possible detail from the age variation.

Any comparisons of variables relative to their respective base category are based upon the coefficient values (B) or their odds ratios (Exp (B)). A positive relationship is indicated by odds greater than '1' (or a positive coefficient) and a negative relationship by odds smaller than '1'

[8] (Tabachnick & Fidell, 2007)
[9] (Kokolakakis *et al.* 2012)

(or a negative coefficient). The coefficients of the model, other than their positive or negative sign, are not easy to interpret, as they relate to a logarithm of odds. Instead we use the values of the odds ratios. For example, in the first model of life satisfaction, the odds ratio of traditional sport is 1.29, implying that for this group the odds of reporting very high outcomes are 29% higher than non-sport participants. The interpretation of odds ratios in the cases of age, occupation and ethnicity is more complex as the base is another specific population group. In the Life satisfaction model I for example, the odds ratio of age people aged 55-64 is 0.64 implying that their likelihood of very high life satisfaction is reduced by 36% compared to the base category of those aged 75+. It is more informative to observe the progress of the odds ratio across age categories: its increase as people becomes older shows a progressive increase in the score of LS achieved, with only exception the 'switch' from the aged group 25-34 to 35-44.

A3.2 Regression results and interpretation

Table A3.1 summarises the output of the multinomial logistic regression analysis, which includes the variables used, the estimated coefficients (B), the standard error (S.E), the level of significance (p), the odds ratios (Exp(B)), as well as statistics on significance and multicollinearity.

A3.2.1 Life satisfaction (LS)

Considering the first of the three models (Model I), the dependent variable is LS, a binary variable taking the value '1' for very high values and zero for medium or low values.

The Likelihood Ratio test results and the levels of significance (p) reported in Table A3.1 show that the variables 'fitness', 'gender', SECs 1/3/4, and most ethnicities are insignificant when we examine the total effect from medium/low to high scores. The implication is that there is no statistically significant differentiation between the life satisfactions experienced by men or women when all the other participation engagement and demographic factors are taken into account; the same applies to the aforementioned occupational groups and ethnic categories.
Among the engagement categories all three examined have strong associations with life satisfaction. The highest odds ratio appears in the case of being active (1.28) closely followed by volunteering. Hence the active sport participants are 28% more likely (than inactive people) to report very high life satisfaction. The odds ratio of fairy active (1.13) supports the 'dose' response to participation: a little is good, but more is better. The activity and club membership variables have overall a positive association with LS. The exceptions are fitness (no significant effect) and active travel (negative effect). Among the others particularly strong effects are noted in Dance, Leisure Walking, Traditional sport and club membership. Note however that Dance has a very small sample base (2%) compared to the other activities that span large parts of the adult population. Further note that the effect of club membership in traditional sport increases the odds ratio from 1.29 to 1.36, implying that greater involvement is associated

with greater satisfaction. In the case of the age categories there is a significant increase in the in the amount of life satisfaction as age increase (except for the age category 35-44; particularly high values are achieved in the older groups 55-64 and 65-74. The latter is associated with the highest value of odds ratios. The occupational variables that remain significant show a gradual decline in the odds ratios. Hence the life satisfaction associated with occupational groups declines as economic circumstances decline. The lowest odds ratio in occupational categories is in the unemployed group (0.58) implying that the unemployed are 42% less likely to report very high LS scores compared to the base category of students. Finally note that disability has a significant and low odds ratio (0.21) implying that disability is a major obstacle in reporting very high LS scores (reduces chances by 79%).

In models II and III we can break the underlying effect above into component parts from medium/low to high and from high to very high. Note that, as the model II indicates, being active and fairly active are almost equal effective in their association with high LS outcomes (model II). Following that however (model I), being active become much more effective in its association with very high LS outcomes.

A3.3.2 Individual development (ID)

Considering the first of the three models (Model I), the dependent variable is LD, a binary variable taking the value '1' for replying positively to the ID question and zero for a negative reply.

The Likelihood Ratio test results and the levels of significance (p) reported in A3.2 show that the variables ‘active travel’, ‘dance’, 'fitness', some age groups (16-24, 35-44 and 55-64) and some occupational categories (SECs 3/4/unknown) and most ethnicities are insignificant when we examine the total effect from ‘no’ to ‘yes’.

Among the engagement categories all three examined have strong associations with individual development. The highest odds ratio appears in the case of being active (1.57) followed by volunteering. Hence the active sport participants are 57% more likely (than inactive people) to report individual development. The odds ratio of fairy active (1.32) supports again the ‘dose’ response to participation: a little is good, but more is better. The activity and club membership variables have overall a positive association with ID; still statistically insignificant effects were detected in the cases of active travel, creative dance and fitness. Among activities, the strongest effects were at club membership (1.26 odds), leisure cycling (1.17) and leisure walking (1.13). Further note that the effect of club membership in traditional sport increased the odds ratio from 1.10 (traditional sport) to 1.26, implying that greater involvement is associated with greater ID.

