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Leeds Let's Get Active:

Final Report – August 2015

Prepared by Leeds Beckett University

Reader Information

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Glossary of Key Terms

ADOPTERS – Participants signing up to *'Leeds Let's Get Active'* (LLGA).

BASELINE –The time point at the start of LLGA data collection.

BASELINE DATA –Collected from participants when they first engaged/signed up.

FOLLOW-UP –The time point after adopting LLGA when programme impact is assessed.

FOLLOW-UP DATA –Collected from participants after signing and completing baseline measures.

SINGLE-ITEM PHYSICAL ACTIVITY QUESTION – Provides a quick overview of a person's activity level. Typically they are used to identify when individuals meet a physical activity standard.

IPAQ – The International Physical Activity Questionnaire is a short measure of physical activity recall. IPAQ identifies total volume of physical activity, graded by different levels of intensity or by the exercise domain.

IPAQ ADOPTERS – Participants signing up to LLGA who completed a baseline IPAQ.

IPAQ PER-PROTOCOL – Participants signing up to LLGA who completed an IPAQ at follow-up that can be matched to a baseline score for comparison.

MET's – The metabolic equivalent (MET) refers to the unit used to estimate the amount of oxygen used by the body during physical activity. Higher MET values indicate more intensive activity.

MVPA – Moderate to vigorous physical activity

PER-PROTOCOL – Adhering to the evaluation protocol (i.e. signing up to LLGA, providing baseline and follow-up measures)*.

SPORT ENGLAND PRIORITY GROUP (SPeG) – Participants who, report doing less than 30 minutes of moderate intensity physical activity each week.

Executive Summary

This document was prepared to provide an overview of the findings from *'Leeds Let's Get Active'* (LLGA). Results are generated for data that was collected up to 11th June 2015, approximately one year and 8 months since LLGA was launched.

Summary of Baseline Demographics

- At the point of analysis N=64,340 participants had signed up to LLGA. This was 390% of the Sport England Target (16,500).

- Participants adopting LLGA were predominantly female (60%) and aged 45 years or younger (76%). Areas of deprivation were well represented among the cohort.

Summary of Baseline Data

- Baseline activity data was provided by n=41,495 Adopters.

Single Item Measure Derived Baseline Activity Data:

- n=18,107 (48%) IPAQ Adopters were classified as inactive.

- n=32,787 (86.9%) failed to achieved the current physical activity recommendations.

- Males were more active than females and participants aged 16-25 and 66+ years were the most active age groups. Participants aged 46-55 years were the least active.

IPAQ Derived Baseline Activity Data:

- n=8,007 (21.2%) IPAQ Adopters were classified as inactive.

- n=13,945 (37%) failed to achieve the current physical activity recommendations.

- IPAQ Adopters were averaging 2,060 (±2,586.2) MET-minutes/week in total. They were achieving 748 (±1,449.3) MET-minutes/week of vigorous activity, 439 (±846.6) MET-minutes/week of moderate activity and 873 (±1,086.5) MET-minutes/week of walking.

- n=16,267 (43.3%) IPAQ Adopters sat for at least five hours per day.

- n=13,254 (35.4%) IPAQ Adopters played sport at least ONCE each week.

- n=4,151 (11.1%) IPAQ Adopters played sport at least THREE TIMES each week.

- On average, IPAQ Adopters were undertaking 33 (±65.8) minutes of sport each week.

Summary of Attendance & Participation Data

- To date, there have been 251,023 visits to LLGA sessions; 93% of the Sport England target (270,000). Over 135 thousand of these were by inactive participants.

- n=15,295 (40.6%) IPAQ Adopters had attended at least 1 LLGA session since signing up, 75% attended their first session within one month of signing up.

- In the last 6 months, on average, 500 inactive participants attend sessions each week.

- 58% of all attendance came from the *'Swim'* option, 42% from *'Bodyline Gym'* visits.

- n=6,888 (38%) inactive IPAQ Adopters had attended AT LEAST ONE LLGA session. Compared to inactive women, inactive men engaged significantly more sessions.

- n=2,960 (16.3%) inactive IPAQ Adopters attended sessions at LLGA for at least four weeks since sign-up. Inactive men attended for significantly more weeks versus women.

Summary of IPAQ Per-Protocol Data

- This analysis is based on n=962 Adopters completing IPAQ Per-Protocol measures.

Findings from the Single-Item Question:

- n=345 (71.1%) inactive participants reported one or more days of physical activity at follow-up. This is 25.6% (n=345/1350) of the 18 month Sport England Target (n=1350).

- There were an additional n=158 IPAQ Per-Protocol participants achieving the physical activity guidelines.

Findings from the IPAQ:

- IPAQ Per-Protocol participants were doing an additional 799 (±3092.6) MET-minutes/week at follow-up.

- Improvements were also seen for vigorous activity (393 ±1,728.2 MET-minutes/week), moderate activity (211 ±1,287.7 MET-minutes/week) and walking (195 ±1,591.7 MET-minutes/week).

- An additional n=118 participants achieving the physical activity guidelines.

- 80% (n=128) of inactive participants reported ≥1 day of physical activity at follow-up.

- n=353 (44.6%) participants improved their sitting quartile at follow-up.

- Participants were undertaking an additional 5 (±63.9) minutes of sport at follow-up.

1: Evaluation Introduction

Leeds is reported to be the most active big city in the country (1). The Active People poll by Sport England shows that over 31% of people in Leeds now take part in sport or active recreation three or more times a week. However, while Leeds may be billed as top of the UK fitness league (2), disparities in physical activity involvement across the city disadvantage low socioeconomic status communities who have much to gain from making use of existing provision to become more active. Worryingly, across Leeds, over 40% of residents engage in no sport and over 60% don't meet current physical activity recommendations.

Participation in physical activity for health improvement has a long history. Pioneering work from the 1950's onwards by, among others, Jerry Morris and Ralph Paffenbarger, paved the way for years of scientific research showing a clear causal connection between activity and health. However, current population levels of physical activity are discouraging. The world health organization has estimated that around two thirds of the world's population are insufficiently active (3). In the UK, over 60% of men, and over 70% of women fall short of achieving the current physical activity recommendations of ≥150 minutes of at least moderate intensity physical activity each week (4), despite a raft of evidence showing that important indices of health are responsive to additional energy expenditure.

Studies have estimated the risks of inactivity to be comparable to smoking one packet of cigarettes a day (5). Yet whilst only 21% of the population smoke, it is common in many countries for a much higher proportion of adults to fall short of contemporary physical activity targets. For this reason, among others, it is alarming the extent to which physical activity is so underutilized as a prevention strategy, let alone as a treatment.

However, persuading individuals to achieve current physical activity recommendations alone is not the *'magic bullet'*. Increasingly, evidence suggests that even when individuals do engage in 150 minutes of moderate intensity physical activity per week, what happens in the remaining 6500 minutes of the waking week is important for health too (6). Consequently, encouraging lifestyle activity that raises energy expenditure and reduces morbidity and mortality is an attractive prospect for public health. This document outlines the interim findings from the interim evaluation of *'Leeds Let's Get Active'*.

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2: Evaluation Methodology

This section summarises the methodology employed in the evaluation of 'Leeds Let's Get Active'. It highlights the methods used to capture measure and analyse the data. LLGA is a programme designed to encourage people who do not do any physical activity to do at least 30 minute of moderate intensity physical activity each week. LLGA supports inactive people to become active through the provision of free access to leisure centres, community sports and activities within a supportive and welcoming environment.

As recommended by 'Sport England', the short form International Physical Activity Questionnaire (IPAQ) was used to gather activity data (Appendix A). This tool has been shown to be valid and reliable with adult populations (7). IPAQ is a short recall questionnaire providing a quick assessment of the total volume of physical activity classified by dimension of intensity or domain (type or mode) (8). Using IPAQ responses, we calculated total MET-minute/week expenditure by summing the relevant activity dimension's and domains. The number of days featuring these activities was multiplied by the estimated time per day spent doing each one. The relative energy expenditure of each activity was taken into account by multiplying weekly minutes by a MET value (multiples of the resting metabolic rate) recommended by the IPAQ scoring protocol (walking was scored as 3.3 METS, moderate intensity activity was 4 METS and vigorous intensity activity and 8 METS) (7). From this data, participants were coded into three levels of physical activity as per the IPAQ scoring protocol (9).

Further activity data were captured through a single item physical activity question assessing days of physical activity per week. The single-item measure has been validated for use demonstrating strong reproducibility and modest concurrent validity (10). An open response scale to the question was used, with valid responses ranging from 0 to 7 days. Self-reported measures of physical activity and energy expenditure have been found to be sensitive enough to predict changes in activity (11). Additional data was gathered through XN, a leisure industry IT management system that provides data on attendance at LLGA.

Data were collected at baseline (typically at registration) and again at follow-up (every 4 months), see Appendix A for the full data collection tool. Participants were then grouped into health enhancing physical activity categories according to activity scores from the single-item measure and IPAQ. This division formed three distinct groups, (i) inactive, (ii) insufficiently active and (iii) sufficiently active participants (12).

A participant was classified as inactive if they reported a zero or one on the single-item measure, or no days of MVPA totalling less than 120 MET-minutes/week on the IPAQ. Insufficiently active participants reported 2-4 days of physical activity on the single-item measure, or 1-4 days of any combination of walking/MVAP achieving between 120-599 MET-minutes/week on the IPAQ. The cut point for participants being classified as sufficiently active was achieved if participants reported 5 days or more on the single-item measure, or reported 5 or more days of any combination of walking/MVPA achieving a minimum of at least 600 MET-minutes/weeks on the IPAQ.

Following ethical clearance, once collected, data were inputted into the statistical software package SPSS (v21) for analysis. Percentages were calculated from the total number of valid answers given for a question. In addition to generating descriptive statistics, inferential analyses were conducted (where appropriate) to explore the relationship between variables of interest. Unless otherwise stated, a p value of 0.05 or less was taken to be statistically significant. Variations in the sample size were found for variables when compared to the number of Adopters and Per-Protocol participants engaged in the LLGA evaluation.

In the results section, demographics are reported for All Adopters and IPAQ Adopters. All Adopters refers to any participant signing up to LLGA, IPAQ Adopters are those participants signing up to LLGA and submitted an IPAQ. It is important to examine these two groups separately and compare their demographic profiles. If they are comparable, we can hypothesise that findings from IPAQ Adopters can be generalised to All Adopters.

3: Results

A: Baseline Data - Participants Adopting LLGA

(i)   Demographics

This section shows the demographic breakdown of participants adopting LLGA. In this section data is reported for two groups, (i) All Adopters – referring to any participant signing up to LLGA, and (ii) IPAQ Adopters – referring to any adopter who signed up to LLGA and completed an IPAQ. Essentially IPAQ Adopters are a subset of All Adopters.

Summary of Demographics for All Adopters

- This analysis is based on N=64,340 participants signed up to LLGA.

- Almost 60% of All Adopters were female. LLGA's original marketing approach was to target females as they were seen as the gatekeeper to the family – this therefore suggests that this desired target group was reached.