Unlike the case of life satisfaction, gender has a significant association with ID: males are 19% more likely to report ID than females. In the case of the age categories there is a significant

increase in the in the ID score when we compare the youngest category (higher score) to the 45-54 years old. The effect increases even further following the retirement age of 65-74, giving an odds ratio of 1.56.

The occupational variables that remain significant show a gradual decline in the odds ratios. Hence the ID score associated with occupational groups declines as economic circumstances decline. The lowest odds ratio in occupational categories is in the unemployed group (0.41) implying that the unemployed are 59% less likely to report high ID scores compared to the base category of students. The opposite is true for the managerial occupations (SEC1), having a very high odds ratio at 1.31. Hence, the occupational inequalities in relation to ID are particular pronounced when we compare the two extremes of the SEC scale.

Finally note that disability has a significant and low odds ratio (0.20) implying that it is a major obstacle in reporting high ID scores (reduces chances of 'yes' by 80%).

A3.2.3 Social Trust (ST)

Considering the first of the three models (Model I), the dependent variable is ST, a binary variable taking the value '1' for replying positively to the social trust question and zero for a negative reply.

The Likelihood Ratio test results and the levels of significance (p) reported in A3.3 show that the variables ‘dance’, 'fitness', gender, some occupational categories (SECs 2/3/4/unknown) and some ethnicities (Asian/other) are insignificantly different from their bases when we examine the total effect from ‘no’ to ‘yes’. As in the case of life satisfaction there is no gender effect in relation to ST.

Among the engagement categories all three examined have positive associations with social trust. The highest odds ratio appears in the case of volunteering (1.29) followed by active and fairly active. Hence volunteers are 29% more likely (than no-volunteers) to report positive social trust. Among the three outputs examined in the regression analysis, ST is the only case where volunteering has a stronger effect on the output score than being active. This is in agreement with the correlation analysis and the existing academic literature.

Among activities the greatest positive effects can be observed in Leisure cycling and Traditional Sport, both having an odds ratio of 1.25. Note that, as in the case of life satisfaction, Active Travel is associated with a significant negative effect (odds ratio: 0.90).
In the case of the age categories there is a significant increase in the in the ST score as age increases. Following an initial drop of the odds from the youngest category to the aged 25-34, there is a progressive rise in the chances to report ST as the age increases.

As in the case of ID, the occupational variables show a gradual decline in the ST odds ratios as economic circumstances decline. The lowest odds ratio in occupational categories is in the unemployed group (0.62) implying that the unemployed are 38% less likely to report high ST scores compared to the base category of students. The opposite is true for the managerial occupations (SEC1), having a very high odds ratio of 1.72. As in ID, the occupational inequalities are particular pronounced when we compare the two extremes of the SEC scale.
Finally note that disability has a significant and low odds ratio (0.430) implying that it has a major negative association with in reporting ST scores (reduces chances of 'yes' by 57%). This is consistent with the effects shown in leisure satisfaction and individual development, albeit at a lesser scale.

Overall, the current research has shown a strong link between wellbeing outcomes (life satisfaction, individual development and social trust) and engagement in sport and pa. This effect is particularly strong among the active and the volunteers. Most activities have positive effects, with strong effects in Leisure Walking, Traditional Sport, Leisure Cycling and club membership.

The research confirms strong occupational effects; 'richer' occupations are associated with rising wellbeing scores. This is more pronounced when comparing the two extremes of the SEC scale (managers v unemployed).

Table A3.1: Results of multinomial logistic regression analysis- Life satisfaction

Variable	MODEL I Very high v medium/low				MODEL II High v medium/low				MODEL III Very high v high				*LR test Sig.*	*Tolerance*	*VIF*
	B	*S.E.*	*p*	*Exp(B)*	*B*	*S.E.*	*p*	*Exp(B)*	*B*	*S.E.*	*p*	*Exp(B)*			
Intercept	0.290	0.107	0.007		0.795	0.094	0.000		-0.505	0.099	0.000		.000		
Active in sport and pa 150+ (base inactive)	0.244	0.043	0.000	1.276	0.230	0.036	0.000	1.258	0.014	0.039	0.712	1.014	.000	.355	2.814
Fairly active (base: inactive)	0.120	0.045	0.007	1.128	0.216	0.037	0.000	1.241	-0.096	0.041	0.021	0.909	.000	.626	1.596
Volunteered at least 2x in 12 months	0.229	0.037	0.000	1.257	0.235	0.032	0.000	1.265	-0.006	0.031	0.845	0.994	.000	.883	1.132
Member of a club: Traditional Sport	0.303	0.036	0.000	1.354	0.145	0.031	0.000	1.156	0.158	0.031	0.000	1.171	.000	.692	1.445
Leisure Walking	0.275	0.029	0.000	1.317	0.169	0.025	0.000	1.185	0.106	0.026	0.000	1.112	.000	.714	1.401
Active travel	-0.171	0.028	0.000	0.843	-0.058	0.024	0.015	0.944	-0.112	0.024	0.000	0.894	.000	.822	1.217
Leisure Cycling	0.218	0.038	0.000	1.244	0.098	0.033	0.003	1.103	0.121	0.032	0.000	1.128	.000	.882	1.134
Creative dance	0.533	0.101	0.000	1.704	0.313	0.090	0.001	1.368	0.220	0.081	0.006	1.246	.000	.979	1.022
Fitness	-0.011	0.031	0.732	0.989	0.095	0.026	0.000	1.100	-0.106	0.027	0.000	0.900	.000	.803	1.245
Traditional sport	0.251	0.033	0.000	1.286	0.264	0.028	0.000	1.302	-0.013	0.029	0.655	0.987	.000	.618	1.619
Males (base females)	-0.045	0.026	0.086	0.956	0.054	0.022	0.014	1.056	-0.099	0.024	0.000	0.906	.000	.881	1.135
Age 16-24 (base 75+)	-1.193	0.100	0.000	0.303	-0.854	0.089	0.000	0.426	-0.338	0.092	0.000	0.713	.000	.114	8.792
Age 25-34 (base 75+)	-1.064	0.092	0.000	0.345	-0.813	0.083	0.000	0.444	-0.251	0.083	0.003	0.778	.000	.116	8.607
Age 35-44 (base 75+)	-1.102	0.091	0.000	0.332	-0.802	0.083	0.000	0.449	-0.300	0.083	0.000	0.741	.000	.126	7.949
Age 45-54 (base 75+)	-0.967	0.091	0.000	0.380	-0.782	0.083	0.000	0.457	-0.185	0.082	0.025	0.831	.000	.119	8.436
Age 55-64 (base 75+)	-0.448	0.091	0.000	0.639	-0.528	0.083	0.000	0.590	0.080	0.082	0.328	1.084	.000	.138	7.224
Age 65-74 (base 75+)	0.356	0.092	0.000	1.428	-0.181	0.086	0.034	0.834	0.538	0.082	0.000	1.712	.000	.145	6.892
SEC1 (base students)	0.014	0.064	0.822	1.014	0.210	0.051	0.000	1.234	-0.196	0.060	0.001	0.822	.000	.166	6.020
SEC2 (base students)	-0.231	0.072	0.001	0.794	0.038	0.057	0.507	1.038	-0.268	0.067	0.000	0.765	.000	.326	3.063
SEC3 (base students)	0.004	0.076	0.953	1.004	0.069	0.062	0.266	1.071	-0.064	0.070	0.358	0.938	.456	.387	2.582
SEC4 (base students)	-0.030	0.078	0.701	0.971	-0.024	0.063	0.709	0.977	-0.006	0.072	0.931	0.994	.908	.448	2.234
SEC5 (base students)	-0.252	0.066	0.000	0.777	-0.237	0.052	0.000	0.789	-0.015	0.062	0.811	0.985	.000	.302	3.307

SEC-Unemployed (base students)	-0.539	0.089	0.000	0.583	-0.755	0.070	0.000	0.470	0.216	0.092	0.018	1.242	.000	.632	1.583
SEC-Unknown/ over 75 (base students)	0.284	0.096	0.003	1.329	-0.103	0.084	0.219	0.902	0.387	0.089	0.000	1.473	.000	.142	7.052
White other (base White British)	-0.074	0.055	0.175	0.929	0.027	0.043	0.531	1.028	-0.101	0.050	0.042	0.904	.123	.964	1.037
Asian (base White British)	0.048	0.048	0.320	1.049	-0.198	0.040	0.000	0.820	0.246	0.046	0.000	1.279	.000	.923	1.083
Black (base White British)	-0.002	0.086	0.983	0.998	-0.139	0.070	0.049	0.870	0.137	0.082	0.095	1.147	.085	.974	1.026
Chinese (base White British)	-0.685	0.170	0.000	0.504	-0.038	0.109	0.730	0.963	-0.647	0.163	0.000	0.524	.000	.986	1.014
Other (base White British)	0.111	0.073	0.128	1.117	-0.080	0.061	0.187	0.923	0.191	0.068	0.005	1.211	.019	.975	1.026
Disability	-1.549	0.038	0.000	0.213	-1.007	0.028	0.000	0.365	-0.541	0.038	0.000	0.582	0.000	.898	1.114