- The mean age of All Adopters was 33 years. Females had a significant higher mean age (34 years) when compared to males (32 years). In total over 76% of All Adopters were aged 45 years or younger.

- LLGA was attracting participants from target areas of deprivation. Areas with the highest proportion of All Adopters were LS12 (Armley, Farnley, New Farnley, Wortley) and LS13 (Bramley, Rodley, Swinnow).

Summary of Demographics for IPAQ Adopters

- From the total sample, baseline IPAQ's were provided for n=41,495 Adopters.

- There were more females than males completing IPAQ's. Females accounted for around 62% of IPAQ Adopters.

- On average, IPAQ Adopters were older than all Adopters by three years. Mean age for IPAQ Adopters was 36 years; females had a higher mean age (36 years) when compared to males (35 years).

- Over 73% of IPAQ Adopters were aged 45 years or younger.

3.A. i.i - Gender:

All Adopters -

In total n=63,549 Adopters provided information on gender. Male and female Adopters engaged LLGA interventions across all sites. Figure 1 highlights that a larger proportion of the total sample was female, 59.7% (n=37,907/63,549).

IPAQ Adopters -

For IPAQ Adopters, n=36,266 provided data on gender. Among this group 61.9% (n=22,455/36,266) of IPAQ Adopters were female versus 38.1% (n=13,811/36,266) that were male.

Figure 1: All Adopters Gender
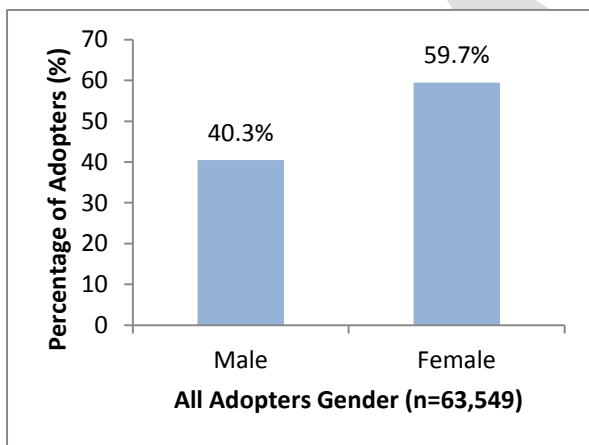
Figure 2: IPAQ Adopters Gender

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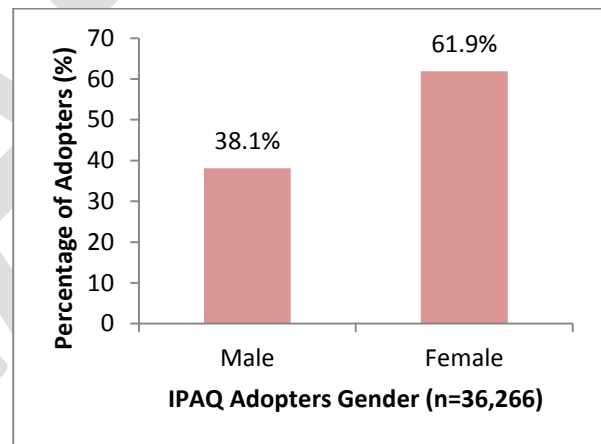
3.A. i.ii - Age:

All Adopters -

In total n=64,307 Adopters provided data on age. Participants mean age was 33 (±17.89) years. As figure 2 indicates, 76% (n=49,936/64,307) of all Adopters were 45 years old or younger. Further, there were statistically significant differences in age by gender (t [63519] =-11.902, $p<.001$). Analysis highlighted that female Adopters, (34 years ±17.2) had a higher mean age when compared to the males (32 years ±18.7).

IPAQ Adopters -

For IPAQ Adopters, n=36,422 provided age data. Mean age was 36 (±16.5) years, roughly three years higher than mean age reported by all Adopters. Among this group, 73.4% (n=26,738/36,422) were aged 45 years or younger. Further, there were no statistically different differences in age by gender (t [36264] = -1.948, $p>.05$). Although, females (36 years ±15.89) had a higher mean age compared to males (35 years ±17.40).

Figure 3: All Adopters Age Range
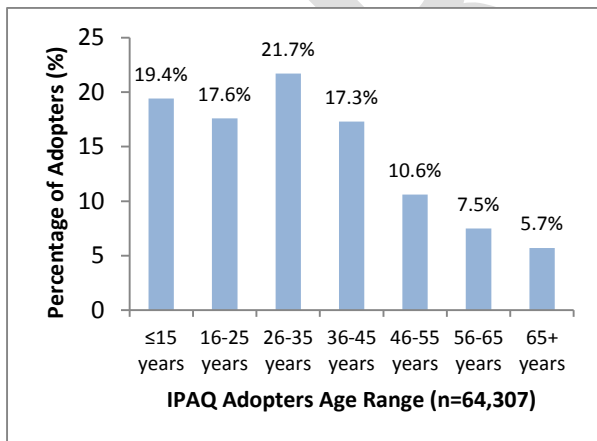
Figure 4: IPAQ Adopters Age Range

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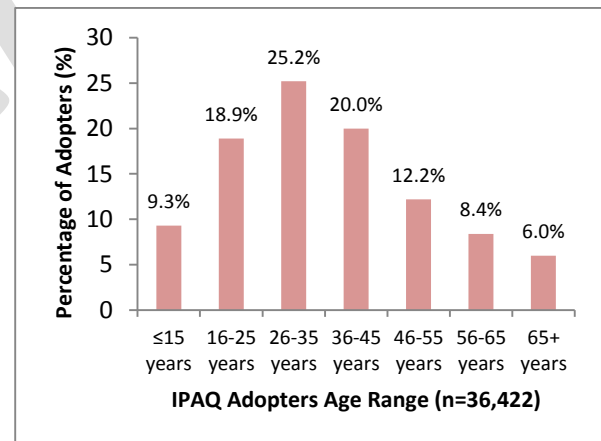
3.A.i.iii - Postcode Area:

All Adopters -

In total n=64,340 Adopters provided data on postcode. The majority of these (92.5% n=59,532/64,340) reported a Leeds postcode. The other 7.5% reported not living in Leeds; they may own multiple homes (their main residence being outside Leeds) or commute to Leeds and use the leisure facilities within the city even though they may not live here. The LS12/13 postcodes (west Leeds) were most common among All Adopters.

IPAQ Adopters -

For IPAQ Adopters, n=36,387 participants provided data on their postcode area. Again, the majority of this group reported their main residence to be in a Leeds post code, 92.6% (n=33,720/36,387). Further, Wakefield and Bradford were the other main postcode areas reported. The LS12 and 13 postcodes were also the most common among this group.

Table 1: All Adopters Top 5 Postcode Areas

Postcode	Area's	Percentage
LS12	Armley, Farnley, New Farnley, Wortley	10.5% (n=6,744/64,340)
LS13	Bramley, Rodley, Swinnow	6.1% (n=3,907/64,340)
LS28	Calverley, Farsley, Pudsey, Stanningley	5.3% (n=3,427/64,340)
LS8	Roundhay, Oakwood, Gledhow	5.1% (n=3,261/64,340)
LS10	Belle Isle, Hunslet, Middleton	5.0% (n=3,227/64,340)

Table 2: IPAQ Adopters Top 5 Postcode Areas

Postcode	Area	Percentage
LS12	Armley, Farnley, New Farnley, Wortley	8.9% (n=3,254/36,387)
LS13	Bramley, Rodley, Swinnow	5.6% (n=2,032/36,387)
LS28	Calverley, Farsley, Pudsey, Stanningley	5.4% (n=1,951/36,387)
LS8	Roundhay, Oakwood, Gledhow	5.3% (n=1,938/36,387)
LS25	Garforth, Hillam, Kippax, Micklefield	5.2% (n=1,908/36,387)

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(ii)   International Physical Activity Questionnaire (IPAQ) & Baseline Data

Following data cleaning, this section highlights the physical activity, and sports participation levels for those Adopters who completed and returned baseline IPAQ data (IPAQ Adopters).

Summary of IPAQ & Baseline Data

- This analysis is based on n=41,495 Adopters completing IPAQ's and baseline measures.

- LLGA attracted a significant proportion of IPAQ Adopters that were inactive, sat for prolonged periods each day and engaged in no sport each week.

- Examples of IPAQ and the supplementary questions used are shown in appendix A.

Findings from the Single-Item Question:

- n=18,107 (48%) IPAQ Adopters were classified as inactive - failing to achieve 30 minutes of moderate intensity physical activity each week.

- n=32,787 (86.9%) of participants failed to achieve the physical activity recommendations.

- Males were more active than females and participants aged 16-25 and 66+ years were the most active age groups. Participants aged 46-55 years were the least active.

Findings from the IPAQ:

- n=8,007 (21.2%) IPAQ Adopters were classified as inactive.

- n=13,945 (37%) of IPAQ Adopters failed to achieve the physical activity recommendations.

- Inactive participants were older than those deemed sufficiently active for health.

- IPAQ Adopters were averaging 1,158 (*Mdn*) MET-minutes/week of physical activity. Males were significantly more active than females and IPAQ Adopters aged 16-25 years were significantly more active than all other age groups.

- n=16,267 (43.3%) IPAQ Adopters sat for at least five hours per day. Participants aged 16-25 and 66+ years presented the lowest sitting risk.

- n=13,254 (35.4%) participants played sport at least ONCE each week.

- n=4,151 (11.1%) participants played sport at least THREE TIMES each week.

- Male IPAQ Adopters and those aged 16-25 years old engaged in sport for significantly more time each week compared to women and all other age groups.

3.A.ii.i - Days of Physical Activity per Week: (Single-Item Question: Q1 – Appendix A)

Current recommendations suggest that adults should undertake 150+ minutes of moderate intensity physical activity each week, equating to around five sessions of physical activity lasting 30 minutes or more each week (4). Numerous investigations have confirmed the strong link between physical activity and health in a variety of populations. Following data cleaning, n=37,711 data sets were available on days of physical activity undertaken per week. Only 13.1% (n=4,924/37,711) were achieving the recommended amount of physical activity each week based on this measure; 38.9% (n=14,680/37,744) were insufficiently active. Further, there were n=18,107 (48%) IPAQ Adopters meeting the inclusion criteria for Sport England's priority target group (i.e. less than 30 minutes of moderate intensity physical activity per week). Male IPAQ Adopters were physically active on significantly more days per week compared to female IPAQ Adopters (t [32645] = 11.124, $p<.001$). Further there were significant differences in days of physical activity pre week by age (F [5, 32671] =47.860, $p<.001$). IPAQ Adopters aged 16-25 and 66+ years were significantly more active than all other age groups apart from each other. IPAQ Adopters aged 46-55 years were the least active age group.