Note: Likelihood ratio test: $p < 0.001$

Table A3.2: Results of multinomial logistic regression analysis- Individual development

Variable	MODEL I Yes v No				MODEL II Neutral v No				MODEL III Yes v Neutral				*LR test Sig.*	*Tolerance*	*VIF*
	B	*S.E.*	*p*	*Exp(B)*	*B*	*S.E.*	*p*	*Exp(B)*	*B*	*S.E.*	*p*	*Exp(B)*			
Intercept	1.963	0.155	0.000		1.003	0.165	0.000		0.960	0.096	0.000		0.000		
Active in sport and pa 150+ (base inactive)	0.448	0.056	0.000	1.566	0.302	0.061	0.000	1.352	0.147	0.036	0.000	1.158	0.000	0.355	2.814
Fairly active in sport and pa (base: inactive)	0.278	0.056	0.000	1.321	0.165	0.060	0.006	1.179	0.113	0.038	0.003	1.120	0.000	0.626	1.597
Volunteered at least 2x in the last 12 months excluding raising funds	0.332	0.056	0.000	1.393	0.037	0.061	0.547	1.038	0.295	0.034	0.000	1.343	0.000	0.883	1.133
Member of a club: Traditional Sport	0.227	0.053	0.000	1.255	0.044	0.058	0.448	1.045	0.183	0.033	0.000	1.201	0.000	0.692	1.444
Leisure Walking	0.127	0.040	0.002	1.135	0.031	0.044	0.485	1.031	0.096	0.026	0.000	1.101	0.000	0.714	1.400
Active travel	0.001	0.040	0.980	1.001	0.011	0.043	0.791	1.011	-0.010	0.025	0.673	0.990	0.911	0.822	1.217
Leisure Cycling	0.160	0.058	0.006	1.173	-0.009	0.064	0.889	0.991	0.169	0.035	0.000	1.184	0.000	0.882	1.134
Creative dance	-0.035	0.133	0.794	0.966	-0.287	0.151	0.057	0.750	0.252	0.095	0.008	1.287	0.019	0.979	1.022
Fitness	0.088	0.045	0.052	1.092	-0.028	0.049	0.572	0.973	0.115	0.028	0.000	1.122	0.000	0.803	1.245
Traditional sport	0.097	0.047	0.038	1.102	-0.028	0.051	0.577	0.972	0.125	0.029	0.000	1.133	0.000	0.618	1.619
Males (base females)	0.170	0.035	0.000	1.186	0.081	0.037	0.031	1.084	0.090	0.023	0.000	1.094	0.000	0.881	1.135
Age 16-24 (base 75+)	-0.090	0.146	0.540	0.914	-0.150	0.155	0.334	0.861	0.060	0.089	0.498	1.062	0.594	0.106	9.420
Age 25-34 (base 75+)	-0.248	0.137	0.071	0.780	-0.454	0.145	0.002	0.635	0.206	0.082	0.012	1.229	0.003	0.107	9.312
Age 35-44 (base 75+)	-0.280	0.137	0.041	0.756	-0.238	0.145	0.101	0.788	-0.042	0.082	0.607	0.959	0.135	0.116	8.597
Age 45-54 (base 75+)	-0.307	0.136	0.024	0.736	-0.143	0.143	0.319	0.867	-0.164	0.081	0.042	0.849	0.023	0.110	9.124
Age 55-64 (base 75+)	0.013	0.137	0.923	1.013	0.071	0.145	0.624	1.074	-0.058	0.081	0.478	0.944	0.755	0.128	7.800
Age 65-74 (base 75+)	0.445	0.141	0.002	1.560	0.467	0.149	0.002	1.596	-0.022	0.082	0.784	0.978	0.003	0.135	7.432
SEC1 (base students)	0.272	0.083	0.001	1.313	0.073	0.092	0.428	1.076	0.199	0.057	0.000	1.220	0.000	0.166	6.021
SEC2 (base students)	-0.228	0.090	0.011	0.796	0.152	0.099	0.122	1.164	-0.380	0.061	0.000	0.684	0.000	0.326	3.067
SEC3 (base students)	0.196	0.102	0.055	1.216	0.133	0.112	0.236	1.142	0.063	0.068	0.354	1.065	0.132	0.387	2.585
SEC4 (base students)	0.195	0.106	0.066	1.216	0.308	0.116	0.008	1.360	-0.112	0.068	0.101	0.894	0.025	0.447	2.236
SEC5 (base students)	-0.272	0.084	0.001	0.762	0.155	0.092	0.093	1.168	-0.427	0.057	0.000	0.652	0.000	0.302	3.309

SEC-Unemployed (base students)	-0.894	0.095	0.000	0.409	-0.038	0.101	0.704	0.962	-0.855	0.072	0.000	0.425	0.000	0.631	1.584
SEC-Unknown and over 75s (base students)	0.267	0.143	0.062	1.306	0.550	0.153	0.000	1.734	-0.283	0.087	0.001	0.753	0.000	0.134	7.442
White other (base White British)	0.001	0.070	0.985	1.001	-0.060	0.077	0.434	0.942	0.061	0.047	0.194	1.063	0.416	0.964	1.037
Asian (base White British)	-0.085	0.061	0.164	0.919	-0.056	0.066	0.399	0.946	-0.029	0.043	0.496	0.971	0.356	0.923	1.083
Black (base White British)	0.399	0.122	0.001	1.490	-0.092	0.136	0.498	0.912	0.491	0.084	0.000	1.634	0.000	0.974	1.026
Chinese (base White British)	0.391	0.230	0.089	1.479	0.868	0.237	0.000	2.382	-0.477	0.111	0.000	0.621	0.000	0.986	1.014
Other (base White British)	0.016	0.093	0.866	1.016	-0.167	0.104	0.108	0.846	0.183	0.068	0.007	1.200	0.022	0.975	1.026
Disability	-1.629	0.037	0.000	0.196	-1.039	0.040	0.000	0.354	-0.591	0.029	0.000	0.554	0.000	0.897	1.114

Note: Likelihood ratio test: $p < 0.001$

Table A3.3: Results of multinomial logistic regression analysis- Social Trust

Variable	MODEL I Yes v No				MODEL II Neutral v No				MODEL III Yes v Neutral				*LR test Sig.*	*Tolerance*	*VIF*
	B	*S.E.*	*p*	*Exp(B)*	*B*	*S.E.*	*p*	*Exp(B)*	*B*	*S.E.*	*p*	*Exp(B)*			
Intercept	2.796	0.132	0.000		1.747	0.130	0.000		1.049	0.090	0.000		.000		
Active in sport and pa 150+ (base inactive)	0.108	0.047	0.022	1.114	0.020	0.047	0.666	1.020	0.087	0.033	0.008	1.091	.011	.355	2.814
Fairly active in sport and pa (base: inactive)	0.132	0.049	0.007	1.141	0.086	0.048	0.075	1.090	0.046	0.035	0.188	1.047	.024	.626	1.598
Volunteered at least 2x in the last 12 months excluding raising funds	0.250	0.042	0.000	1.285	0.039	0.043	0.367	1.040	0.212	0.028	0.000	1.236	.000	.882	1.133
Member of a club: Traditional Sport	0.215	0.040	0.000	1.240	0.157	0.041	0.000	1.171	0.058	0.027	0.034	1.060	.000	.692	1.444
Leisure Walking	0.117	0.032	0.000	1.124	0.003	0.032	0.920	1.003	0.114	0.022	0.000	1.120	.000	.714	1.400
Active travel	-0.109	0.031	0.000	0.897	-0.129	0.031	0.000	0.879	0.020	0.021	0.350	1.020	.000	.822	1.216
Leisure Cycling	0.224	0.043	0.000	1.251	0.152	0.043	0.000	1.164	0.072	0.029	0.012	1.075	.000	.882	1.134
Creative dance	0.077	0.106	0.467	1.080	0.119	0.107	0.266	1.126	-0.042	0.075	0.575	0.959	.528	.979	1.022
Fitness	0.029	0.034	0.396	1.029	0.031	0.035	0.369	1.031	-0.002	0.024	0.926	0.998	.646	.803	1.245
Traditional sport	0.222	0.036	0.000	1.249	0.084	0.037	0.021	1.088	0.138	0.025	0.000	1.148	.000	.618	1.618
Males (base females)	-0.012	0.028	0.685	0.989	-0.041	0.029	0.154	0.960	0.029	0.020	0.150	1.030	.222	.881	1.136
Age 16-24 (base 75+)	-2.495	0.127	0.000	0.082	-1.399	0.124	0.000	0.247	-1.096	0.085	0.000	0.334	.000	.104	9.622
Age 25-34 (base 75+)	-2.535	0.122	0.000	0.079	-1.297	0.119	0.000	0.273	-1.238	0.078	0.000	0.290	.000	.105	9.529
Age 35-44 (base 75+)	-2.106	0.122	0.000	0.122	-0.990	0.119	0.000	0.372	-1.116	0.078	0.000	0.328	.000	.114	8.786
Age 45-54 (base 75+)	-1.933	0.121	0.000	0.145	-0.816	0.119	0.000	0.442	-1.117	0.077	0.000	0.327	.000	.107	9.336
Age 55-64 (base 75+)	-1.659	0.122	0.000	0.190	-0.644	0.120	0.000	0.525	-1.014	0.078	0.000	0.363	.000	.125	7.977
Age 65-74 (base 75+)	-0.949	0.127	0.000	0.387	-0.204	0.125	0.102	0.815	-0.744	0.078	0.000	0.475	.000	.132	7.601
SEC1 (base students)	0.542	0.060	0.000	1.720	0.340	0.060	0.000	1.405	0.202	0.050	0.000	1.224	.000	.166	6.023
SEC2 (base students)	0.083	0.068	0.226	1.086	0.228	0.068	0.001	1.257	-0.145	0.056	0.009	0.865	.001	.326	3.066
SEC3 (base students)	0.123	0.075	0.100	1.131	0.103	0.075	0.171	1.109	0.020	0.059	0.735	1.020	.244	.387	2.582
SEC4 (base students)	-0.078	0.076	0.306	0.925	0.153	0.076	0.043	1.165	-0.231	0.061	0.000	0.794	.001	.447	2.235
SEC5 (base students)	-0.293	0.061	0.000	0.746	-0.044	0.060	0.467	0.957	-0.249	0.052	0.000	0.780	.000	.302	3.311