Figure 5: IPAQ Adopters Days of Physical Activity per Week
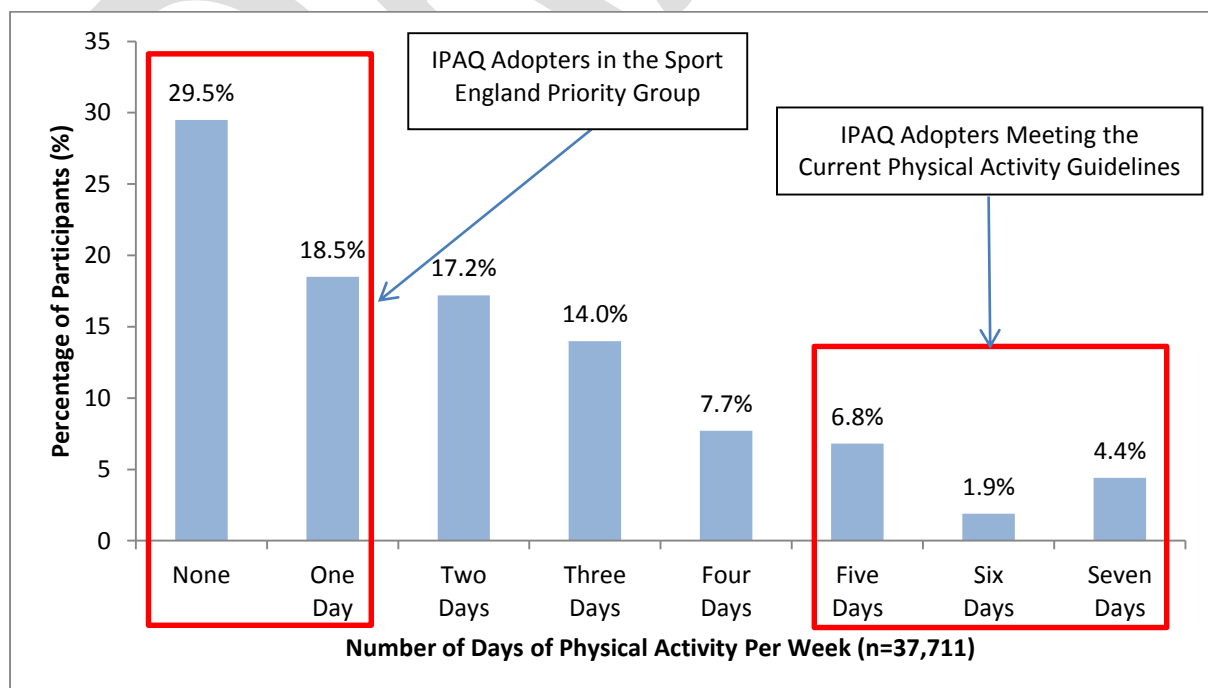
3.A.ii.ii - MET-Minutes/Week of Physical Activity: (IPAQ data– Q2-8 Appendix A)

IPAQ is an instrument designed primarily for the population surveillance of physical activity among adults (9). It has been developed, tested and validated for use in adults (aged 15-69 years) to determine an individual's weekly metabolic equivalent (7). The metabolic equivalent (MET) refers to the unit generated to estimate the amount of oxygen used by the body during physical activity. One MET is equal to the energy (oxygen) used by the body whilst at rest, sitting quietly or reading a book, for example. The harder your body works during an activity, the more oxygen is consumed and the higher the MET level. Research has matched the MET intensity levels to physical activities. They range from 0.9 MET's (sleeping) to 18 MET's (running at 10.9mph) (13). In general, the more MET-minutes/week of physical activity an individual undertakes the greater health benefits they can expect.

In total n=37,711 IPAQ Adopters provided data on physical activity undertaken during the previous week. Table 3 shows the MET-minutes/week expenditure summary. The mean and median MET-minutes/week of physical activity undertaken by participants returning IPAQ was 2060 (±2586) and 1158 (231-2910) respectively. MET-minutes/week expenditure in males (*Mdn*=1,455) was significantly different compared to females (*Mdn*=1,044) U=110358279, *Z*=-16.442, *p<.001*. These findings suggest that males were more physically active compared to females. Further, significant differences between MET-minutes/week expenditure and age were identified (H [5] = 331.947, *p<.001*). Post hoc analysis using a Bonferroni correction found that Adopters aged 16-26 years were significantly more active than all other age groups (*p*<.001).

Table 3: IPAQ Physical Activity Summary

	Vigorous Activity	*Moderate Activity*	*Walking Activity*	*TOTAL ACTIVITY*
Mean MET-minutes/week (±*SD*)	748.0 (±1449.33)	439.1 (±846.62)	873.1 (±1086.47)	2060.2 (±2586.2)
Median MET-Minutes/week (*IQR*)	0 (0-960)	0 (0-480)	432 (33-1337)	1158 (231-2910)

3.A.ii.iii – IPAQ Derived Physical Activity Category: (IPAQ data– Q2-8 Appendix A)

Using the MET-minute/week scores from the data above, n=37,711 IPAQ Adopters were assigned a physical activity category determined by the IPAQ scoring protocol (9). Figure 6 shows that 37% (n=13,945/37,711) were in the Low Activity category, and therefore not meeting the current physical activity guidelines. There were 39.3% (n=14,802/37,711) classified as Moderately Active and 23.8% (n=8,964/37,711) Highly Active. Data suggests that IPAQ Adopters were a relatively active cohort compared to national averages. There were statistically significant differences in activity category between males and females (χ^2 [2] = 363.123, *p*<.001), males presented more favourable activity categories. A larger proportion of males (30.3% n=3,631/11,985) resided in the Highly Active category compared to females (20.9% n=4,327/20,662), and more females (37.7% n=7,796/20,662) in the Low Activity category compared to males (32.4% n=3,887/11,985). Significant differences in age between physical activity categories were also identified (F [2, 32,674] = 92.240, *p<.001*). Post hoc analyses using a Bonferroni correction found that IPAQ Adopters in the High Activity category (36.9 years, ±15.43) were significantly younger than those in the Moderate (39.0 years, ±15.03, *p<.001*), and Low Activity categories (39.8 years, ±14.64, *p<.001*).

Figure 6: IPAQ Adopters Physical Activity Categories
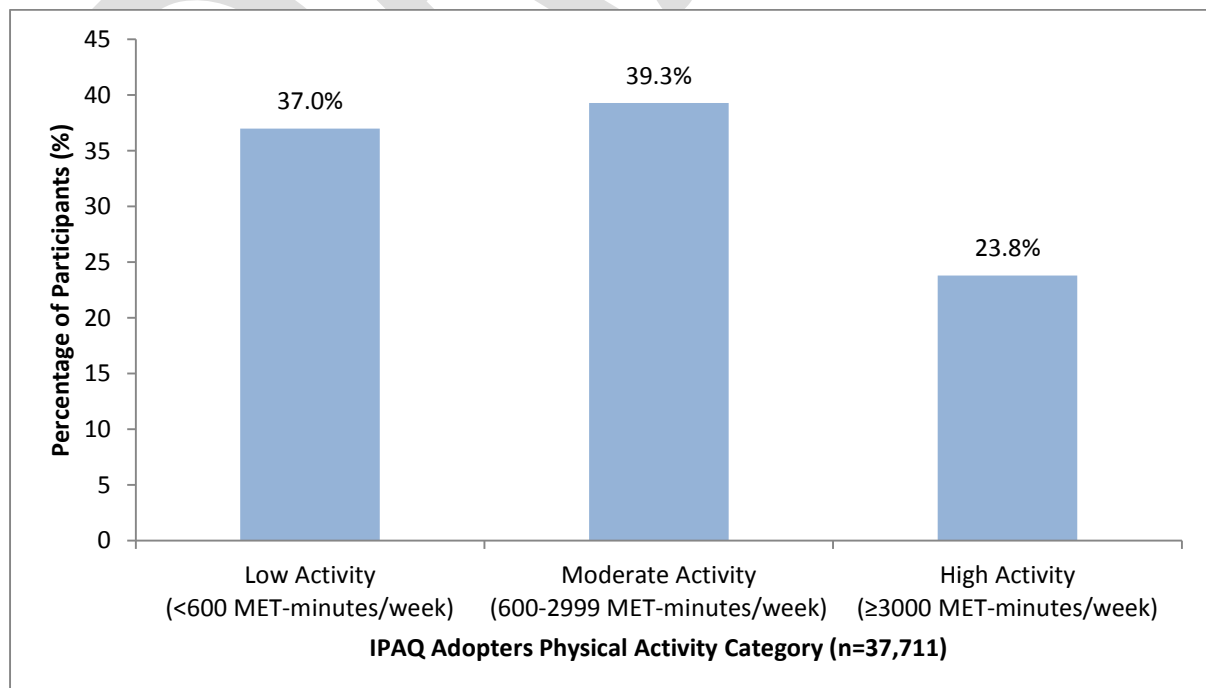
3.A.ii.iv - Sport England Priority Target Group (SPeG): (IPAQ data – Q2-8 Appendix A)

Based on IPAQ scores, participants were then grouped into health enhancing physical activity categories; (i) inactive, (ii) insufficiently active and (iii) sufficiently active participants (12). A participant was classified as inactive (SPeG) if they reported no days of MVPA totalling less than 120 MET-minutes/week. Insufficiently active participants reported 1-4 days of any combination of walking/MVAP achieving between 120-599 MET-minutes/week. Participants were classed as sufficiently active if they reported 5 or more days of any combination of walking/MVPA achieving a minimum of at least 600 MET-minutes/week. Often considered the least fit within society, inactive (SPeG) individuals generally benefit most from improvements in physical activity (14). In total, 21.2% (n=8,007/37,711) of IPAQ Adopters were inactive, meeting the criterion for inclusion in the SPeG group. There was no significant association between gender and the SPeG status of participants (χ^2[1] =0.494, *p*=0.482). However, there were significant differences in age between the SPeG group (39.3 years, ±14.66) and those who achieved >30 minutes of moderate physical activity pre week (38.6 years, ±15.12) *t* [32675] =3.343, *p*<0.001.

Figure 7: IPAQ Adopters HEPA Categories
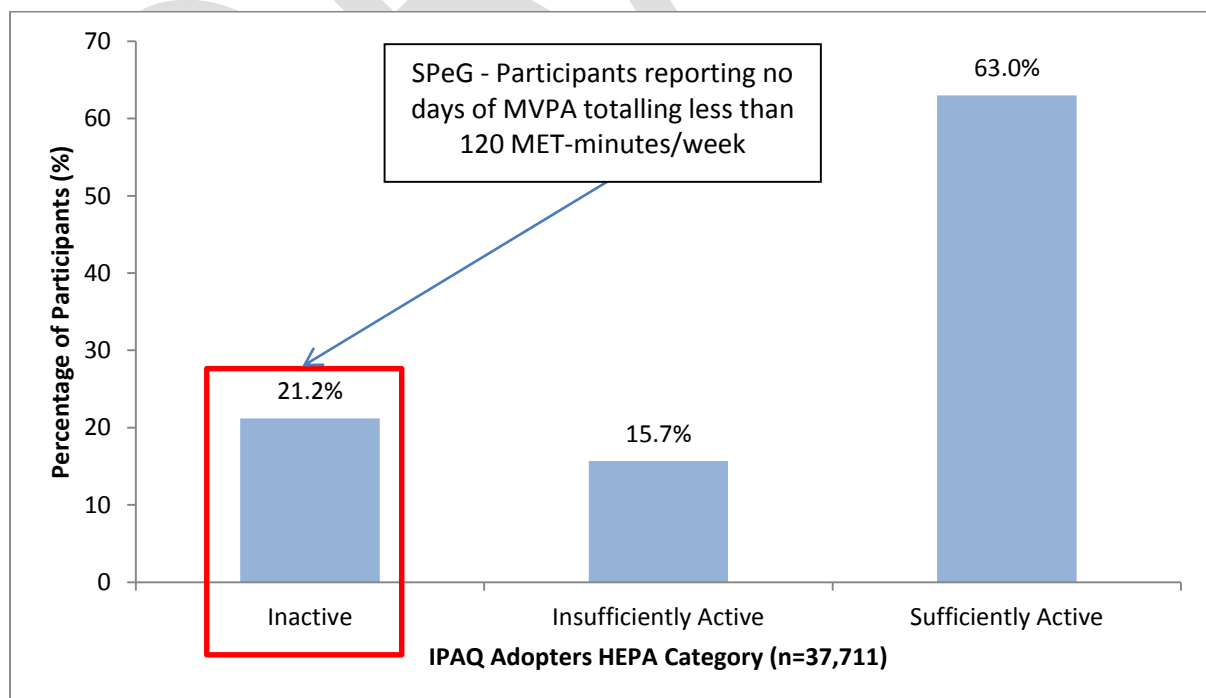
3.A.ii.v - Daily Sitting Time: (IPAQ Data – Q7 Appendix A)

In total n=37,711 IPAQ Adopters provided data on weekday sitting time. Prolonged sitting, independent of time spent in physical activity, is associated with all-cause mortality, CVD, obesity, type 2 diabetes, poor bone health and metabolic syndrome (15). In general, longer, more frequent bouts of prolonged siting throughout the day are harmful to health. Median daily sitting time was 240 minutes/day (four hours). Daily sitting time ranged from 1-659 minutes/day with an inter quartile range of 60-390 minutes/day. In total, 43.3% (n=16,267/37,569) of IPAQ Adopters sat for at least five hours per day, and 33.4% (n=12,539/37,569) sat for at least six hours daily. There were statistically significant differences in daily sitting time by gender (*t* [32518] =3.735, *p*<0.001), males (260 minutes/day) sat for approximately 9 minutes longer each day compared to females (251 minutes/day). Further, there were statistically significant differences in daily sitting time by age category (*F* [5, 32544] =15.787, *p<.001*). IPAQ Adopters aged 16-25 and 66+ years sat for significantly less time per day than every other age group (*p*<.001) apart from each other.

Figure 8: IPAQ Adopters Daily Sitting Time Quartiles
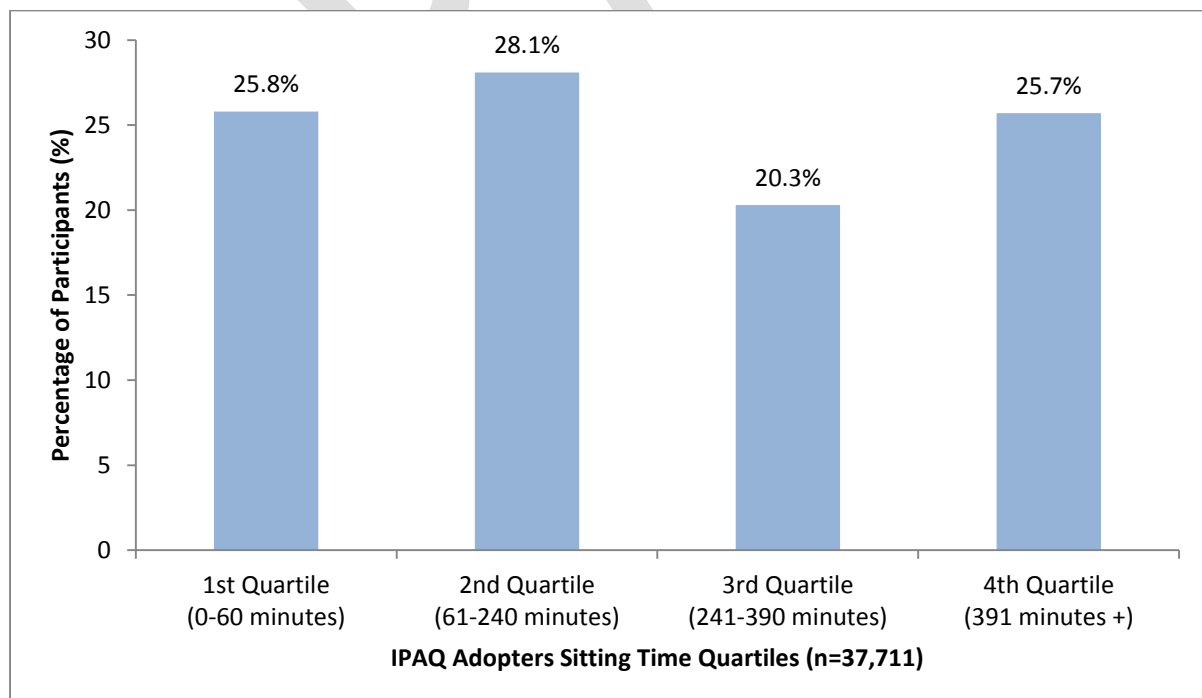
3.A.ii.vi - Weekly Sport Participation: (Q 9-10: Appendix A)

Data on sports participation was provided by n=37,483 IPAQ Adopters. Analysis indicates that 35.4% (n=13,254/37,483) of IPAQ Adopters played sport at least once each week, and 11.1% (n=4,151/37,483) played sport at least three times each week. In total, 43.3% (n=5,189/11,985) of men played sport at least once a week, compared to 32.1% (n=6,597/20,535) of women. On average, IPAQ Adopters were undertaking 33 (±65.8) minutes of sport each week. Men engaged in sport for significantly more time each week - around 17 minutes - compared to women (t [32645]=22.824, *p<.001*). There were also significant differences in sports participation by age (F [5, 32671] =135.322, *p<.001*). IPAQ Adopters aged 16-25 years were participating in significantly more sport pre week compared to all other age groups (*p<0.001*).

Figure 9: IPAQ Adopters Days of Sport per Week
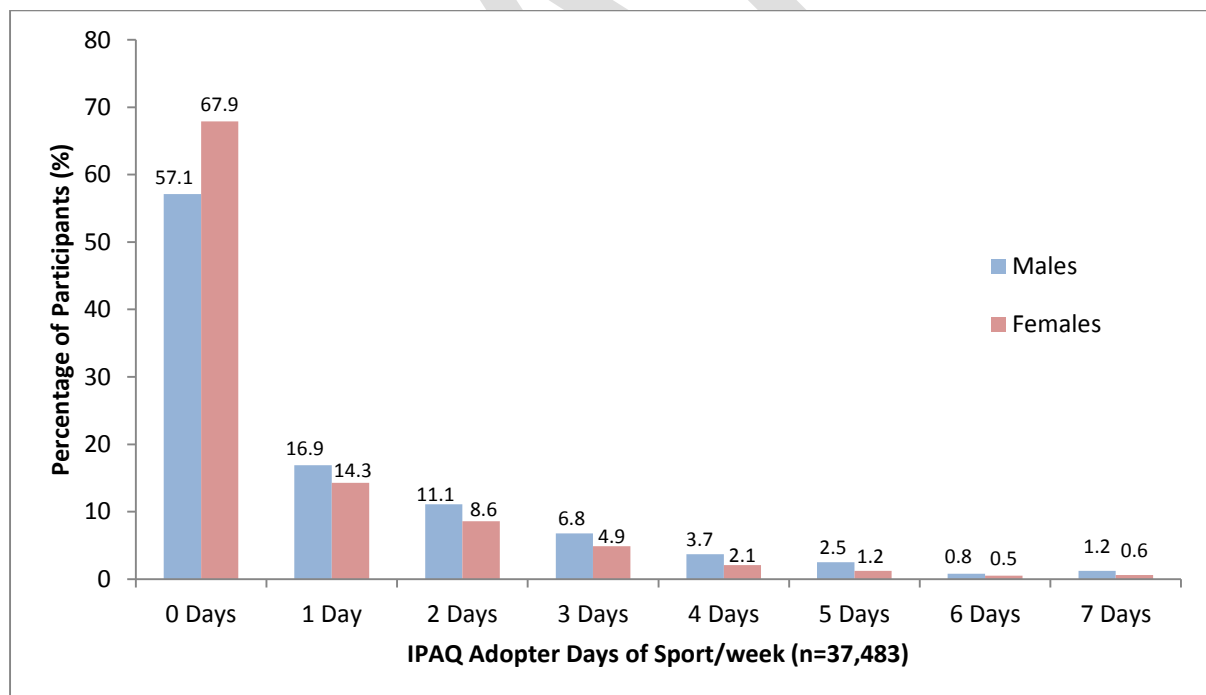
(iii) **Attendance Data & Participation at LLGA**

This section highlights the number and proportion of Adopters that signed up to LLGA and attended weekly gym and/or swim sessions from XN data.

Summary of Attendance Data & Participation at LLGA

- At the point of analysis n=64,340 Adopters had signed up to LLGA, accounting for 390% of the recruitment target (16,500) set by Sport England.

- To date, there have been over 251,023 thousand visits to LLGA sessions. This accounts for 93% of the 18 month attendance target set by Sport England (270,000).

- Further, over 135 thousand of these visits were by inactive participants, and in the last 6 months, LLGA has been regularly engaging with over 500 inactive participants each week.

- Attendance data indicate that the *'Swim'* option was more frequently attended than the *'Bodyline Gym'* offer; around 58% of attendance came from the *'Swim'* option and 42% came from *'Bodyline Gym'* visits.

- Armley leisure centre was the best attended centre, accounting for 21.9% of total visits.

- There were n=18,107 inactive IPAQ Adopters at baseline, of these n=6,888 had attended at least one LLGA session. Among this group of attendees men engaged significantly more sessions since signing up compared to women.

- At the point of analysis, n=2,960 inactive IPAQ Adopters had attended at least one session at LLGA for at least four weeks since singing up. Among this group, inactive men engaged in sessions at LLGA leisure centres for significantly more weeks since signing up compared to women.

- Only 40.6% of IPAQ Adopters had attended a session at LLGA since signing up. Among this group, around 75% attended their first session within one month of signing up.

- Only a quarter of participants who do not attend a session within 1 month of signing up ever attend.

- Sufficiently active IPAQ Adopters took significantly less time to attend their first session when compared to inactive and insufficiently active IPAQ Adopters.

3.A.iii.i - LLGA Sign Up/Attendance for All Participants: (XN Data)

Overall LLGA attracted N=64,340 card members, which is 390% of the 18 month recruitment target set by Sport England. Further, there have been 251,023 visits to Leeds leisure centres which account for 100.4% of the 18 month attendance target (250,000). Over 135 thousand of these visits (53.9%) were by participants identified as inactive at baseline by the single-item measure. Figure 10 shows LLGA sign-up and attendance data up to 11th June 2015. At this point n=30,089 adopters had attended at least one session (46.8%), however, n=34,251 were yet to attend (53.2%). Data indicate that the *'Swim'* option was more frequently attended than the *'Bodyline Gym'* offer; around 57.5% of attendance came from the *'Swim'* option and 42.5% came from *'Bodyline Gym'* visits. Moreover, Armley leisure centre was the most popular venue accounting for 21.9% of total visits.