SEC-Unemployed (base students)	-0.481	0.079	0.000	0.618	-0.162	0.075	0.031	0.850	-0.319	0.071	0.000	0.727	.000	.631	1.585
SEC-Unknown and over 75s (base students)	0.021	0.110	0.851	1.021	0.410	0.106	0.000	1.507	-0.389	0.082	0.000	0.678	.000	.132	7.572
White other (base White British)	0.159	0.059	0.008	1.172	0.387	0.058	0.000	1.473	-0.229	0.040	0.000	0.796	.000	.964	1.037
Asian (base White British)	-0.052	0.051	0.309	0.950	0.258	0.049	0.000	1.295	-0.310	0.039	0.000	0.733	.000	.924	1.083
Black (base White British)	-0.776	0.092	0.000	0.460	0.104	0.079	0.187	1.110	-0.881	0.075	0.000	0.415	.000	.975	1.026
Chinese (base White British)	0.818	0.179	0.000	2.266	0.916	0.178	0.000	2.500	-0.098	0.105	0.348	0.906	.000	.986	1.014
Other (base White British)	0.108	0.076	0.155	1.114	0.176	0.076	0.020	1.192	-0.068	0.057	0.236	0.934	.061	.975	1.026
Disability	-0.840	0.035	0.000	0.432	-0.677	0.035	0.000	0.508	-0.163	0.028	0.000	0.850	.000	.897	1.115

Note: Likelihood ratio test: $p < 0.001$

A4: APPENDIX 4 –REVIEW OF OTHER DATASETS

The purpose of element 3 was to provide an assessment of existing datasets (in particular longitudinal datasets) that could provide further evidence of the association between engagement in sport and physical activity and the outcomes. Our recent work on the social value of medal success for UK Sport tells us that there are two datasets that are worth investigating for this project. These are the Taking Part Survey (TPS) and Understanding Society survey (US). The first part of this element was to conduct an audit of the variables within each dataset to assess their potential to contribute to our understanding of the association between engagement in sport and physical activity and the outcome areas. The second part was to conduct an in-depth (matrix) analysis of previous research which has analysed large datasets, to draw out methodological similarities and differences and to summarise the key findings. Both parts were used to make recommendations for further research which could be undertaken with Active Lives, Taking Part and Understanding Society.

A4.1 Datasets

The Taking Part Survey and Understanding Society both provide considerable potential for further research linked to the outcomes. A4.1 provides an overview of these surveys. For comparative purposes, the table also includes a summary of Active Lives. Both surveys have a sample size which is much smaller than Active Lives, but they both have the advantage of a longitudinal element, which gives potential for investigation of causality in relation to the outcomes.