Figure 10: Sign Up and Attendance at LLGA
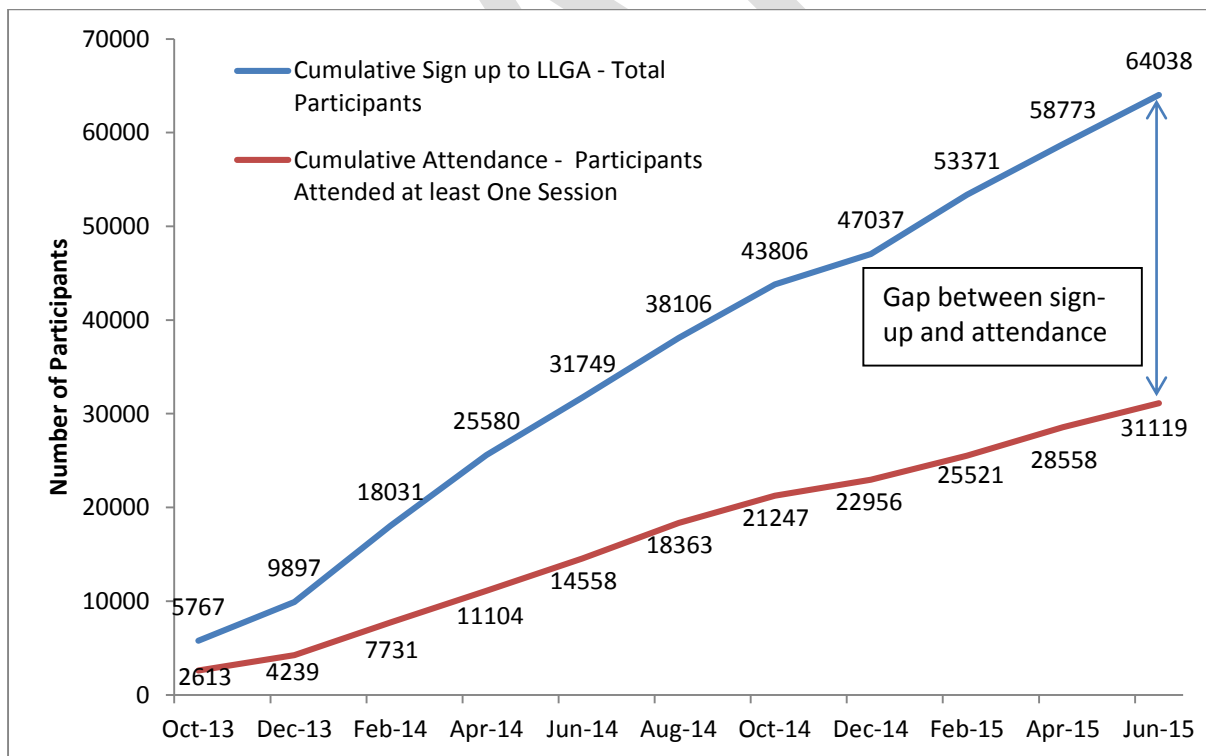
3.A.iii.ii – Inactive IPAQ Adopters Attendance at LLGA: (XN Data& Q1 Appendix A)

Using XN attendance data combined with question 1 of the data collection tool, n=18,107 inactive IPAQ Adopters were identified at baseline. Figure 11 shows the attendance levels of these individuals by week number. In the absence of complete follow-up IPAQ data, these data may act as an indirect measure for assessing changes in physical activity participation. On average, around 476 inactive IPAQ Adopters engaged LLGA sessions each week. Over the last 6 months, data indicates that on average, 512 inactive IPAQ Adopters attend LLGA sessions each week. At the point of analysis, 38% (n=6,888/18,107) of inactive IPAQ Adopters had attended at least one LLGA session. Among this group, men had engaged in significantly more sessions (11.1) compared to women (7.9) since signing up, *t* [6684] =7.349, *p*<.001. Further, there were 16.4% (n=2,960/18,107) of IPAQ Adopters - identified as inactive at baseline - that had attended at least one session at LLGA for at least four weeks since singing up. Among this group, men engaged sessions at LLGA leisure centres for significantly more weeks (13 weeks) compared to women (11 weeks), *t* [2905] = 4.809, *p*<.001.

Figure 11: Number of Inactive IPAQ Adopters Attending LLGA Sessions Each Week
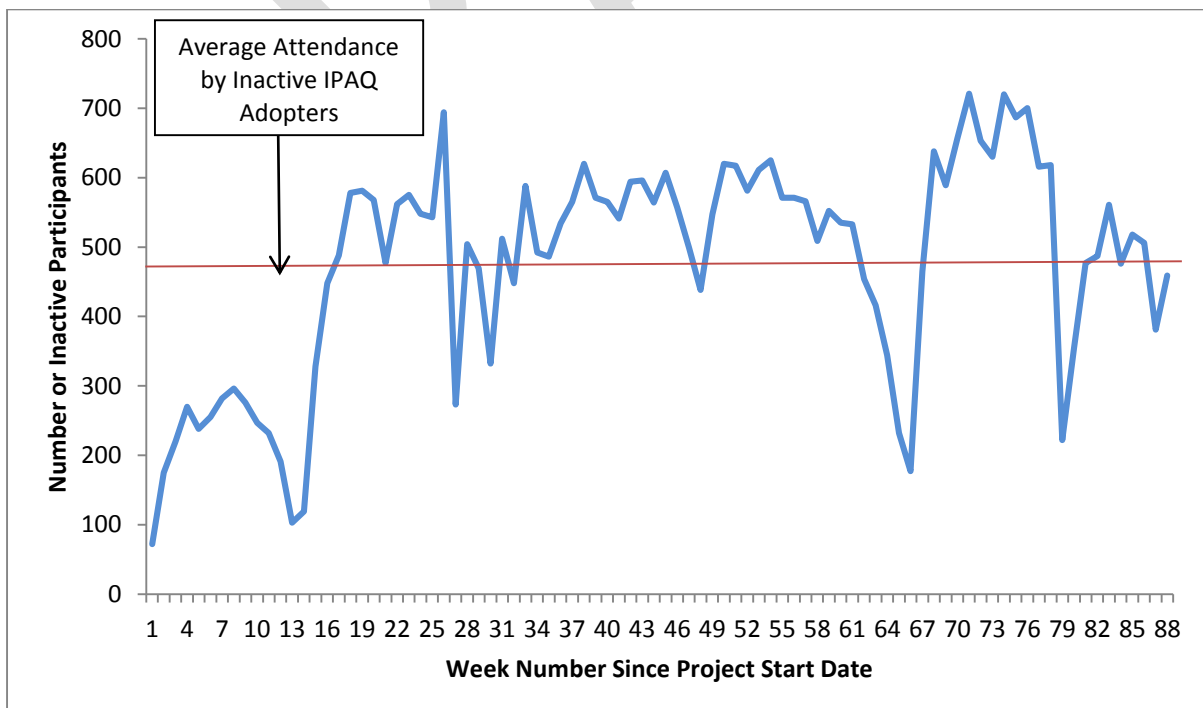
Note: This graph shows four large dips in attendance – these include two Christmas and two Easter periods where some sites will have either been closed or had restricted opening times.

3.A.iii.iii – Time from Sing-Up to First Visit at LLGA: (XN Data & IPAQ data – Q2-8 Appendix A)

Once participants had signed-up to LLGA they were eligible to attend free gym and/or swim sessions put on by the 17 participating leisure centres. At the time of analysis 40.6% (n=15,295/37,711) of IPAQ Adopters had attended at least one session at LLGA. Overall, 73.9% (n=11,043/14,960) had attended their first session within one month of signing up, 12% (n=1,797/14,960) took between 1-3 months, 6.4% (n=954/14,960) took between 3-5 months, 5.4% (n=806/14,960) took between 6-12months and 2.4% (360/14,960) waited 12 months+ before attending their first LLGA session. Put another way, only one quarter of participants who do not attend within 1 month of signing up, ever attend a single session. Men took a significantly shorter time period (5.4 weeks, ±11.63) from signing-up to attending their first LLGA session compared to women (6.8 weeks, ±13.78), t [14944] = -6.123, $p<.001$). Table 4 shows the time period from sign-up to first LLGA visit by HEPA category. In each HEPA category the majority of participants, around 75%, attended their first session within one month of signing-up. Further, although the data in table 4 looks analogous, there were statistically significant differences in time from signing-up to first visit by HEAP category (H [2] =3.118, $p<.05$). IPAQ Adopters who were sufficiently active took significantly less time to attend their first session compared to inactive insufficiently active participants.

Table 4: Time from sign-up to first visit at LLGA by HEPA

HEPA Category (n=14,960)	Time Period from Sign-Up to 1st Visit (n)				
	< 1 Month	1-3 Months	3-5 Months	6-12 Months	12 Months +
Inactive (n=6,728)	72.6% (4,884)	12.5% (843)	6.7% (453)	5.7% (384)	2.4% (164)
Insuff Active (n=6,121)	74.4% (4,551)	12.0% (735)	6.0% (365)	5.2% (321)	2.4% (149)
Suff Active (n=2,111)	76.2% (1,608)	10.4% (219)	6.4% (136)	4.8% (101)	2.2% (47)

Note: Insuff = Insufficiently, Suff = Sufficiently

B: Follow-Up Data (Impact Evaluation) –

This section highlights the demographic profile, physical activity levels, and sports participation rates of those Adopters completing baseline and follow-up measures (IPAQ Per-Protocol).

Summary of IPAQ Per-Protocol Data

- This analysis is based on n=962 Adopters completing IPAQ Per-Protocol measures.

- The demographic profile of this group is comparable to IPAQ Adopters.

- 45% of participants completed follow-up measures at least 6 months after baseline. Therefore, the positive findings among this group indicate maintenance of behaviour.

Findings from the Single-Item Question:

- n=345 (71.1%) inactive participants reported one or more days of physical activity at follow-up.

- There were an additional n=158 participants achieving the physical activity guidelines at follow-up compared to baseline.

- Data show significant improvements in HEPA category, and days of physical activity.

Findings from the IPAQ:

- IPAQ Per-Protocol Participants were doing an additional 799 (±3092.6) total MET-minutes/week at follow-up.

- Participants also displayed significant improvements in vigorous activity (393 ±1,728.2 MET-minutes/week), moderate activity (211 ±1,287.7 MET-minutes/week) and walking (195 ±1,591.7 MET-minutes/week).

- An additional n=118 participants were achieving the physical activity guidelines.

- n=128 (80%) inactive participants reported ≥one day of physical activity at follow-up.

- n=353 (44.6%) participants improved their sitting quartile at follow-up.

- Data indicated statistically significant improvements in days of sport per week from baseline to follow-up. There was true for both males and females.

- Participants were undertaking an additional 5 (±63.9) minutes of sport at follow-up.