A4.1: Overview of national surveys and relevant variables

Characteristic	Taking Part	Understanding Society	Active Lives
Nature	Survey commissioned by DCMS into engagement in culture and sport	Publicly funded survey managed by University of Essex and concerned with a broad array of social issues	Survey commissioned by Sport England to monitor sport and physical activity
Sample size	c. 10,000 p.a.	c. 10,000 p.a.	c. 155,000p.a
Research design	Cross sectional and longitudinal	Longitudinal	Cross-sectional
Coverage	England only	United Kingdom	England only
Data collection	In house interview using CAPI[1]	In house interview using CAPI	Telephone Survey
Data periods	2005/06 onwards	2009/10 onwards	2016/17 onwards
Engagement	Participation and volunteering	Participating and volunteering	Participation and volunteering
Outcome measures	Happiness Sport participation Volunteering	Life satisfaction Perceived health engagement?	Life satisfaction, happiness, anxiety, worthwhileness, self-efficacy, social trust

[1] CAPI stands for Computer Aided Personal Interviewing

A4.1.1 Taking Part Survey

The Taking Part Survey is an annual face to face survey designed to collect data on leisure, culture and sport participation and engagement within England. The survey provides a repeated cross-sectional dataset from 2005/06 onwards. From 2011/12 onwards the survey has included a longitudinal aspect. Thus from 1 April 2012, 5,000 adults (16+) and c. 1,000 children (5-15) who were first interviewed in 2011/12 were followed up in the Taking Part longitudinal survey. From 1 April 2012, the Taking Part sample was split in two – with half cross-sectional (questions asked of new respondents) and half will be longitudinal (questions asked of respondents followed-up one year later). The longitudinal questions focus on life events and changes in the behaviour of respondents since they were last interviewed a year ago. The survey is repeated annually.

A4.1.2 Understanding Society

Understanding Society, also known as the UK Household Longitudinal Study (UKHLS), is an annual longitudinal panel survey designed to track and analyse change at individual and household level. It began in January 2009 with an initial sample of over 40,000 households[10] . Each adult in the household (aged 16+) is asked to complete a face to face questionnaire. Questions on health and wellbeing are asked via a self-completion questionnaire. Some questions are asked in every survey. Others, such as engagement in sport and physical activity are only asked in certain waves. Engagement questions were included in 2010/11 (Wave 2) and 2013/14 (Wave 5).

A4.1.3 Audit of variables

Table A4.1 summarises the questions of potential interest in relation to mental wellbeing, individual development and social and community development. As is clearly shown, the survey contains relevant questions around engagement and the outcomes, which lend themselves to further investigation and provide potential scope for longitudinal analysis.

[10] https://www.understandingsociety.ac.uk/about

Table A4.1: Audit of variables TPS/USS

	Participation questions	Sport Volunteering questions	Mental wellbeing questions	Individual development questions	Social/community development questions
USS	How frequently do you play sport? (never, once a year or less, several times a year, once a month, once a week) active engagement post Olympics: taking part in a games-related sports or physical activity.	active engagement post Olympics: volunteering during the games mc volunteering during the games	satisfaction with life overall satisfaction with amount of leisure time satisfaction with income satisfaction with health ghq: general happiness ghq: unhappy or depressed ghq: believe in self-worth difficulties accessing services: anxiety / lack of confidence why don t go out socially: anxiety / lack of confidence	ghq: losing confidence ghq: ability to face problems important who you are: occupation/ education/ background etc.	close-knit neighbourhood people willing to help their neighbours people in this neighbourhood can be trusted people in this neighbourhood don't get along with each other worry about being affected by crime feel safe walking alone at night willing to improve neighbourhood belong to neighbourhood

	Participation questions	Sport Volunteering questions	Mental wellbeing questions	Individual development questions	Social/community development questions
TPS	**(continuously since year 7**) Did respondent take part in sports activities when growing up? How often respondent did sports activities when growing up? Who respondent did sports activities with when growing up - Youth Club (several options) Free time activity - Sport/exercise Still thinking about the last four weeks, have you done any sporting or active recreation activities? In last 4 weeks, has respondent done ANY sport/recreational physical activity? Revised in Y4 - Sport PSA21 - Number of days done at least 30 minutes of sport (Alspday3 revised to force -3 value to 0 and delete miscellaneous	During the last four weeks how much time have you spent on sport voluntary work? - Total in hours. minutes Total minutes - sports voluntary work in last 4 weeks	Any physical or mental health conditions or illnesses lasting or expected to last for 12 months or more? How satisfied are you with life nowadays? Nought is not at all satisfied & 10 is completely To what extent do you feel that the things in your life are worthwhile? Nought is not at all worthwhile & 10 is completely How anxious did you feel yesterday? Nought is not at all anxious & 10 is completely Taking all things together, how happy would you say you are?		Would you say that most people....[trustworthiness in general] (Q1 only) Would you say that...[trustworthiness of neighbours] (Q1 only) In general, what kind of neighbourhood would you say you live in? (help each other) What do you like most about your area? - Friendliness of the area / good neighbours / community spirit (Q1 only)