3.B.i – IPAQ Per-Protocol Demographics:

Once data were cleaned, n=962 IPAQ Per-Protocol Adopters provided demographic data on gender, age and postcode. Table 4 shows the demographic breakdown of this group compared to the demographic breakdown of cleaned IPAQ Adopters data. The IPAQ Per-Protocol sample contained 63.8% females and 36.2% males, comparable to the IPAQ Adopters sample. However, IPAQ Per-Protocol Adopters had a mean age of 45 (±14.4) years; this was considerably higher when compared to IPAQ Adopters mean age, 39 (±15.0) years. The most frequently occurring postcodes among this group were comparable to the sample of IPAQ Adopters; LS12 was the most frequent accounting for nearly 9% of IPAQ Per-Protocol Adopters. Data suggests that the demographic make-up of the IPAQ Per-Protocol sample is comparable in terms of gender, but on average they are considerably older than IPAQ Adopters. Further, both groups came from areas of comparable health inequalities.

Table 5: Demographics for IPAQ Per-Protocol vs. IPAQ Adopters

		Per-Protocol Adopters % (n)	*IPAQ Adopters % (n)*
Gender	Male	36.2% (347)	36.7% (11,985)
	Female	63.8% (611)	63.3% (20,662)
Age	16-25	8.4% (81)	20.7% (6,770)
	26-35	18.0% (173)	27.7% (9,061)
	36-45	24.9% (239)	22.1% (7,224)
	46-55	20.5% (197)	13.5% (4,424)
	56-65	19.1% (183)	9.3% (3,034)
	66+	9.0% (86)	6.6% (2,164)
Postcode	LS12	8.6% (83)	8.0% (3,025)
	LS13	4.9% (47)	4.9% (1,866)
	LS28	7.7% (74)	4.7% (1,779)
	LS8	4.9% (47)	4.5% (1,706)
	LS25	4.7% (45)	4.4% (1,655)

3.B.ii – Time from Baseline to Follow-Up for IPAQ Per-Protocol Participants:

Regarding follow-up data collection, it was agreed with Sport England that LLGA would implement a series of 'IPAQ Week's' whereby all participants signed-up to LLGA would receive an e-mail inviting them to complete follow-up measures. It was thought that method this would help maximise the response rate. This 'IPAQ Week' would take place every 4 months, meaning that the time period from baseline to completing follow-up measures would not be a uniform 12 weeks, but would vary by participant. Participants are then grouped by the time period from baseline to follow-up. For this analysis, there were n=962 IPAQ Per-Protocol Adopters, Table 6 shows the time period between baseline and follow-up data collection. Over 45% of IPAQ Per-Protocol participants completing follow up measures at least 6 months after signing up. Further, only 5.1% of participants completed follow-up measure less than one month after signing up. The majority of participants, 77.2% (n=743/962), had undertaken follow-up measures more than 12 weeks (or 3 months) after baseline.

Table 6: Time from Completing Baseline to Follow–Up Measures by HEPA Category

	Time Period from Baseline to Follow-Up Visit (n)				
	< 1 Month	*1-3 Months*	*3-5 Months*	*6-12 Months*	*12 Months +*
Total (n=962)	5.1% (49)	17.7% (170)	32.1% (309)	32.5% (313)	12.6% (121)
Inactive (n=485)	4.7% (23)	15.5% (75)	37.3% (181)	32.0% (155)	10.5% (51)
Insuff Active (n=364)	6.0% (22)	18.4% (67)	27.2% (99)	32.1% (117)	16.2% (59)
Suff Active (n=113)	3.5% (4)	24.8% (28)	25.7% (29)	36.3% (41)	9.7% (11)

Note: Insuff = Insufficiently, Suff = Sufficiently

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3.B.iii – IPAQ Per-Protocol Days of Physical Activity per Week: (Q1 – Appendix A)

Following data cleaning, n=962 IPAQ Per-Protocol Adopters provided data on days of physical activity undertaken per week at baseline and follow-up. Based on these scores, participants were categorised in to HEPA categories (see section 2: Evaluation Methodology). Figure 12 shows changes in HEPA categories for IPAQ Per-Protocol Adopters from baseline to follow-up. In total, 345 (71.1%, n=345/485) inactive IPAQ Per-Protocol Adopters had moved out of this category at follow-up. Further, 158 (18.6%, n=158/849) participants classified as not meeting the physical activity recommendations at baseline had gone on to achieve them at follow-up. Data also indicated statistically significant improvements in days of physical activity from baseline (1.9, ±1.90) to follow-up (3.1, ±1.84), *t* [961] = -17.853, *p*<.001 *r* = 0.50). Likewise, HEPA categories were significantly improved from baseline to follow-up (*z* = -14.226, *p* <.001, *r* = 0.46).

Figure 12: Changes in Single-Item Question Derived Activity Category for IPAQ Per-Protocol Adopters
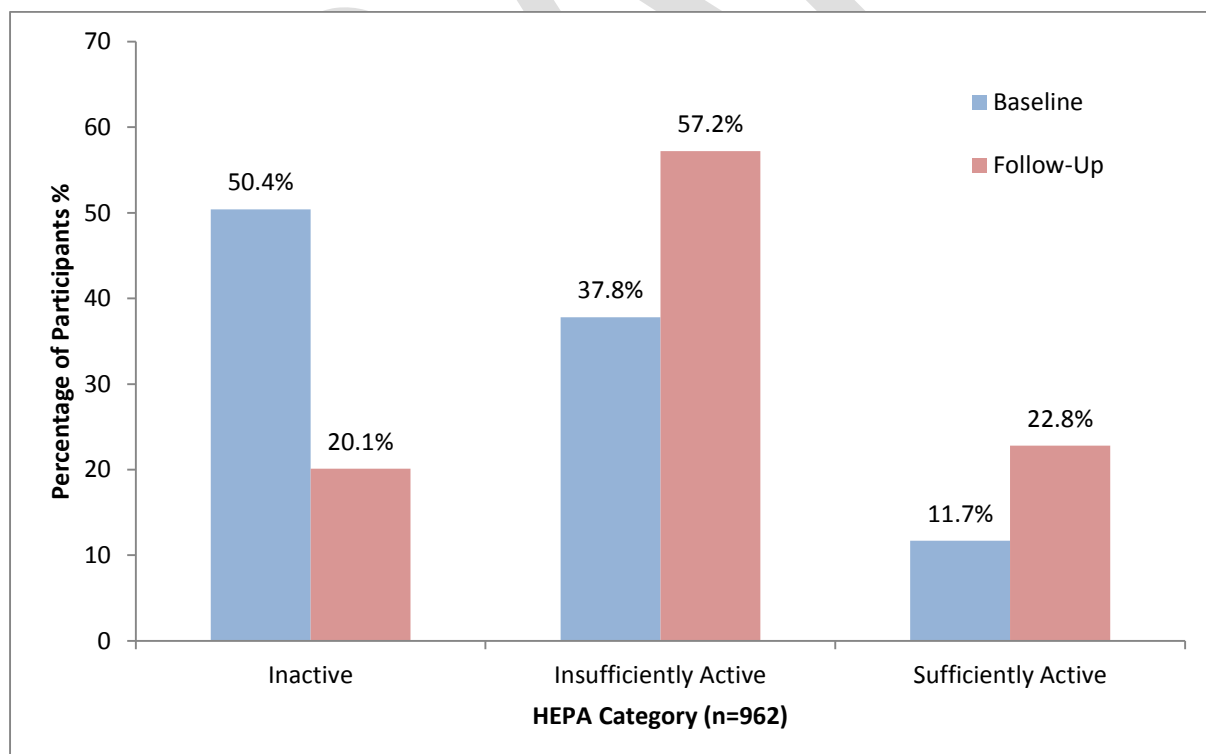
3.B.iv – IPAQ Per-Protocol MET-Minutes/Week: (IPAQ data– Q2-8 Appendix A)

In total, n=962 IPAQ Per-Protocol Adopters provided data on MET-minutes/week at baseline and follow-up, this is depicted in Figure 13. On average, IPAQ Per-Protocol participants were doing an additional 799 (±3,092.5) MET-minutes/week. These data indicated statistically significant improvements in total MET-minutes/week of physical activity from baseline (1,774, ±2,134.4) to follow-up (2,573, ±3,071.7), t [961] = -8.015, p<.001, r= 0.25. Participants also displayed significant improvements in vigorous activity (393 ±1,728.2 MET-minutes/week, p<.001), moderate activity (211 ±1,287.7 MET-minutes/week, p<.001) and walking (195 ±1,591.7 MET-minutes/week, p<.001). Analysing change by gender, females were achieving an additional 137 MET-minutes/week at follow-up, a statistically significant improvement compared to baseline (t [610] = -2.340, p<.05, r= 0.09). Further, males were achieving an additional 296 MET-minutes/week at follow-up, this change was also statistically significant (t [346] = -3.037, p<.05, r= 0.16).

Figure 13: Changes in mean IPAQ Per-Protocol Adopters MET-minutes/week
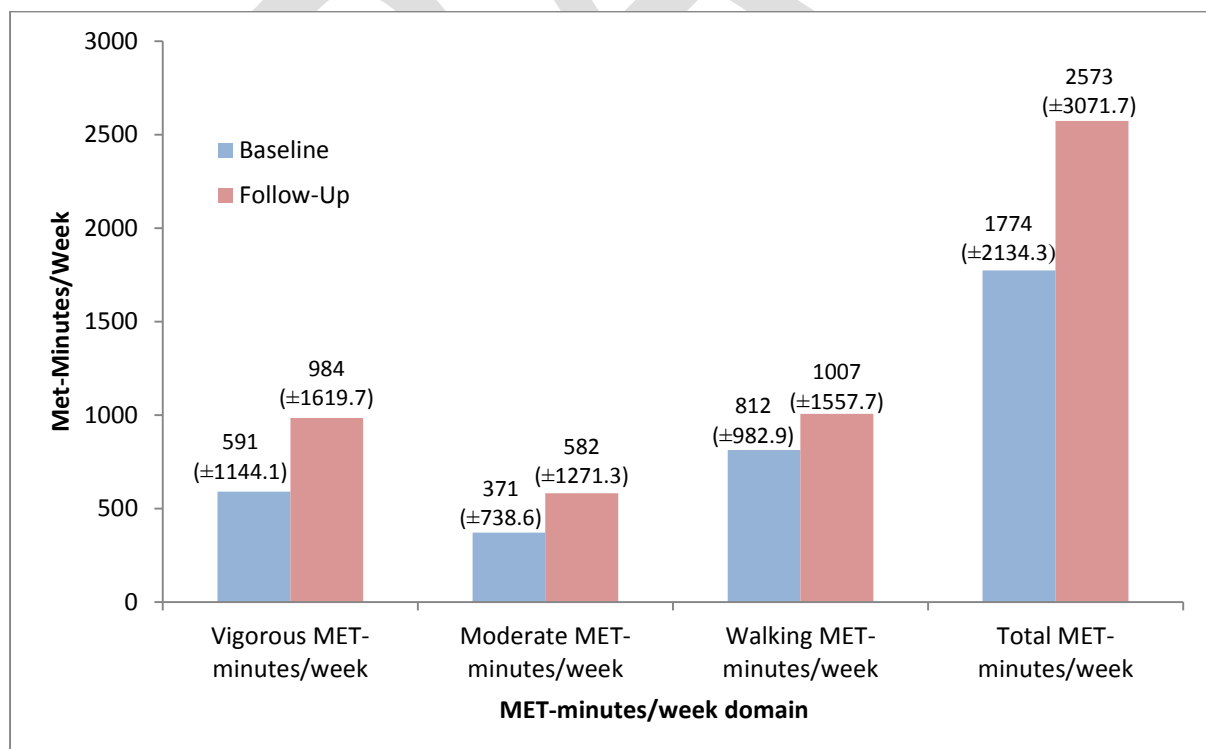
3.B.v – IPAQ Per-Protocol Physical Activity Category: (IPAQ data– Q2-8 Appendix A)

Using the IPAQ scoring protocol, participants were grouped in to three activity categories (Low, Medium and High). Altogether, n=962 IPAQ Per-Protocol Adopters provided data on IPAQ derived physical activity category at baseline and follow-up, these data are graphically depicted in Figure 14. At baseline, over 35% (n=341/962) of participants were in the low activity category, yet, this figure dropped to around 23% (n=223/962) at follow-up. Further, around 18% (n=176/962) were classified in the high activity category at baseline compared to almost 28% (n=226/962) at follow-up. Overall, data showed a statistically significant improvement in physical activity category, with a fair effect size, from baseline to follow-up (z= -7.544, p=<.001, r= 0.24).

Figure 14: Changes in IPAQ Per-Protocol Adopters Activity Category
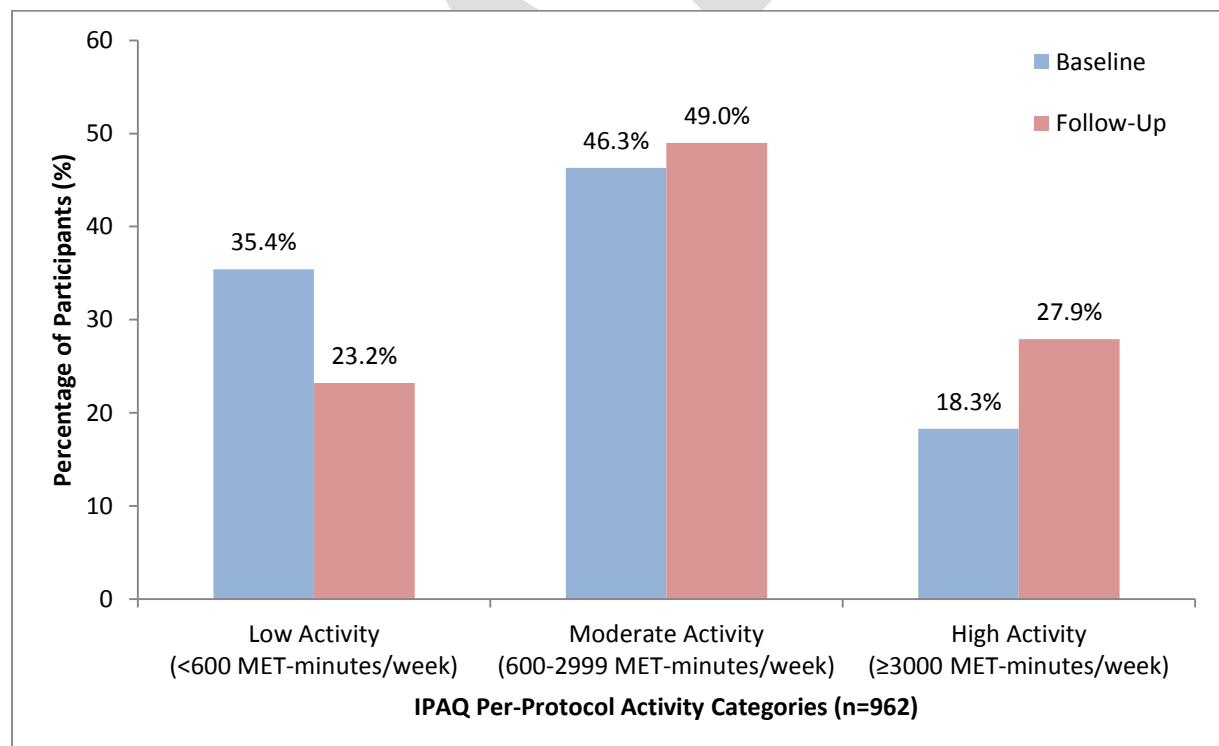
3.B.vi – IPAQ Per-Protocol SPeG: (IPAQ data – Q2-8 Appendix A)

In total n=962 IPAQ Per-Protocol Adopters provided data on days of physical activity undertaken per week at baseline and follow-up. Based on these scores, participants were categorised in to HEPA categories (see section 2: Evaluation Methodology). Figure 15 shows changes in HEPA categories for IPAQ Per-Protocol Adopters from baseline to follow-up. Based on data from IPAQ, it is clear that a greater proportion of participants are classed as sufficiently active compared to the single-item question (see 3.B.i). In total, 80% (n=128/160) of inactive IPAQ Per-Protocol Adopters improved their HEPA category and were no longer considered inactive at follow-up. Further, an additional n=118 participants were achieving the physical activity recommendations at follow-up. Also, HEPA categories were significantly improved from baseline to follow-up (z= -5.215, p<.001, r= 0.17). However, the effect size for improvement in HEAP category was considerably lower comparable to single-item measure scores. This suggests that the programme effect was influenced by the activity measure.

Figure 15: Changes in IPAQ Per-Protocol Adopters HEPA Category

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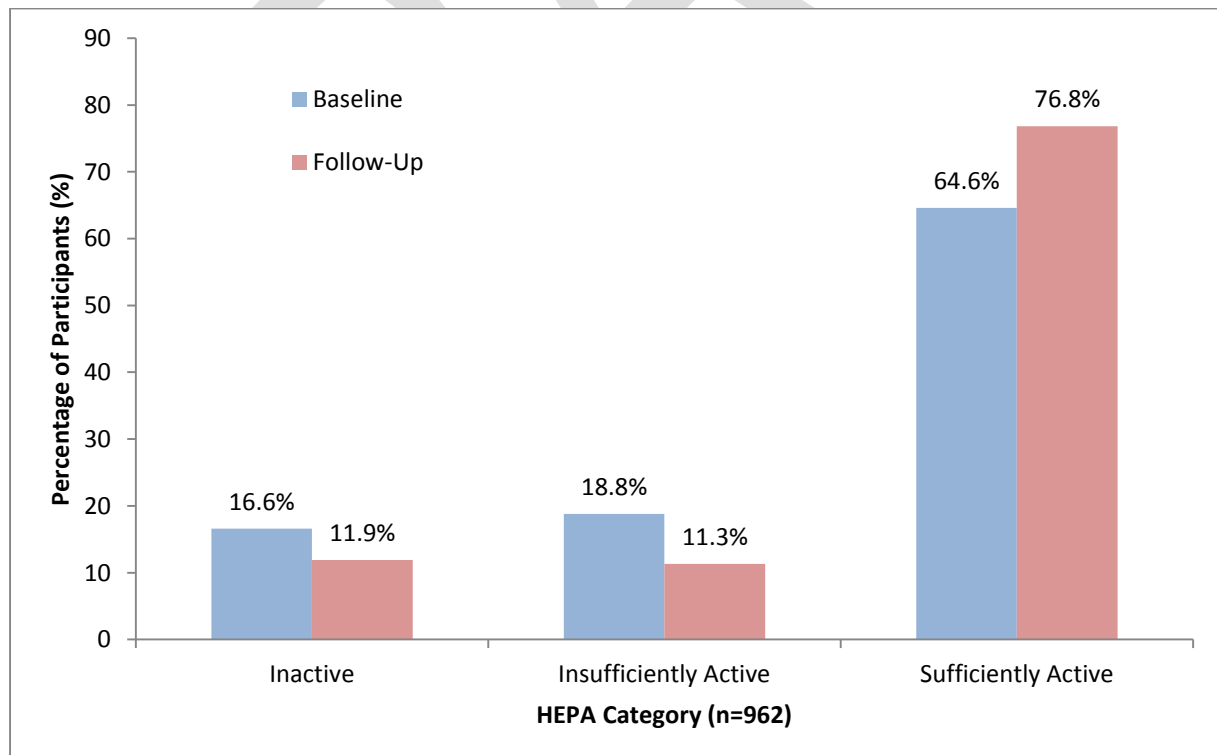
3.B.vii – IPAQ Per-Protocol Daily Sitting Time: (IPAQ Data – Q7 Appendix A)

Sitting quartiles used in the analysis of this data are the same as those calculated for IPAQ adopters (see section 3.A.ii.v). Data on sitting time was provided by n=957 IPAQ Per-Protocol Adopters and is graphically represented in figure 16. At follow-up, 44.6% (n=353/791) of participants had lowered their sitting quartile, however, simultaneously, 28.3% (n=183/646) of participants presented detrimental sitting quartiles. Moreover, sitting quartiles showed a statistically significant improvement, with a fair effect size, from baseline to follow-up (z= -6.944, p=<.001, r= 0.22). Further, there were statistically significant reductions in sitting time from baseline (296 minutes/weekday ±193.7) to follow-up (257 minutes/weekday ±211.7), t [956] = 5.275, p<.001, r= 0.17. This change represented a small effect, and on average; participants were sitting for around 39 minutes less per weekday at follow-up.