	hobbies) Revised in Y4 - Sport PSA21 - Whether doing sufficient moderate intensity sport Number of days done at least 30 minutes of sport excluding walking for recreational purposes in last 4 weeks Whether done active sport in last 4 weeks (excl. utility cycling, other sport and misc) Whether achieved 1x30 MIS per week (excl. walking and cycling) - uses totalsportscount DSO Sport - excludes walking and cycling for recreational purposes (revised from previously data) Number of days done 30 mins of sport in last 4 weeks - no intensity (excl. walking and cycling) (28+ = 28) Whether achieved 1x30 per week - no intensity (excl. walking and cycling) Number of days done 30 mins				

	of sport in last 4 weeks - no intensity (incl. walking and cycling) (28+ = 28) Whether achieved 1x30 per week - no intensity (incl. walking and cycling) Number of days done MIS recreational walking in last 4 weeks Revised ALSPDAF - Number of days done 3x30 MIS in last 4 weeks PSA21 Sport (revised from previously published PSASports data) - whether achieved 3x30 MIS per week (incl. MIS walking and MIS cycling) Number of days done 30 mins of MIS in last 4 weeks (28+ = 28) - Whether achieved 1x30 MIS per week (incl. MIS walking and MIS cycling) - uses totalPSAcountr				

A4.2 Matrix analysis

From the 125 papers included in the literature review, we identified nine which papers have analysed large datasets and were of interest methodologically in terms of taking this research forward. Table A4.2 summarises the methodological similarities and difference of the nine papers. A fuller version of the data extraction is available in excel format (output 2).

Most papers were concerned with life satisfaction. Seven of the nine papers focused on this outcome measure; two papers analysed happiness and just one considered self efficacy. Most studies were concerned with measuring association and the majority of studies (8/9) used cross-sectional analysis, even those datasets which contained panel (longitudinal) data. Three studies examined causal relationships.

Regression analysis is widely used to control for certain characteristics (e.g. age or income) and to examine associations between the dependent variables (e.g. life satisfaction), and other independent factors. Logistic regression is considered to be an appropriate method in this case. Other regression methods have been used.

Two papers identified relevant methods for investigating causal relationships using cross-sectional data (Dolan et al, 2014; Fujiwara et al, 2014). Both utilise an instrumental variable approach, which is generally considered to be the optimal method given the nature of the data. A further paper attempts to identify the extent physical activity is positively related to individual subjective wellbeing i.e. the role played by perceived health as a mediator of the relationship between the level of physical activity and individual happiness and life satisfaction. This paper could be considered as moving towards a form of causality through mediation.

Four studies (Brown et al, 2015; National Centre for Social Research, 2017 – forthcoming; Schmiedeberg and Schröder, 2017; Fujiwara et al, 2014) use datasets which contain longitudinal data, but all of these carry out cross sectional analysis on either a single or multiple waves. Only Fujiwara considers causality, but restricts this to analysis of a single wave of Understanding Society.

A4.2 Summary of matrix analysis

The table provides a summary* of the nine papers selected from the literature review for methodological investigation.

A4.2: Summary of selected papers

Reference	Outcome	Association / causality	Method	Dataset
Brown et al. (2015)	Life satisfaction	Association	Bivariate analysis and ordinal regression	Understanding Society
National Centre for Social Research. (2017 - forthcoming)	Life satisfaction (wave 2 and 5) / Self-efficacy (wave 5 only)	Association	Bivariate analysis and logistic regression	Understanding Society
Schmiedeberg and Schröder (2017)	Life satisfaction	Association	**Fixed effects regression models	German Family Panel
Dolan et al. (2014)	Life satisfaction	Causality	Probit model	Eurobarometer
DCMS (2014)	Happiness	Association	Linear regression model using ordinary least squares	Taking Part
Fujiwara et al. (2014)	Life satisfaction	Causality	Regression analysis using ordinary least squares / two stage least squares	Understanding Society
Lera-López et al. (2014)	Happiness / life satisfaction	Causality through mediation	Ordinary least squares model and ordered probit model	Physical Activity, Health and Wellbeing survey
Leadbetter and O'Connor (2013)	Life satisfaction	Association	Logistic regression	Scottish Household Survey
Rascuite and Downward (2010)	Happiness	Association	Bivariate probit models, Ordered Choice model, Ordinary least squares model	Taking Part

**Full data extraction of the papers can be found in Output 2 (excel format)*

***Panel data analysis*