Figure 16: Changes in IPAQ Per-Protocol Adopters Sitting Category
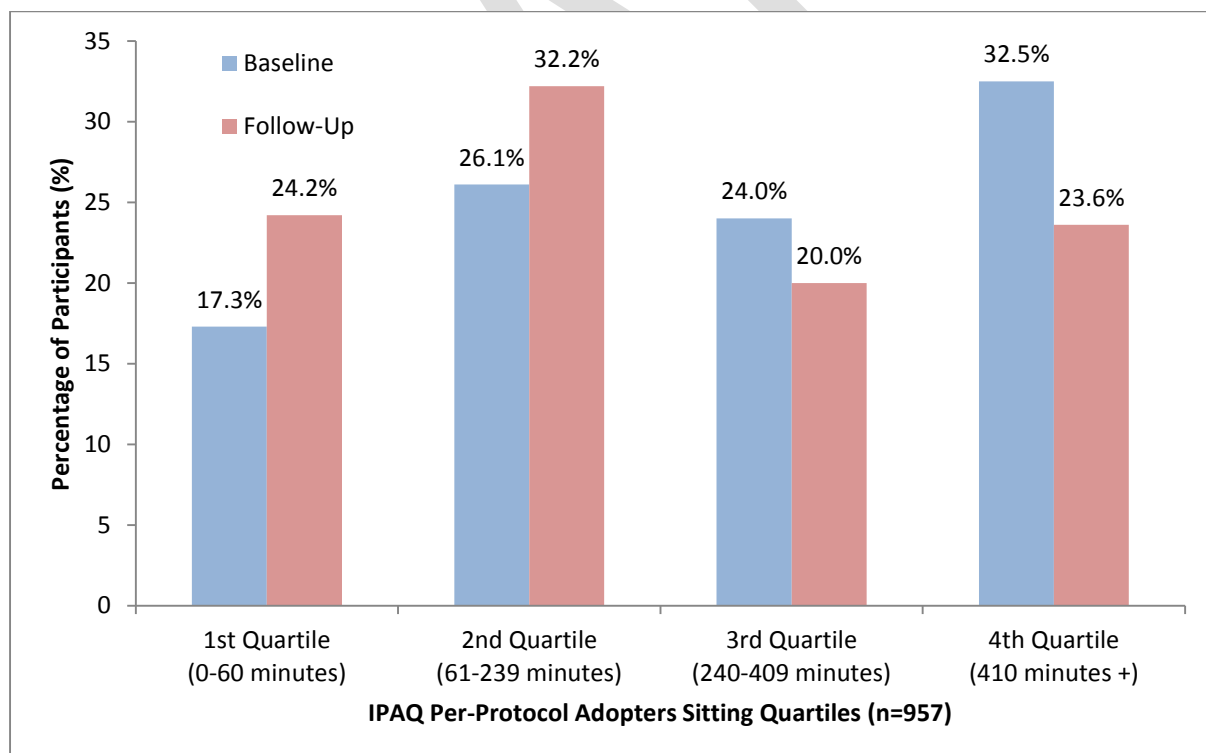
3.B.viii – IPAQ Per-Protocol Weekly Sport Participation: (Q 9-10: Appendix A)

In total, n=956 IPAQ Per-Protocol Adopters provided data on sports participation at baseline and follow-up, this is graphically depicted in Figure 17. In total, 34.8% (n=333/956) of participants were doing one day or more of sport per week at baseline compared to 49.3% at follow up (n=471/956). Further, there were 13.1% (n=125/956) of participants playing sport for three days or more per week at baseline compared to 20% (n=191/956) at follow up. These data indicated statistically significant increases in days of sport per week from baseline to follow-up, with a small effect size (t [955] = -7.037, $p<.001$, $r= 0.22$). On average, participants were doing an additional 5 (±63.9) minutes/week of sport at follow-up. Regarding gender, males showed a statistically significant improvement in days of sport from baseline to follow-up (t [343] = -4.442, $p<.001$, $r= -0.23$); males were doing an additional 6 minutes/week. Females also displayed a statistically significant improvement in days of sport from baseline to follow-up (t [607] = -5.433, $p<.001$, $r= -0.22$), females were doing an additional 4 minutes/week.

Figure 17: Changes in IPAQ Per-Protocol Adopters Sports Participation by Gender
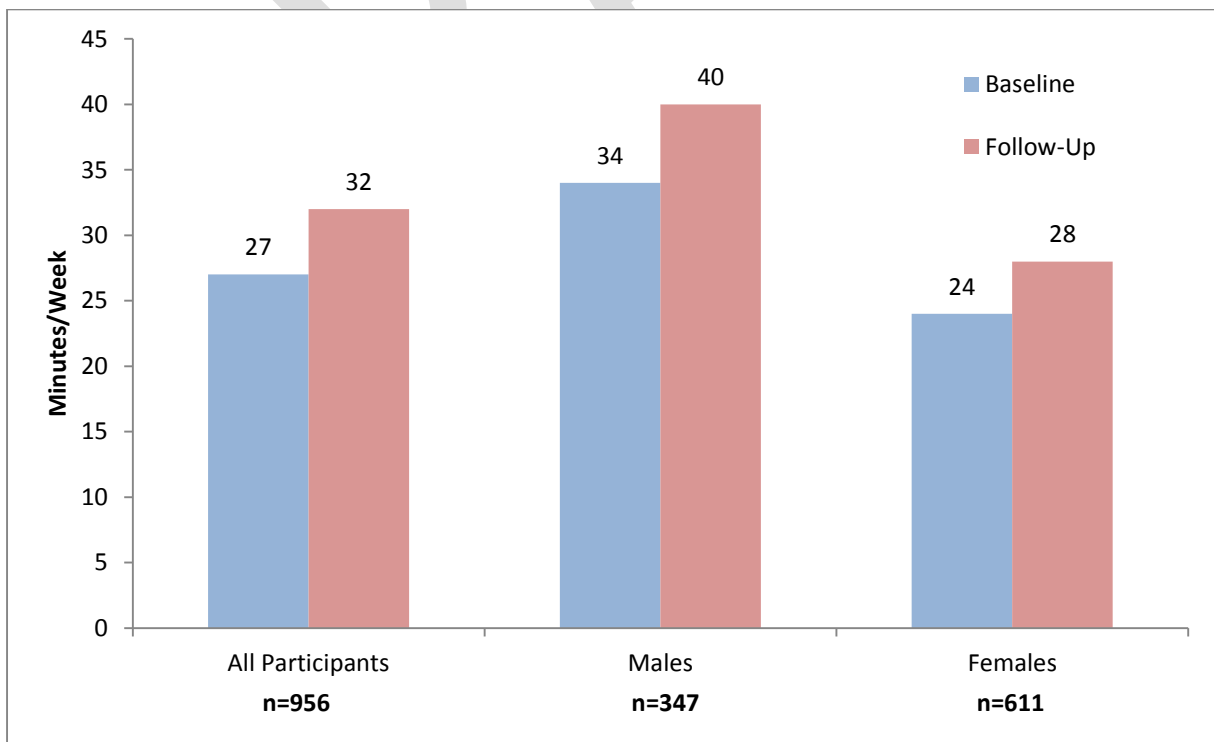
4: Interpretation and Conclusions

Findings from LLGA provide insight into the impact of a free swim and gym offer delivered in local leisure centres. Principally, this report underlines the need for physical activity within Leeds for people of all ages given the associated health outcomes and benefits for social care and health services. In addition, this report highlights the alarming prevalence of sedentary behaviour which is independently associated with all-cause mortality (4).

LLGA was tasked with increasing physical activity and sport among inactive residents in Leeds (i.e. those achieving ≤30 minutes of moderate physical activity/week). Determining the number of people who are in this category and subsequently move out of it is an on-going Public Health priority (4). LLGA recruited 64,340 participants, among this group a large proportion were classified as inactive (48%, n=18,107). Taken in isolation, these findings provide cause for concern. However, simultaneously, around 43% (n=16,267) of participants sat for at least five hours per day. This is significant as a growing epidemiological and physiological evidence base has underlined the adverse health implications that prolonged sedentary time may stimulate (16). Further, only 35% of participants played sport at least once each week.

However, after examining attendance at LLGA sessions, results revealed potential improvements in activity levels. Participants made 251,023 visits to LLGA sessions, over 135k of these were by inactive participants. Altogether, 6,888 inactive participants (<30 Minutes PA per week) attended at least one LLGA session. Further, there were 2,960 participants identified as inactive that attended a session at LLGA for at least four weeks since registering. Further, 75% attended their first session within one month of signing up, suggesting that this period is important for securing engagement.

Furthermore, data from IPAQ Per-Protocol participants (i.e. those providing baseline and follow-up data) confirms the positive change witnessed over the intervention period. Using the single-item measure as the primary metric of change, over 71% (n=345) of participants classified as inactive at baseline were on longer inactive at follow-up. Additionally, there were a further n=158 participants achieving the physical activity recommendations at follow-up. Data from IPAQ revealed that on average participants were doing an additional 799 MET-minutes/week at follow-up. This finding could have significant implications for health given

that every 1-MET increase in aerobic capacity is associated with a 13% and 15% reduction in all-cause mortality and cardiovascular events respectively (17, 18). In addition, over 44% of participants improved their sitting quartile, and there were statistically significant improvements in days of sport per week from baseline to follow-up.

However, findings from this work should be treated with caution as there are a number of limitations. The use of a non-probability sample may have limited the external validity. For instance, males were underrepresented accounting for 40% of the sample. Additionally, there were relatively few demographic markers which may in turn lower the generalizability and external validity. Further, both measures of physical activity rely on self-report, meaning that response bias may have caused some level of misclassification.

In conclusion, data from this report points towards the following:

- *The scale of LLGA is testament the potential impact of targeted activity programmes.*

- *LLGA engaged individuals from across the physical activity spectrum, including a considerable proportion who were inactive, insufficiently active for health and in need of additional physical activity opportunities.*

- *Participants revealed elevated levels of sedentary behaviour (i.e. sitting time) combined with low physical activity. Therefore, LLGA exhibits substantial public health potential as the greatest health benefits are often witnessed when positive change occurs among this group.*

- *The offer of free gym and swim sessions were appealing to many chronically inactive individuals. Of the quarter of a million LLGA visits, over half were made by inactive individuals.*

- *LLGA was effective at increasing physical activity levels and reducing sedentary behaviour among a sample of chronically inactive individuals.*

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Appendix A: Example Questionnaire

1. In the past week, on how many days have you done a total of 30 minutes or more of physical activity, which was enough to raise your breathing rate? This may include sport, exercise, and brisk walking or cycling for recreation or to get to and from places, but should not include housework or physical activity that may be part of your job?

___   **Days per week**

*We want to find out about the kinds of physical activities that people do in everyday life. The questions are about the time you spent being physically active in the **last 7 days**. Please answer each question even if you think of yourself as inactive. Please think about the activities you do at work, as part of your work around the house or garden, to travel from place to place, and in your spare time for fun, exercise or sport.*

*Think about all the **vigorous** things you did in the **last 7 days**. **Vigorous** physical activities take hard physical effort; they make you breathe much harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.*

2. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

___   **Days per week**   **OR**   ☐   Nothing vigorous ➡ ***Skip to Q3***

3. How much time did you usually spend doing **vigorous** physical activities on one of those days?

_____   **Hours per day**   _____   **minutes per day**   **OR**   ☐   ?/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities that take moderate physical effort and that make you breathe a bit harder than normal. Think only about activities that lasted at least 10 minutes at a time.

4. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads or bicycling at a regular pace? Do not include walking.

___   **Days per week**   ☐   none ➡ ***Skip to Q5***

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5. How much time did you usually spend doing **moderate** physical activities on one of those days?

___ **Hours per day**   ___ **minutes per day**   **OR** ☐ ?/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking as travel, and any other walking that you might do.

6. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

___ **Days per week** ➡ ☐ No walking   *Skip to Q7*

7. How much time did you usually spend **walking** on one of those days?

___ **Hours per day**   ___ **minutes per day**   **OR** ☐ ?/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

8. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

___ **Hours per day**   ___ **minutes per day**   **OR** ☐ ?/Not sure

Finally, I'd like you to think about any **Sport** that you have done in the **last 7 days.** By **Sport** we mean any competitive or non-competitive sporting activity. This can include planned exercise sessions such as running or jogging. Think only about those sports or exercises that you did for at least 10 minutes at a time.

9. During the last 7 days, on how many days did you take part in any **sport**?

_____ **Days per week**   ☐ No sport ➡ *Skip to end*

10. How much time did you usually spend doing sport on one of those days?

___ **Hours per day**   ___ **minutes per day**   **OR** ☐ ?/Not sure

This is the end of the questionnaire, thank you for participating.

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